Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

William N. Bailey

On Behalf Of:

Zinc Corporation of America

Author ID Number:

316bEFR.001

Comment ID 316bEFR.001.001

Author Name William N. Bailey
Organization Zinc Corporation of America

Subject Matter Code 3.05
Facilities not covered by today's proposal

It is ZCA's understanding that manufacturing facilities such as ours are not covered under the Phase II Rule, but may be covered under the upcoming Phase III Rule. This understanding is based language in the preamble and discussions with USEPA staff. Language in the proposed Phase II Rule preamble supports this understanding. For example, the following statement is made in preamble Section I.B., "Today's proposal would not apply to existing manufacturing facilities... ." 67 Fed. Reg. 17122, 17124. The preamble further states that ". . . certain existing manufacturing facilities. . . would not be subject this proposed rule . . ." 67 Fed. Reg. 17122, 17128. In addition, USEPA states in Section IV of the preamble, "Today's rule does not apply to facilities whose primary business activity is not power generation . . ." 67 Fed. Reg. 17122, 17135.

Although it does not appear to be the USEPA's intent to regulate non-utility manufacturing facilities the Phase II Rule, the proposed regulatory language is somewhat ambiguous. In order to clarify such ambiguity, ZCA requests that the USEPA modify the language of proposed 40 CFR 125.91(a)(2) to read as follows:

"Both generates and transmits electric power, or generates electric power but sells the majority of that power to another entity for transmission. A facility whose primary business activity is not power generation is not subject to this subpart."

ZCA further recommends a change to the last sentence of the first paragraph of Section IV of the preamble, 67 Fed. Reg. 17122, 17135. The new sentence would read as follows:

Today's rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by cogeneration or for use in its own manufacturing operations (i.e., the rule does not apply to facilities whose primary SIC code is not 4911).

Incorporation of such language will eliminate confusion over the status of manufacturing facilities, and clearly delineate which facilities are subject to the Phase II Rule.

EPA Response

See response to 316bEFR.050.002.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas W. Skinner

On Behalf Of:

Office Environmental Affairs; Office of Coastal Zone Management

Author ID Number:

316bEFR.002

Comment ID 316bEFR.002.001

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code SUP

General statement of support

In general, CZM is supportive of the proposal for reducing entrainment and impingement existing facilities with cooling water intake structures (CWIS) by 60-90%, supports compliance monitoring for verifying the efficacy of technological modifications to CWIS, and supports giving the Director or Regional Administrator authority to require more stringent regulations in areas where it is deemed necessary (e.g., estuaries).

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.002.002

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 10.02

Benefit Estimation Methodology

CZM does not support any proposal that ignores the value of entrained and impinged organisms to ecological networks (e.g., evaluation schemes where the impact to entrained and impinged organisms is measured relative to only their commercial or recreational dollar value)

EPA Response

EPA disagrees that its analysis "ignores the value of entrained and impinged organisms to ecological networks." Although EPA has not included quantitative estimates of nonuse values for the final 316b rule, due to unavoidable uncertainty in monetizing non-use values, the valulation methodologies explored by the Agency suggest the potential for significant values. These methods include meta-analysis of surface water valuation studies and a benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values, including meta-analysis and the benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.002.003

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

CZM does not recommend that EPA implement habitat restoration or restocking as mitigation for CWIS impacts unless long-term scientific analysis suggests that these methods are effective at replacing the ecological role and function of entrained and impinged organisms.

EPA Response

EPA agrees with the commenter that long-term scientific analysis suggesting that a restoration method is effective at replacing the ecological role and function of entrained and impinged organisms is a useful tool for determining whether or not a restoration measure is feasible.

The final rule allows permitting authorities to make decisions on the feasibility of restoration measures on a site-specific, case-by-case basis. All restoration measures must meet the requirements described in the final rule, including those under sections 125.94 and 125.95. Permitting authorities and permit applicants should consider the ability of a restoration measure to replace the ecological role and function of entrained and impinged organisms when evaluating a restoration measure's feasibility.

Comment ID 316bEFR.002.004

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

CZM does not support any form of trading of entrainment reduction credits.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.002.005

Subject Matter Code 1.0
Introduction

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM believes EPA regulation will be the best way to ensure that the greatest possible benefits to the environment are realized. CZM believes that this decision will be most effective when made by the Regional Administrators on a region-by-region basis.

EPA Response

Today's final rule has established national requirements, and gives State permitting authorities great discretion in implementing the rule.

Comment ID 316bEFR.002.006

Subject Matter Code 7.02
Performance standards

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

It is CZM's opinion that compliance monitoring should be required. CZM believes the Regional Administrator should reserve the right to reopen the permit to modify the permit conditions to require compliance with performance standards if the prescribed technology is not performing as expected.

EPA Response

EPA notes that with the exception of compliance alternative one (closed-cycle cooling), all compliance alternatives require verification monitoring to ensure adequate performance of the selected compliance options. The Technology Installation and Operation Plan (TIOP) allows a facility to select a suite of design and construction technologies, operational measures, and/or restoration measures and request that the implementation of the TIOP be considered compliance with today's rule. This option is available to the permittee with the approval of the Director.

Comment ID 316bEFR.002.007

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

CZM believes there is no evidence in this proposed rule (e.g., economic analysis) to validate EPA's belief that "it is appropriate to set a lower cost threshold in this rule to avoid economically impracticable impacts on energy prices, production costs, and energy production." A table of information such as Exhibit 3 on p. 103 would be helpful to identify if in fact the cost to existing facilities would be an unreasonable proportion of revenues. Furthermore, not all facilities would need to comply at the same time because existing permits will expire at different times. Therefore the impact to regional or nationwide prices of electricity should not be affected by individual facilities complying with a rule whose premise is that the BTA should not be wholly disproportionate to the costs EPA considered when proposing the rule.

EPA Response

For information regarding EPA's rejection of cooling towers, see the preamble to the final rule.

Comment ID 316bEFR.002.008

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

This will be affected by what costs are considered. For example, evaluating the commercial value of fish lost due to entrainment and impingement is not the same as enumerating the costs to successfully reintroduce those fish to the ecosystem. The latter might require creating viable habitat and could take a number of years, the costs of which would far outweigh a fish's economic value.

EPA Response

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E (DCN #6-0003).

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN # 6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.002.009

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

CZM recommends that additional information be required before a restoration measure alone, or in combination with control technologies and operational measures, is accepted by the Director. CZM requests that long-term site-specific data be collected, validated, and approved by the Director and appropriate Federal, State, and Tribal fish and wildlife management agencies before a restoration measure is accepted.

EPA Response

EPA believes the requirements for restoration measures described in the final rule under sections 125.94 and 125.95 allow permitting authorities the flexibility to request or conduct analyses appropriate to the nature of the restoration measures under consideration.

Comment ID 316bEFR.002.010

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

CZM cautions against comparisons between fish restocking programs and performance standards for reducing entrainment and impingement because of the difference in the life stages affected by each. Restocking programs usually focus on the reintroduction of juveniles or adults whereas technological methods that reduce entrainment enhance egg and larvae numbers. These various life stages have very different ecological roles and importance.

EPA Response

The Agency agrees with the commenter that eggs and larvae of aquatic organisms have a different ecological role and importance than juveniles and adults and that restocking programs tend to focus on reintroduction of juveniles and adults. The final rule addresses impacts to eggs and larvae as well as to juveniles and adults. For some facilities, restocking might be a viable restoration alternative.

All restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.002.011

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

CZM believes that in most cases compensatory mitigation has failed to completely replace or restore impacted wetlands (Brown and Veneman, 2001). CZM believes that a restoration or mitigation method must be shown to reproduce the ecological value that was lost in order for the method to be counted as having "substantially similar performance" as technological or operational measures that reduce entrainment or impingement. To date, no restoration or mitigation measures that CZM is aware of in New England have been shown to adequately replace the ecological role or value of organisms killed through entrainment and impingement in cooling water intake structures.

CZM would not be able to endorse any taking or loss of existing marine resources that is not mitigated by a minimum goal of one-to-one. CZM also questions the efficacy of restocking measures. Because the conditions under which restocking organisms are grown will never be able to replicate the psychosensory environment found outside a controlled aquaculture environment, CZM is not convinced that restocking will be able to replace functioning ecological units that are lost through impingement or entrainment. For example, organisms raised in a laboratory or in a cage in the "wild" will not be exposed to predators and may not develop appropriate predatory escape behaviors. Laboratory- or cage-raised organisms may also not develop foraging behaviors that are appropriate for survival under natural conditions. In addition, replacing functional ecological units with organisms that belong to a different ecological unit will not achieve the goals of attaining "substantially similar performance technological or operational constraints at the facility. For example, replacing fish larvae through entrainment with a number of "equivalent adults" does not replace the ecological role of the larvae as a link within a complex food and energy web.

As a case in point, in the Commonwealth of Massachusetts Entergy Nuclear Generation Co, owner of the Pilgrim Nuclear Power Station (PNPS) in Plymouth, has attempted to mitigate its entrainment impacts by introducing hatchery raised young-of-the-year winter flounder to Plymouth Harbor. The company has proceeded despite concerns from the Commonwealth Division of Marine Fisheries and CZM on the hatchery growing techniques and the inability of the company to verify that hatchery-raised flounder survive long enough to contribute to the population that the company is depleting through entrainment of flounder larvae. In addition to our concerns about the practice of replacing millions of entrained fish larvae and eggs with of thousands of individuals from a different life stage (i.e., young-of-the-year), CZM is concerned that the Proposed Rule would encourage reintroduction of hatchery raised fish when there is no evidence that these fish possess the genetic structure, feeding and avoidance behavior, reproductive capability, survivorship, or natal homing ability to replace the ecological function of the organisms entrained at PNPS.

CZM believes that habitat restoration may be more beneficial than direct restocking because properly restored habitat may serve as a nursery area, providing shelter and foraging area for juvenile organisms (and for additional organisms other than the ones entrained or impinged). However, CZM believes that habitat restoration in and of itself can not be considered a replacement to technological or operational measures that reduce impingement and entrainment if the habitat can not be shown to directly increase the abundance of organisms and life stages (in the ratio in which they were entrained and impinged) within the ecosystem or localized areas that the facility occupies. The introduction of stocked organisms without investigating population dynamics (e.g., source/sink dynamics) or available niche space and resource availability at the point of reintroduction will not serve the purposes of this Proposed Rule or Section 316 of Clean Water Act.

EPA Response

If a permit applicant wishes to utilize a particular restoration measure, they will need to demonstrate to the permitting authority that these approaches will meet the performance standard.

For a discussion of the permitting authority's role in determining the nature of a restoration measure that is necessary to meet the requirements of the final rule, see EPA's response to comment 316bEFR.060.026.

For a discussion of the requirement to examine design and construction technologies and operational measures before choosing to implement restoration measures, see EPA's responses to comments 316bEFR.033.005 and 316bEFR.202.029.

Comment ID 316bEFR.002.012

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

CZM in general supports habitat conversation, however, CZM does not believe that conservation of existing habitat will replace the ecological function of organisms that are entrained or impinged. As EPA has stated in the Proposed Rule, conserved habitat is already contributing to the relative productivity and diversity of an aquatic system, therefore conservation measures would not necessarily ensure a net benefit to the waterbody or watershed of concern. CZM maintains that reductions of entrainment and impingement through technological changes or reductions in flow are the most efficient means of reducing cooling water intake structure impacts.

EPA Response

Any restoration measure must meet all of the requirements in the final rule.

The final rule requires permit applicants who propose restoration projects to demonstrate to the permitting authority that they have sufficiently considered design and construction technology and operational options for their site. This will help ensure that all parties identify the most feasible means of addressing environmental impacts from cooling water intake structures.

Comment ID 316bEFR.002.013

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 12.02

RFC: Monitoring frequencies

CZM is concerned that this proposed monitoring scheme is not sufficient. For example, it is unclear from this document as to whether "biweekly" sampling means every two weeks or twice each week. CZM is concerned that these minimum sampling frequencies might be used not as the minimum amount of work needed to quantify entrainment and impingement, but as the required standard above which more sampling is not necessary. Without any explanation as to why frequencies were chosen, it is difficult to evaluate their merits.

Recently, EPA New England and the Commonwealth of Massachusetts Department of Environmental Protection have been requiring that existing power plants with CWIS monitor for impingement three times per week - often enough to capture at least one morning, one afternoon and one night sample. In addition, entrainment data must be collected three times per week (morning, afternoon, and night) every week from March to September and every two weeks in other months. These sampling periods cover times of spawning and recruitment for Representative Important Species (RIS) in such a way that impacts to the RIS can be determined without having to sample every day. Less frequent sampling would risk missing key impingement or entrainment events.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.002.014

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 10.02

Benefit Estimation Methodology

Valuing fish that are part of a commercial fishery in the manner suggested in option 1 fails to recognize that these fish and their eggs and larvae have an ecological role before they are caught. Likewise, the valuation presented in option 2 addresses only the value of fish to recreational fisherman. Option 3 provides a valuation scheme that focuses narrowly on how much citizens are willing to pay (e.g., an increase in their electric bill) to prevent impingement and entrainment. The value of entrained and impinged fish to an ecosystem will always be underestimated if only their transient commercial or recreational value is considered. In addition, many respondents to the suggested surveys may not recognize how the types entrained and impinged fish contribute to ecological integrity or socioeconomic prosperity.

All three of these options fail to address the larger quality of life issues associated with ability to see, catch, eat, or sell fish in or from one's own watershed. The health of fish populations is intimately linked with the communities surrounding a watershed. Activities as disparate as bird watching and bait dealing and commercial ventures as varied as gas stations or seafood restaurants, all depend upon adequate fish populations and help strengthen the tax and the well-being of local communities. These issues are not factored into a simple survey looking narrowly at the dollar value of fish deemed recreationally or commercially important. CZM recommends that such valuation schemes not be used to quantify the benefits that would occur if a facility were to comply with the performance standards in this Proposed Ru1e. A combination of the above methodologies may be useful as a relative measure of the benefits of several different options or level of compliance with the performance standards. CZM does not recommend using any one of the proposed methodologies by itself to evaluate the benefits of reducing entrainment and impingement.

EPA Response

EPA agrees that the value of entrained and impinged fish to an ecosystem is underestimated "if only their transient commercial or recreational value is considered." For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values for this rule. These methods include meta-analysis and the benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.002.015

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

CZM agrees with EPA that all estimates of entrainment and impingement mortality should be based upon scientific studies with quality assurance goals approved by local resource agencies and EPA. These studies should be conducted during times of high abundance of the organisms of interest, and at times when the facility is operating at full capacity, at times when biocides are in use, and at times that reflect current entrainment rates at the facility. In order for the results of these studies to be useful, it should be ensured that sample sizes are large enough to make inferences to the populations at large. Mortality rates for several different species within the ecosystem should be identified and sub-lethal effects after passing through the CWIS should be quantified for each of the RIS. CZM realizes that to accomplish all of these goals will be a large task and suggests that in the absence of the aforementioned data, 100% mortality of organisms should be assumed.

EPA Response

EPA agrees with this commenter. Designing studies to accurately determine whether entrainment survival occurs can be very difficult. At this point in time, it may even be impossible. In the interest of leaving the door open for the advancement of techniques to determine entrainment survival, today's final rule allows facilities to attempt to study this topic and use the results in their benefits assessments when seeking a site-specific entrainment requirements. However, the permitting authority must review and accept the study before the results may be incorporated into the benefits assessment. Permitting authorities also may want to see benefit analyses as a range with and without the incorporation of any entrainment survival estimates.

EPA encourages permitting authorities to use the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule, as a guide when reviewing these studies. In general, EPA believes that the studies it has reviewed are not acceptable and should not be incorporated in any benefits assessment. EPA's review of these studies has shown that while some individual organisms may be alive in some of the discharge samples, the proportion of the organisms that are alive in the samples is highly variable and unpredictable. In addition, the studies contain various sources of potential bias which case the estimated survival rates to be higher than the actual survival rates. If the permitting authority determines that the facility's study does not support a defensible and reliable prediction of entrainment survival, then EPA would encourage the permitting authority to reject the study for the site-specific benefit analysis.

Comment ID 316bEFR.002.016

Subject Matter Code 13.0

More Stringent Requirements

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM agrees that more stringent requirements than those that would be required based on the proposed performance standards in the rule (§ 125.94(b)), or based on the proposed site-specific determination of the best technology allowed under the rule (§ 125.94(c)), would be appropriate under the scenarios described above. CZM suggests that EPA evaluate the impact of multiple stressors, including multiple intakes within a waterbody, when evaluating demonstration studies.

EPA Response

EPA agrees with the commenter that cumulative stressors, including multiple intakes located in close proximity to each other, are of concern and should be considered when evaluating demonstration studies and permit requirements. Today's rule does not limit a State's authority to adopt more stringent requirements.

EPA notes that in considering a permit application, the Director must review the performance of the technologies implemented and require additional or different design and construction technologies, operational measures, and/or restoration measures, if needed, to meet the requirements of the rule. In addition, the Director may consider any other factors including chemical, water quality, and other anthropogenic stresses on the source waterbody and other factors in determining whether to impose more stringent conditions to comply with the requirements of the applicable State and Tribal law or other Federal law.

Please see response to comment 316bEFR.099.004.

Comment ID 316bEFR.002.017

Subject Matter Code 13.0

More Stringent Requirements

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM concurs that the Director should be allowed (and mandated) to require more stringent technologies so that the recovery of aquatic species is not delayed.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.002.018

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

The working definitions of "significant" and "population" are very important to the identification of any impacts in this scenario. CZM would like clarification on EPA's definition of "significant" numbers of organisms. Does "significant" represent a certain fraction of the estimated local population (e.g. 5%)? Or does it refer to a statistically significant difference from some established baseline. If the latter, this definition would be constrained by the ability to detect statistical differences, which itself is constrained by the sampling techniques. Statistically significant differences may be very difficult to determine given the wide variation in larval and egg abundances even on short temporal scales and the amount of effort required to attain representative samples. Because of the difficulty involved in establishing baselines especially where waterbodies have historically been impacted by CWIS and the difficulty collecting enough plankton samples to detect statistically significant changes, CZM recommends that "adverse environmental impact" be assumed whenever there is entrainment or impingement as a result of a CWIS.

While CZM agrees that the health of critical aquatic populations or ecosystems is the endpoint of interest (and not necessarily numbers of individuals lost), CZM is not convinced that adequate metrics of population or ecosystem health have been developed for waterbodies affected by CWIS in New England. This is a goal to which resource agencies should strive, but the science has not yet been developed that would make this option implementable in the near-term. Furthermore, CZM is not convinced that biotic health metrics can adequately account for the compensatory reserve required for populations or subpopulations to rebound from major declines associated with catastrophic events, long-term climate or habitat changes, fluctuations in predators, prey, or other resources.

CZM suggests that EPA use local populations (or subpopulations) to determine adverse environmental impacts. The current definition of adverse environmental impact (described on p. 188 of the Proposed Rule) allows a facility to decimate the local population of an organism (e.g., that portion of a larger population that resides within a given embayment or river segment) so long as this reduction does not affect the larger population. CZM does not believe that it is the intention of the Clean Water Act to allow power plants with CWIS to decimate local populations of organisms.

EPA Response

EPA has elected not to define "adverse environmental impact" or "significant". Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule. The definition of significant has been left to the discretion of the permit director. However, EPA would like to be clear that by significant, the agency is not referring to statistically significant.

Comment ID 316bEFR.002.019

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

UWAG contends that its recommended definition of "adverse impact" is scientifically sound and environmentally protective because it focuses on protecting populations or species and because it requires that the level of population protection be adequate to ensure protection of the integrity of the ecosystem (community structure and function). However, the UWAG definition would allow for the creation of metapopulations with local "sinks" (areas of net negative local population growth for certain species) around CWIS. As stated above, CZM is supportive of scientific approaches that protect subpopulations of organisms but feels that the UWAG proposal fails to recognize that holistic (i.e., inclusive of all sources of mortality) scientific approaches to determining long-term population or ecosystem health have not yet been developed or verified in New England and that the UWAG proposal does not differ from the site-by-site evaluation of CWIS that is currently being implemented under 316(b). Under the current system, determination of "adverse impact" is broad enough that it requires resource agencies to constantly redefine the term in each segment of a waterbody in which there is a CWIS. This has been proven to be neither expeditious nor cost-effective.

UWAG's protective decision criteria (e.g., Locational Criterion, Design Criterion Proportion of Flow or Volume Criterion, Percent Population Loss Criterion, No Significant Downward Trend Criterion; pp.190, 191) should be protective in many cases but will not be protective if a subpopulation is at such a low level that any entrainment or impingement at all may hinder recovery. The latter is likely the case for winter flounder in Mount Hope Bay. CZM opposes the proposed caveat that allows achieving only one of the UWAG criteria to demonstrate no risk of adverse environmental impact for a facility. CZM does however concur with UWAG that if population-based criteria are to be used, they should be applied independently to each RIS species, and each species should meet the criteria in order for the facility to demonstrate no risk of adverse environmental impact.

EPA Response

In today's final rule, EPA has elected not to define adverse environmental impact. EPA has rejected the UWAG, PSEG and "alternative" definitions of adverse environmental impact because they are too broad and dependent on proven damage on the community and population levels before controls on cooling water intake structures could be put in place as the best technology available. EPA does not view adverse environmental impact as limited to demonstrated community or population level effects. Damage on the community or population level is extremely difficult to quantify and attribute to a particular cooling water intake structure given the vast number of environmental factors which work concurrently on fisheries at that organizational level. In today's final rule, EPA seeks to simplify the section 316(b) determination process by requiring the reduction of impingement mortality and entrainment by a performance standard. These reductions will reduce stress on fish populations. Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.002.020

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM believes that EPA should not allow a previous 316(b) demonstration to be used for determining whether there is no adverse environmental impact unless the applicant can demonstrate, through scientific studies, that the waterbody of interest and the biota therein have not changed since the previous 316(b) demonstration. Increases in water quality and restoration of habitat can increase the number of organisms near a CWIS and can lead to increases in a facility's effects on a population or subpopulation where none was demonstrated in the past. On the other hand, decreasing water and habitat quality and diminishing populations in the area of a CWIS can also increase the impact of a CWIS if a facility impacts a larger and larger proportion of organisms as populations decline. For this reason, CZM believes that an applicant, after consultation with local resource agencies on the appropriate detection methods, demonstrate to the satisfaction of EPA and the local resource agencies that no change has occurred to the ecosystem in which the CWIS is located.

EPA Response

EPA agrees with the commenter and has not allowed the use of historical determinations of BTA in today's final rule. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.002.021

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

CZM would like clarification as to the definition of compliance. Does it mean that the CWIS upgrade (if this track is selected) has to be completed before a NPDES permit is issued? Or does it mean that some sort of construction plan with a timetable has to be in place?

EPA Response

For a discussion of how compliance is to be determined, please see EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. A facility will not have to complete upgrades to its cooling water intake structures prior to the issuance of its NPDES permit. For permits that expire within 4 years, EPA has allowed a facility to submit the required information in accordance with a schedule established by the Director. This information need not be incorporated into the permit application. For additional information on timing requirements please see EPA's response to comment 316bEFR.034.066.

Comment ID 316bEFR.002.022

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM agrees that this is a wise approach. CZM asks for clarification as to who will be responsible for investigating the cumulative impacts of multiple intakes in a given area? Would it be the permit applicant? The Regional EPA office? National Marine Fisheries Service?

EPA Response

The permitting authority should consider the cumulative impacts of multiple intakes in a watershed as part of its section 316(b) decision making process.

Comment ID 316bEFR.002.023

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 8.04

Proposed standards for tidal rivers and estuaries

CZM agrees with EPA that estuaries are especially sensitive to impacts from cooling water intakes and agrees that facilities with CWIS in estuaries should be held to the highest standards.

EPA Response

EPA agrees with the commenter.

Comment ID 316bEFR.002.024

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 7.02

Performance standards

One problem with this approach, recognized by EPA in its discussion of the Ohio River (p. 78) is that waters that will experience greater aquatic life as they are cleaned up or as impediments are removed, may experience greater entrainment and impingement impacts and the CWIS may no longer be considered BTA because EPA made the BTA determination at a time when fewer organisms were to be found in the source waterbody.

CZM would like clarification on EPA's proposed technology-based approach freshwater in rivers or streams (p. 85). How will EPA determine if a control technology is BTA if the technology has not yet been implemented at a specific site? Will it be possible to issue a temporary BTA determination contingent upon the performance of the technology at a specific site? Further, what if a technology is expected to reduce entrainment and impingement studies following construction and implementation show that the target reductions are not met? Can EPA rescind a BTA determination? Will another technology be required? What if the combined cost of having constructed and implemented both technologies is greater than expected environmental benefits?

EPA Response

EPA recognizes that improvement of impaired waters is a goal of the Clean Water Act and will continue to be achieved over time. EPA also acknowledges that improvements to water bodies are the result of concerted efforts involving numerous factors, the results of manifest themselves over time. NPDES permits are valid for five years to allow the permitting authority to revisit issues and circumstances that may not have been present during the previous permit issuance. Improvements in water quality is one such issue that can be addressed during a permit reissuance. EPA believes it is unlikely that a water body would experience such a dramatic and unforeseen improvement in water quality within the term of a 5-year permit as to warrant a revised BTA determination.

EPA does not believe that a technology must be tested in situ in order to make a BTA determination for the facility in question. Sufficient data exist about several technologies and operational modifications to enable permitting authorities and facilities to select the optimal configuration meet the performance standards for the facility in question.

Because compliance monitoring occurs over several years, a temporary BTA determination is unnecessary. Insufficient performance of a technology or operational modification cannot usually be determined without several years worth of data. Thus, a decision whether it is necessary to modify a BTA determination would likely be made during the next permit reissuance rather than a mid-cycle revocation of BTA. In addition, today's regulation authorizes the permit writer to make site-specific determinations of BTA, taking into account cost-cost or cost-benefit considerations. Please see the preamble to today's rule for additional discussion.

Comment ID 316bEFR.002.025

Subject Matter Code 7.02

Performance standards

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM would like clarification on this statement. Is EPA implying that it would prefer a lower reduction in entrainment and impingement (and therefore more organisms passing through the facility) when there is the risk that "fragile" organisms could be killed by a barrier mechanism? CZM questions why EPA is proposing the least amount of reduction in entrainment and impingement rates when the organisms of interest are most sensitive.

EPA Response

EPA does not believe that the presence of fragile organisms warrants a lower performance standard for either entrainment or impingement mortality. Today's rule adopts ranges for the performance standards to maintain the desired flexibility for facilities to determine the most appropriate and cost-effective means of meeting the requirements. EPA notes that care must be taken when developing an impingement mortality and/or entrainment reduction strategy to prevent unintended losses that may result from the final action. Fragile species, while they may require a more focused effort on the part of the facility, are not subject to less stringent requirements.

Comment ID 316bEFR.002.026

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 7.02

Performance standards

CZM notes that it is not mentioned in this section that a reduction in flows could be counted as BTA. EPA has previously mentioned in this document that flow is directly related to entrainment and impingement but does not specifically include reductions in flow with existing or with additional CWIS upgrades as BTA. But “EPA believes that many facilities achieve further reductions (estimated at 15-30 percent) in impingement mortality) entrainment by providing for seasonal flow restrictions, variable speed pumps, and operational measures and innovative flow reduction alternatives” (p. 90).

EPA Response

EPA recognizes the potential reductions that can be achieved by reducing the overall intake flow to a facility. However, because of the increased cost associated with adopting a reduced flow (most likely the installation of some sort of closed-cycle system), EPA acknowledges the unlikelihood that many Phase II facilities would opt for flow reduction to meet the requirements of the final rule. This does not preclude any facility from selecting this option, either alone or in concert with other technologies or operational modifications, to satisfy the requirements of the final rule.

EPA has not predetermined any technology to be BTA for all facilities. Instead, EPA has opted left the determination of the means of compliance up to the facility and the responsible permitting authority.

Comment ID 316bEFR.002.027

Subject Matter Code 10.1

General: cost tests

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM believes that allowing facilities the option for site-specific determination of BTA by establishing that the facility's costs are exceptionally high or the benefits are exceptionally low, depends upon such relative terms that a facility will always tend to overestimate the costs of reducing entrainment and impingement (e g, by including production value lost while installing technological upgrades). In addition, calculating the benefit to a population or ecosystem may also be subjective, especially if the current quality of the receiving waters, and the abundance the biota in these waters, have been affected by historical activities of the facility.

EPA Response

The only example given for how a facility might overestimate costs in a site-specific determination is not a valid example of an "overestimate" of costs, in the Agency's opinion. In fact, the Agency views valuating foregone electricity production due to a construction downtime for installing technology to comply with this rule to be a valid economic practice.

EPA agrees that current impacts will depend, in part, on the effects of historical conditions on current abundances of organisms in the vicinity of an intake. Historical conditions include whatever impacts the plant may have had in the past, as well as the effects of other potential stressors, including water quality. However, EPA believes it can be extremely difficult to detect effects at the population or ecosystem level without knowledge of the population or ecosystem before and after an impact at both control and impact sites (see Schmitt and Osenberg, "Detecting Ecological Impacts," Docket #2-019A-R21). This is a major reason that EPA has focused its analysis directly on impingement and entrainment, rather than attempting to determine the magnitude of potential population or ecosystem impacts.

See Sections V and IX of the preamble for a site-specific determination of best technology available for minimizing adverse environmental impact. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.002.028

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

CZM believes that flow reductions at facilities with limited capacity utilization should be addressed during periods when eggs or larval organisms are in the water in the vicinity of the CWIS. Flow reductions (and therefore entrainment reductions) should not be assumed to have occurred merely because a facility operates only 15% of the time on an annual basis. Biologically and ecologically what is most important is the frequency of the facility's open during the time period when spawning and early development is occurring. CZM is opposed to allowing facilities with limited capacity utilization to be categorically accepted as in compliance with the rule requiring 60-90% reduction in entrainment.

EPA Response

See response to comment 316b.EFR.330.032.

Comment ID 316bEFR.002.029

Subject Matter Code 17.01

RFC: Other proposed provisions

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

CZM opposes allowing facilities to request alternatives that are less stringent than those specified in the Proposed Rule, even if the facility believes compliance would result in significant adverse impacts on local energy markets. CZM believes that there are enough energy generating facilities in New England that significant adverse impacts would not occur to the local energy market as a result of compliance with the Proposed Rule (e.g., in Massachusetts alone there are several generating facilities that operate only during the highest peak generating times. In the summer of 2001 energy was limited more by transportation mechanisms than by generation).

EPA Response

Under this final rule, EPA has established national performance standards for the reduction of impingement mortality and, when appropriate, entrainment (see § 125.94). The performance standards consist of ranges of reductions in impingement mortality and/or entrainment (e.g., reduce impingement mortality by 80 to 95 percent and/or entrainment by 60 to 90 percent). These performance standards reflect the best technology available for minimizing adverse environmental impacts determined on a national categorical basis. EPA believes that a national standard will result in the most effective reduction in impingement and entrainment. Recognizing that site-specific conditions can influence the choice of technologies to meet the performance standards, EPA has also codified several alternatives for complying with the rule's requirements.

Today's rule also preserves each State's right to adopt or enforce more stringent requirements.

Comment ID 316bEFR.002.030

Subject Matter Code 18.03.02

Sample site-specific rule

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

As stated previously, CZM feels it is premature to allow energy-generating facilities to mitigate adverse environmental impacts with fish stocking or any other voluntary restoration measures until these measures can be proven to be effective at reconstructing the ecological networks (e.g., trophic webs, energy webs) that were disrupted by the facilities. Evaluation of these restoration measures should be conducted by an agency, university, or contractor that is independent of the facility.

One flaw with determining BTA on a site-specific basis is that the biological "baseline" that will be determined as part of this demonstration will by definition not be a baseline of the biological or ecological integrity of the receiving water without the plant in operation. Any baseline data collected will have inherent in it the effects of the operation of the plant. While these data may be useful to future decisions about the operation of the plant, they will not allow a determination of full magnitude of the plant's effect on the receiving waters and the biota therein.

EPA Response

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

For a discussion of the calculation baseline, please refer to the preamble to today's rule.

Comment ID 316bEFR.002.031

Author Name Thomas W. Skinner

Organization Office Environmental Affairs; Office of Coastal Zone Management

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

CZM is strongly opposed to establishing a trading program for entrainment reduction credits. Our chief concern arises from the spatial heterogeneity of watersheds and the risk of allowing continued impacts in areas of a watershed that are the most sensitive to CWIS impacts. CZM believes that a trading program is a disincentive for facilities with CWIS to achieve maximum reduction in entrainment required under the Proposed Rule. Further, allowing facilities to trade across waterbodies that share similar ecological characteristics, regardless of the relative geographic proximity of the facilities to each other (as on p.224) would allow for consolidation of high impact areas, most likely in lower socioeconomic areas. Such a strategy not only ignores the ecological importance of young life stages across all waterbodies, but also raises environmental justice issues.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule, comment 316bEFR.077.051 regarding the spatial scale of trading and comment 316bEFR.077.052 regarding the appropriate units of trading.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

David E. Tomlinson

On Behalf Of:

Bethlehem Steel Corporation

Author ID Number:

316bEFR.003

Comment ID 316bEFR.003.001

Subject Matter Code 3.05

Facilities not covered by today's proposal

Author Name David E. Tomlinson

Organization Bethlehem Steel Corporation

Four conditions, all of which must apply, define a "Phase II Existing Facility" subject to proposed Subpart J. Condition 2 is that the facility "both generates and transmits electric power, or generates electric power but sells it to another entity for transmission." [Subpart J, §125.91, page 17220] A strict and literal reading of this condition could draw Bethlehem's power generating units operating as an integral part of iron and steel manufacturing sites into the Phase II requirements. At both of Bethlehem's integrated steel plants, the power generating units are used primarily to generate electricity for on-site consumption. The energy transmitted to another entity is de minimis compared to that generated. At one plant, because of contractual arrangements, some power is exported to the local utility, but the total annual integrated demand (purchased electricity plus internally generated electricity) greatly exceeds the amount of electricity that is fed back to the local public utility. At the other plant, power is "sold" into the grid but a greater amount is purchased back at lower rates, the site is a net consumer of electricity, not a net producer.

Power generating units operating as an integral part of iron and steelmaking (SIC 3312/NAICS 3311 and 3312) facilities should be administratively removed from the Phase II rule because the agency clearly intended that iron and steel facilities will be covered in Phase III. This was discussed at various points in the preamble.

Among these, EPA has established effluent limitations guidelines that apply to most of the industry categories that use cooling water intake structures (e.g., steam electric power generation, iron and steel manufacturing, pulp and paper manufacturing, petroleum refining, chemical manufacturing. [preamble Section I.C.1, page 17125]

Existing facilities with design flows below the 50 MGD threshold, as well as certain existing manufacturing facilities, and offshore and coastal oil and gas extraction facilities, would not be subject to this proposed rule, but will be addressed in Phase III. [preamble Section 11, page 17128]

Existing power generating facilities with design flows below this threshold [50 MGD], as well as certain existing manufacturing facilities, and offshore and coastal oil and gas extraction facilities, would not be subject to the proposed rule, but will be addressed under the Phase III rule. [preamble Section II.E, page 17130]

Five questionnaires were distributed to different industrial groups. They were: (1) Detailed Industry Questionnaire: Phase II Cooling Water Intake Structures – Traditional Steam Electric Utilities, (2) Short Technical Industry Questionnaire: Phase II Cooling Water Intake Structures – Traditional Steam Electric Utilities, (3) Detailed Industry Questionnaire: Phase II Cooling Water Intake Structures – Steam Electric Nonutility Power Producers, (4) Detailed Industry Questionnaire: Phase II Cooling Water Intake Structures – Manufacturers, (5) Watershed Case Study Short Questionnaire. [preamble, Section III.B., page 17134]

All of the above citations from the preamble to the proposed rules clearly show that the agency does not intend to have the Phase II regulations apply to the iron and steel industry. In addition, the data collection questionnaires sent by the agency prior to the rule proposal emphasized the distinction that was made between non-utilities and manufacturers such as the iron and steel industry, which is one of the four major industrial categories considered.

Having the power generation units located on a steel plant site subject to Phase II regulations and the other, traditional iron and steelmaking operations subject to the future Phase III regulations would result in a regulatory morass. At both of the integrated steelmaking facilities operated by Bethlehem, the power generation and steelmaking units share a common intake. To the extent that the Phase III requirements are different from Phase II, it will be difficult for permit writers to equitably apply a set of permit requirements.

Bethlehem's concern could easily be resolved if proposed §125.91 is amended to read:

(a)This subpart applies to an existing facility, as defined in §125.93, if it:

(1)Is a point source that uses or proposes to use a cooling water intake structure;

(2)Both generated and transmits electric power, or generates electric power but sells it to another entity for transmission (except for large industrial complexes whose total integrated demand exceeds the amount of electricity fed back to the local utility on an annual basis or exceeds the capability of its generating units) [new language is underlined]

(3)…

EPA Response

See response to 316bEFR.050.002.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Russell G. Olivier

On Behalf Of:

IMC Phosphates Company

Author ID Number:

316bEFR.004

Comment ID 316bEFR.004.001

Author Name Russell G. Olivier

Organization IMC Phosphates Company

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

IMC questions the need for intake protection in excess of traveling screens along the lower Mississippi River.

Based on site-specific experience, IMC questions the need for biota protections (in excess of those provided by existing traveling screens) for cooling water intakes along the lower Mississippi River.

IMC's traveling screens have been cleared twice per day essentially every day for the past 35 years. Interviews with employees involved with screen cleaning activities reveal that there is very rarely evidence of fish, shellfish or other biota in the screens. For example, one of our operators responsible for this activity does not recall having seen evidence of any fish, shellfish or other biota in the screens for at least the past year. In discussions with our other operators, they report (for the period of record) a total of no more than 20 incidences per year of finding a fish or shellfish in the traveling screen.

Additionally, IMC has strainers (5/16" x 5/16" openings) in service inside the operating units on this water system. These strainers are back-washed as needed several times per week. Evidence of biota on these strainers also indicates no marine life forms are entering the water supply, passing through the traveling screens.

EPA Response

EPA disagrees that all intakes in the lower Mississippi River should not be subject to additional requirements. Facilities withdrawing greater than 5% of the mean annual flow from freshwater rivers and streams (and having a capacity utilization rate greater than 15%) are required to meet both impingement and entrainment requirements. The withdrawal threshold is based on the concept that absent any other controls, withdrawal of a unit volume of water from a waterbody will result in the entrainment of an equivalent unit of aquatic life (such as eggs and larval organisms) suspended in that volume of the water column. EPA discussed these concepts in more detail and invited comment on the use of this threshold and supporting documents in its NODA for the New Facility Rule (66 FR 28863). EPA believes that a 5% mean annual flow requirement for freshwater rivers and streams achieves an acceptable level of protection for the source water while remaining economically and practicably reasonable for existing facilities.

EPA notes that a facility on the Mississippi River is unlikely to withdraw more than 5% of the mean annual flow. Therefore, the facility would be likely be subject to impingement requirements only. Such a facility could elect to demonstrate that the current intake configuration meets the applicable performance standards, as described under § 125.94(a)(2) or could opt to seek a site-specific determination of best technology available, as described under § 125.94(a)(5).

Comment ID 316bEFR.004.002

Author Name Russell G. Olivier

Organization IMC Phosphates Company

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

IMC respectfully suggests that the data collected from the Ohio River (from which Mississippi River effects were projected) may not have been fully applicable to the Mississippi River. In reviewing data presented in section IX.E.2 of the proposed rule, it appears that the study assumes that more than 97% of the fish and shellfish killed in cooling water intakes would eventually be caught by commercial fishing, thus relating directly to that much "lost fishery yield". IMC respectfully suggests that this is not the case for the small amount of biota entrapped in our screens. First, the biota are almost always species which are not fished commercially, but are instead forage creatures which are fed upon by larger biota. We respectfully suggest that essentially all of the small number of biota entrapped and killed in IMC's traveling screens are promptly consumed by other biota in the river. In other words, these creatures become part of the food chain just as they would if they had not become entrapped in the screens.

Second, even if the entrapped biota are species which are fished commercially, it is extremely unlikely that more than 97% of those individuals would be netted by commercial fishermen. It would seem more likely that the vast majority would be consumed by other biota and/or would live their life cycle without being caught by commercial fishermen.

For these reasons, IMC respectfully suggests that the projected current impact of traveling screens on fishery yields along the lower Mississippi River is exaggerated in the proposed regulation, and consequently the projected positive impacts of additional controls are similarly exaggerated. To address these concerns, IMC proposes the following:

-If a relatively large number of facilities affected by these proposed regulations are located on the lower Mississippi River, IMC proposes that EPA conduct a supplemental study specifically to project effects of the cooling water intakes present along the lower Mississippi River. IMC is confident that such a study will conclude that traveling screen technology of the type in use at IMC is sufficient to protect biota along this stretch of the Mississippi River.

-If the number of affected facilities on the lower Mississippi River is relatively small, we request that the final rule allow for individual facilities such as ours to provide site-specific data to the regulatory agencies quantifying fish, shellfish and other biota trapped in our traveling screens over the course of a year (or over some other significant time period). Based on that data, site-specific water intake provisions could be written into NPDES permits, if appropriate, to protect biota from the specific intake structures.

EPA Response

EPA's analysis did not assume that "97% of the fish and shellfish killed in cooling water intakes would eventually be caught by commercial fishing, thus relating directly to that much 'lost fishery yield'." EPA's yield calculations take into account rates of fishing mortality, which are typically 20% or less. The commenter is referred to Chapter A5 of Part A of the Phase II Regional Study Document.

EPA recognizes that Mississippi River I&E rates may not be identical to Ohio River rates. However, the intention of EPA's analysis was not to develop facility- or river-specific estimates of I&E, but rather to develop an estimate of the relative magnitude of I&E for the entire Inland region.

For a national estimate, similarities include the fact that both are large river systems, have large human populations residing near them, who have multiple uses for the river.

Facilities will have the opportunity to present relevant site-specific information during the permitting process.

Comment ID 316bEFR.004.003

Author Name Russell G. Olivier

Organization IMC Phosphates Company

Subject Matter Code 21.03

Monitoring requirements

IMC questions the need for on-going monitoring after Best Available Control Technology has been installed.

The proposed regulations seem to indicate that on-going monitoring may or will be required after Best Available Control Technology has been installed. IMC respectfully suggests that once a facility and the regulating agency have agreed upon what constitutes Best Available Control Technology and have agreed to a maintenance schedule for that technology, on-going monitoring is not necessary and will only add to the permitee's paper-work compliance burden. We suggest that on-going monitoring not be required after installation of BAT.

EPA Response

Please see EPA's response to comment 316bEFR.021.007.

Comment ID 316bEFR.004.004

Author Name Russell G. Olivier

Organization IMC Phosphates Company

Subject Matter Code 7.01.03

Option 3--Site-specific determination

IMC requests maximum flexibility in the regulations.

As currently written, the proposed regulations are quite flexible in most areas. This is good, because the regulations are proposing to address intakes associated with a great many types of water bodies in a great many geographic regions. IMC requests that all existing flexibility in the regulations be maintained, and that supplemental flexibility be added, wherever possible. In particular, we request that the administrative authority which issues NPDES permits be given full authority to determine Best Available Control Technology for facilities under its jurisdiction based on cost/benefit analyses and site-specific information such as the data presented earlier in this document.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Robert N. Stavins

On Behalf Of:

John F.Kennedy School of Government, Harvard University

Author ID Number:

316bEFR.005

Comment ID 316bEFR.005.001

Subject Matter Code OPP

General Statement of Opposition

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

In numerous important respects, the economic analysis offered by EPA in support of the rule is severely flawed, biased, and misleading. Indeed, some of the methodologies employed are neither recommended nor endorsed by EPA's own Guidelines for Preparing Economic Analyses or by the U.S. Office of Management and Budget's guidelines under Executive Order 12866. <FN 2>

In the late 1990s, a dedicated team of EPA economists, economic analysts, and others produced EPA's revised Guidelines for Preparing Economic Analyses, published in September of 2000. <FN 3> But the economic analysis that EPA has prepared to support the proposed rule under Section 316(b) is — in very important dimensions — inconsistent with those Guidelines. In my view, the serious problems I identify could not have occurred had the proposed rule and its economic analysis been subjected to wide internal review by EPA's economics staff. This is particularly striking because EPA's leadership recognizes the importance of having at their disposal the best scientific and economic analysis for this and all other rules. <FN 4> In this spirit, I sincerely hope my comments will help foster the execution of a sound economic analysis and the development of an environmentally and economically sensible rule for implementation of Section 316(b) of the Clean Water Act.

Footnotes

2 U.S. Environmental Protection Agency. Guidelines for Preparing Economic Analyses. Office of the Administrator, EPA 240-R-00-003. Washington, D.C., September 2000. U.S. Office of Management and Budget. Economic Analysis of Federal Regulations Under Executive Order 12866. Washington, D.C., January 1996.

3 In its review of EPA's Guidelines for Preparing Economic Analyses, the Science Advisory Board summarized its findings as follows: "... the Committee's general conclusion is that the Guidelines succeed in reflecting methods and practices that enjoy widespread acceptance in the environmental economics profession. Although some concerns remain about particular parts of the Guidelines, our overall assessment is that the Guidelines are excellent. It is our hope that the Guidelines demonstrate EPA's commitment to credible and consistent economic analyses in support of the policy process" (U.S. Environmental Protection Agency 2000, Appendix A, page 1, Letter to Administrator Carol Browner, signed by Dr. Joan Daisey, Chair, Science Advisory Board, and Dr. Robert N. Stavins, Chair, Environmental Economics Advisory Committee).

4 On July 12, 2002, EPA Administrator Christine Todd Whitman sent a memorandum to all EPA employees on the subject of "Strengthening Economic Analysis at the Environmental Protection Agency." In the memorandum, the Administrator announced that the Associate Administrator of the Office of Policy, Economics, and Innovation [OPEI] will henceforth serve as EPA's Economics Advisor to "help strengthen the analytic foundation of the Agency's decision making process." The second in a list of specific directives in the Administrator's memorandum is the establishment of "a system through which OPEI economists will review program office analyses to ensure compliance with EPA's Guidelines for Preparing Economic Analyses."

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.005.002

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Before turning to my comments, I wish to emphasize the great importance of the proposed 316(b) rule and the analysis used by EPA to support it. According to EPA's calculations, 550 facilities nation-wide will be subject to the Phase II rule, representing 13 percent of the total number of facilities generating electricity for the market (Economic Analysis, page A2-3). This statistic greatly understates, however, the significance of the proposed rule's impact, because this same set of facilities provides fully 48 percent of nation-wide electric generating capacity and 56% of net generation (Economic Analysis, page A2-3). Hence, the impacts of the proposed rule will be widespread and exceptionally important. Given the prominence of the proposed rule, the analytical methods employed in its support are especially critical. Generic methodologies employed in support of the proposed rule, such as those used for estimating benefits and costs, may well be employed for other rules in the future. EPA should take the time to do it right in this important rule.

EPA Response

EPA acknowledges the importance that the facilities subject to the Phase II rule have in the electricity market. As documented in the preamble and the supporting documents, EPA modified a number of assumptions and methodologies in response to comments submitted on the proposed rule and the Notice of Data Availability. Many of the models and methodologies used by EPA are widely accepted and have been peer-reviewed and OMB-approved. EPA therefore asserts that it "did it right."

Comment ID 316bEFR.005.003

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02

Benefit Estimation Methodology

In this introductory overview, I highlight the major issues that arise in EPA's proposed rule and the economic analysis which stands behind it. The most egregious errors in the analysis occur in the use of an avoided-cost method to calculate major elements of the rule's "benefits," including indirect and non-use values. Pleading constraints of time and money, EPA did not employ well-accepted and appropriate economic methods. Instead it developed and applied a completely illegitimate method of analysis, a so-called "habitat replacement cost" (HRC) method, which estimates the costs of an alternative approach — and a very costly alternative — for achieving the same functions as targeted by the proposed regulation. EPA then uses those avoided costs as a "substitute" for a calculation of the real benefits of the rule.

This is not merely a flawed approach to estimating benefits; it is not a benefit-estimation method at all. Such "avoided-cost methods of benefit estimation" have long been recognized as essentially oxymoronic and completely invalid. Applying these methods will mean that any proposed project (whether the project is good or bad for the environment) will appear to be desirable. By taking the next most costly approach of achieving an objective and calling that the project's benefits, one will always find that "benefits" — so measured — exceed costs. This completely faulty reasoning will come back to haunt EPA when others use it to push for actions the Agency opposes.

EPA Response

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment # 316bEFR.005.035.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.005.004

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

While mitigation, restocking, and/or habitat restoration may be acceptable approaches as alternatives to the installation of specific technologies in order to offset I&E losses, the cost of such alternatives is not a reasonable proxy for the value (that is, the benefits) of reducing I&E.

EPA Response

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.005.005

Subject Matter Code 10.02

Benefit Estimation Methodology

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

EPA needs to use an appropriate methodology for calculating the rule's benefits before it can compare those benefits with the costs of the proposed regulation. To the extent that EPA believes that non-use and other values exist which are not adequately captured by the standard and well-accepted valuation methods, it should postpone finalization of this regulation and go back to the drawing board. My comments on the HRC method are presented in detail in section III.D, below.

EPA Response

EPA agrees that they must use appropriate methodologies for calculating benefits. EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003).

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values. These methods include meta-analysis of surface water valuation studies and a benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.005.006

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Related to EPA’s proposed habitat replacement cost method is another proposed valuation method, which EPA characterizes as “societal revealed preference.” Like the HRC method, this approach has no foundation in economic theory, is not accepted by economists as a legitimate empirical method of valuation, and is no more than a method of cost analysis mistakenly applied to the benefit-side of the ledger. It takes the historical cost to restore particular species under various government mandates as an indication of benefits (despite the fact that those mandates — in most cases — were developed without any systematic evaluation of their benefits and costs). The very purpose of a benefit-cost analysis is to assess policies by contrasting their benefits and their costs. EPA’s methodology completely reverses this, and takes the fact that a policy exists as evidence that its benefits exceed its costs (and therefore that its benefits can be proxied by its costs, at a minimum). This makes a complete sham of the very process in which the proposed 316(b) rule is being considered. My comments on this point are presented in section III.E, below.

EPA Response

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Even though the SRP approach is no longer applied to the 316b benefits assessment, EPA believes that the method does have some merit and applicability under suitable conditions.

Dr. Stavins argues that EPA’s method for valuing threatened and endangered species in California, referred to as "societal revealed preference," is not truly a revealed-preference method and has no foundation in economic theory. Dr. Stavins, and some other commenters, base this assertion on the fact that the approach relies on estimates of restoration program "costs" and that these costs should not be confused with "value." They further argue that this approach would simply take the cost of any program or regulation and infer that it has a value equal to its cost.

The Agency agrees with many comments received that, in general, "costs" should not be confused for "values." However, EPA also notes that there are many instances in which cost-based information can provide useful insights to policy makers, and that under suitable circumstances, costs can be used as a proxy for (i.e., in lieu of) more desirable but less accessible "value" information.

There are many instances under which it would be wholly inappropriate to take the costs of some program or activity and assume that the "value" of that activity or program can be inferred from the cost. EPA clearly recognizes that there are specific circumstances and conditions that must apply in order for costs to suitably be interpreted as a reflection of societal (or individual) value. These conditions apply for the SRP.

For example, cost-based data may be viewed as an indication of "value" where the costs are borne voluntarily by the individuals involved, or in cases where public policies reflect a broad consensus based on continuous and extensive input from the general public and the broad array of interested parties. This would be especially true where an adaptive management approach enables adjustments over time in what actions are taken and what costs are incurred. This is the case for the restoration elements of the Cal-Fed program that serve as the basis for the Agency's initial application of the SRP. The SRP analysis was based on a public policy program involving extensive stakeholder input, in a consensus-oriented decision-making context, applying adaptive management. Under such conditions, the outcomes can be conceived as reflecting a real "social choice," and hence the resulting real costs currently borne by the public do provide a valid indication of potential value. Both individual and social choices are important and should be valued, and this approach provides a useful tool for examining social choices, under suitable conditions.

Also note that within the economics profession there are differences of opinion about social preferences. Please refer to comments submitted by Frank Ackerman (316bEFR.014.001 through 316bEFR.014.012). See especially comment #316bEFR.014.009.

Comment ID 316bEFR.005.007

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

In an important part of the Proposed Rule, EPA solicits comments on four alternative decision criteria for comparing the benefits and costs of alternative CWIS technologies: (1) the wholly disproportionate cost test, whereby the alternative which exhibits the greatest environmental gain without bringing about costs which are "wholly disproportionate" to the benefits is preferred; (2) a modified wholly disproportionate cost test; (3) a significantly greater cost to benefit test; and (4) a benefits should justify the costs test, whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred. Only one of these alternative criteria will lead consistently to decisions that are in the general social interest: only criterion (4) — the benefits should justify the costs test — whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred. <FN 5> My comments on this are presented in detail in section I, below.

Footnotes

5 It is important to keep in mind that the correct economic concept of social benefits is by no means limited to financial or commercial benefits. Rather, social benefits is a measure of the net utility that all relevant members of society receive. In the present context, this would include benefits associated with commercial and recreational fishing, as well as any relevant non-use value (that is, the utility that individuals receive simply from knowledge of an amenity's existence).

EPA Response

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

Comment ID 316bEFR.005.008

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Closely related to the issue of alternative decision criteria is EPA's attempt to assess "economic practicability" or "affordability." In this context, EPA argues that the rule will not be damaging to firms (and individuals) which bear its costs, basing this claim upon an examination of the ratio of the annual costs of the rule to the annual revenues of the companies affected. The comparison is utterly irrelevant! It tells us nothing about whether a technology helps to achieve specific objectives, whether it does so at minimum cost (cost effectiveness), or whether an alternative investment would provide greater net benefits to the company, the environment, or society as a whole. The identification of any particular ratio as a criterion for "economic practicability" or "affordability" would be arbitrary and unsupported by sound economics.

The appropriate way, in economic terms, of evaluating society-wide "affordability" is to use a social net present value criterion, in which it is considered to be in society's interest that a technology be adopted by a firm if the present discounted value of anticipated net benefits is greater than the present discounted value of anticipated net benefits from alternatives. Note that although such a socially efficient technology maximizes net benefits to society, it may yield higher costs than benefits to an affected company. My comments on this point are presented in detail in section II, below.

EPA Response

Please refer to the response to comment 316bEFR.005.021 in subject matter code 9.01.

Comment ID 316bEFR.005.009

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.01.02.02

Fish Population Modeling

A large and important part of EPA's overall analysis is its attempt to estimate the potential benefits of the proposed rule in reducing losses from impingement and entrainment (I&E) and any resulting increases in fish stocks and landings. <FN 6> In addition to the severe problems associated with EPA's fatally flawed HRC and related methods, there are significant flaws with its estimates of commercial fishery impacts, including the relationships between impacts on forage species and harvested species.

Changes in fish stocks and related catch levels are best analyzed with an appropriate bioeconomic "stock-recruitment model" that captures these complex relationships over time. EPA indicates that because of "uncertainties" involved in the data and the scientific relationships, and because "many fish stocks are at risk," it has chosen instead to adopt a "precautionary approach to environmental decision-making." This confuses the analysis by introducing what is — if anything — an alternative decision criterion (and one without sound foundation in the economics literature) into the estimation of benefits, rather than treating it as an explicit normative view of how decisions should be reached. Embedding a policy choice in a technical analysis intended to justify a regulatory decision would seem to contradict EPA's agency-wide standard that risk assessment should be kept separate from risk management.

Footnotes

6 I focused on economic aspects of the various analyses, and did not review for accuracy EPA's estimates of I&E losses.

EPA Response

This comment is in response to material on fish population modeling that was presented by EPA at proposal in Chapter A6 of Part A of the Phase II Case Study Document (DCN #4-0003). The commenter is incorrect to interpret the discussion in Chapter A6 to mean that EPA had embedded a policy choice in its technical analysis. Rather, the material in Chapter A6 was presented to provide the scientific basis for EPA's decision not to use dynamic fish population models for its benefits analysis. Because of the misunderstanding of some commenters about the intent of this material, EPA has withdrawn this chapter from its final analysis.

In place of the fish population modeling chapter, EPA provides its rationale for selecting the methods it used to evaluate I&E in Chapter A5 of the final Phase II Regional Analysis Document (DCN #6-0003). For harvested species, which represent less than 2 percent of total I&E losses, EPA used a simple, static model of foregone harvest that assumes that I&E losses of harvested species result in a reduction in the number of harvestable adults in years after the time that individual fish are killed by I&E and that future reductions in I&E will lead to future increases in fish harvest. The approach does not require knowledge of population size or the total yield of the fishery; it only estimates the incremental yield that is foregone because of the number of deaths due to I&E.

EPA believes that this approach provides reasonable estimate of foregone harvest projected directly within a cohort. EPA recognizes that the assumption that the key parameters in its yield model are static is an important one that is not met in reality. However, by focusing on a simple interpretation of each individual I&E death in terms of foregone yield, EPA concentrated on the simplest, most direct assessment of the potential economic value of eliminating that death.

Although EPA's approach to modeling yield requires estimates of a large number of stage-specific growth and mortality rates, the use of more complex fish population models would rely on an even larger set of significant data uncertainties and would require numerous additional and stronger assumptions about the nature of stock dynamics that would be difficult to defend with available data. Additional data uncertainties of population dynamics models include the relationship between stock size and recruitment, and how growth and mortality rates may change as a function of stock size and other factors. Obtaining this information for even one fish stock is difficult and time-consuming; obtaining this information for the many species subject to impingement and entrainment nation-wide was not possible for EPA's national benefits analysis, particularly given the lack of relevant data for the 98% of impinged and entrained species that are forage species.

In addition to a lack of data, there are numerous issues and difficulties with defining the size and spatial extent of fish stocks. As a result, it is often unclear how I&E losses at particular cooling water intake structures can be related to specific stocks. For example, a recent study of Atlantic menhaden (Brevoortia tryannus), one of the major fish species subject to impingement and entrainment along the Atlantic Coast of the U.S., indicated that juveniles in Delaware Bay result from both local and long distance recruitment (Light and Able, 2003, DCN #6-1484). Thus, accounting only for influences on local recruitment would be insufficient for understanding the relationship between recruitment and menhaden stock size. Geographic stock delineation is a significant, ongoing problem in fisheries management.

Another difficulty in developing more complex models of fish species subject to impingement and entrainment is that it is fundamentally difficult to demonstrate that any particular kind of stress causes a reduction in fish population size. All fish populations are under a variety of stresses that are difficult to quantify and that may interact. Fish populations are perpetually in flux for numerous reasons, so determining a baseline population size, then detecting a trend, and then determining if a trend is a significant deviation from an existing baseline or is simply an expected fluctuation around a stable equilibrium is problematic and often not possible with available data. Fish recruitment is a multidimensional process, and identifying and distinguishing the causes of variance in fish recruitment remains a fundamental problem in fisheries science, stock management, and impact assessment. This issue was beyond the scope and objectives of EPA's section 316(b) benefits analysis.

In light of the fact that the availability of current records of I&E loss rates is very limited, that I&E assessment is inherently complex, and that well-established methods for assessment of I&E on a national scale do not exist, EPA chose to use a static yield model to avoid additional uncertainties, and concomitant controversies about results.

For a discussion of the term "precautionary approach," please see EPA's response to Comment 316bEFR.005.026.

Comment ID 316bEFR.005.010

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA attempts to value impacts on forage species outside of a stock-recruitment model, by examining hatchery costs instead. This is not a valuation method at all, but a method of examining alternative costs. This is another example of the fatal error of confusing benefits and costs. My comments on this point are presented in section III.A, below.

EPA Response

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.005.011

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Another problem with EPA's approach to valuing commercial fisheries impacts is its unfortunate adoption of a rule-of-thumb by which it multiplies commercial valuations in a misguided effort to identify broader economic effects. This is arbitrary and not founded upon economic theory or empirical realities. This, like all of the problems I note, imparts a bias in EPA's analysis toward inflating estimated benefits of the proposed regulation relative to its costs. My comments on this are presented in section III.A, below.

EPA Response

Please see EPA's comments on stock-recruitment modeling in response to Comment 316bEFR.005.009.

For a discussion of the term "precautionary approach," please see response to Comment 316bEFR.005.026.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

In the benefits analysis for the final rule, EPA did not use hatchery replacement costs or the 50% rule-of-thumb to estimate non-use benefits, as discussed in response to Comment 31bEFR.005.034.

Comment ID 316bEFR.005.012

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.01

Recreational Fishing Benefits

EPA's analysis of recreational fishery benefits is likewise flawed. The analyses in the various case studies rely — wholly or in part — on empirical results that were not derived from analyses of the cases in question. Instead, EPA uses a benefits transfer approach, in which results of previous studies of other recreational fishery resources are employed. This approach has considerable advantages — since it avoids the expense of carrying out original studies — but it needs to follow well-accepted steps, as documented in EPA's Guidelines for Preparing Economic Analyses. Otherwise, serious errors can occur. My comments on this point are presented in section III.B, below.

EPA Response

The commenter states that EPA's analysis of recreational fishing benefits presented at proposal is flawed because the Agency did not follow steps for developing a benefit transfer approach outlined in EPA's Guidelines for Preparing Economic Analyses. For EPA's response to comments on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where the benefits transfer approach was applied (including proposed rule analysis), EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) and has carefully applied benefit transfer methods. The following steps were followed as recommended in the Guidelines when using BT:

1. describe the policy case;
2. identify existing, relevant studies;
3. review available studies for quality and applicability;
4. transfer the benefit estimates; and
5. address uncertainty.

All of these steps were followed in the Phase II benefits analysis for the final rule.

Comment ID 316bEFR.005.013

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA notes the potential importance of non-use value, for which the only available methods of estimation are stated preference surveys. But EPA did not carry out any original stated preference surveys of non-use value. Instead, it employs two surrogate approaches, and in doing so, it sacrifices accuracy and reliability in estimating benefits. First, EPA uses a rule-of-thumb in which non-use values are assumed to be equal to 50 percent of use values. There is no basis in economic theory for such an approach, and it is not supported by EPA's Guidelines for Preparing Economic Analyses. Second, EPA seeks to estimate non-use value by substituting "restoration-based costs as a proxy for the value of the change in stocks." As emphasized above, this habitat replacement cost approach is completely invalid, without foundation in economics, and likely to lead to highly biased and misleading results. My comments on this are presented in section III.C, below.

EPA Response

In this comment and others Dr. Stavins suggests that EPA has not followed EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003) on matters related to non-use values. On the contrary, EPA believes it correctly followed the guidelines when preparing the cost-benefit analyses for the proposed 316(b) Phase II rule.

Dr. Stavins states that the method used in the case study analyses to value non-use benefits (e.g.., existence and bequest values) is not recommended in the Guidelines. The Guidelines recommend using stated preference methods (e.g., contingent valuation, conjoint analysis, contingent ranking) and applying willingness-to-pay (WTP) values for non-use changes. However, due to time and budget constraints we applied a '50% rule of thumb,' which is based on the Fisher and Raucher (1984 -- DCN #1-3018-BE) study which found that nonuse benefits typically comprise approximately half of recreational use benefits. This method has been applied in many previous EPA cost-benefit analyses (e.g., the recent Economic, Environmental, and Benefits Analysis for the Proposed Metal Products & Machinery Rule, EPA #: 821-B-00-008).

Dr. Stavins states there is no justification for EPA's claim that its 50% rule-of-thumb provides "conservative" estimates. However, we note that Carson and Mitchell (1993, DCN - #4-1401) found a ratio of nonuse to use value ranging from one-fourth to two-thirds, and the 50% assumption falls in the middle of this range. The 50% rule is also conservative because it reflects only the nonuse component of total value to recreational users; it does not reflect any nonuse benefits to recreational nonusers. In addition, the 50% rule does not capture impacts on threatened and endangered species.

Despite EPA's belief that the methods used a proposal are in keeping with the guidelines, EPA made changes to the methodology used in the analysis for the final rule.

In the analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50%

rule-of-thumb to estimate non-use benefits.

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.005.014

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Robert N. Stavins
Organization John F.Kennedy School of Government, Harvard University

Using flawed methodologies for estimating commercial and recreational values, including the wholly invalid habitat replacement cost method, EPA comes up with estimates that are not just highly biased upward, but are in some cases absurd. As I illustrate in detail in my comments, below, this is certainly true in the case of the Brayton Point Station case study, where the total benefit numbers reported by EPA as its estimate of the minimum value of losses are more than 100% greater than what EPA's own analysis would produce if incorrect elements of its analysis were eliminated, and approximately 21,000% (twenty-one thousand percent) greater than the acceptable elements of EPA's analysis would produce for its high case (EPA's "high" case employs its invalid HRC cost proxies instead of real value/benefit estimates). My comments on this are presented in detail in section IV.A, below.

EPA Response

The comment, referring to the proposed rule analysis, states that EPA's methodologies are flawed. While EPA has improved its methodologies for the final rule analysis, the Agency does not agree that the methods are flawed and result in overstatement of benefits by 100 percent.

For EPA's response to comments on commercial fishing methodology used at proposal, please see the response to comment 316bEFR.323.016.

For EPA's response to comments on recreational fishing methodology used at proposal, please see the responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where the benefits transfer approach was applied (including proposed rule analysis), EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) and has carefully applied benefit transfer methods. The following steps were followed as recommended in the Guidelines when using BT:

1. describe the policy case;
2. identify existing, relevant studies;
3. review available studies for quality and applicability;
4. transfer the benefit estimates; and
5. address uncertainty.

All of these steps were followed in the Phase II benefits analysis for the final rule analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. While the Agency agrees that the HRC and hatchery costs are costs of replacement and not benefits, the Agency believes that understanding what it would cost residents in an area to replace CWIS losses is a very useful tool in the regulatory process and also informs decisions on the use of restoration. The HRC ,like the HEA, is a process that requires the analyst to systematically evaluate the losses caused by a CWIS, quantify them, and then consider the steps that would be necessary to replace these individuals and species. The species by species consideration of losses, even if not monetized, is a useful tool in considering the environmental effect of CWIS losses. For more detail on EPA's response to comments on the HRC method, please see the response to comment # 316bEFR.005.035.

Comment ID 316bEFR.005.015

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 6.0

Environmental Impacts

In its various case studies, EPA identifies many causes of ecosystem stress, in addition to I&E associated with power plants, but it makes no effort to include these other stressors in its analyses. For example, EPA identifies a list of "major environmental stressors" of Mount Hope Bay, the body of water that may be affected by the Brayton Point Station facility, including: habitat alteration, dredging, coastal development, over-fishing, industrial pollution, nutrient pollution, wastewater runoff, climate change, and cooling water intake structure (CWIS) surface water withdrawals. No attempt is made in the analysis to attribute quantitatively any of the claimed degradation of the commercial and recreational fisheries to any of the aforementioned factors, with the exception of the Brayton Point Station's CWIS.

EPA Response

Please see comment response 316bEFR.025.018 for the discussion regarding the environmental impacts of cooling water intake structures.

Comment ID 316bEFR.005.016

Subject Matter Code 10.04

National Benefits

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

EPA extrapolates from the case studies, many of which use flawed methodologies, to national-level "benefit" estimates. For its national-level calculations, EPA uses as "best estimates of baselines [economic] losses" due to I&E "mid-points" of its ranges (that is, means of the minimum and maximum values). In the case of the Brayton Point Station, for example, this "best estimate" of losses is claimed by EPA to be $14,711,000. But this "mid-point" is the average of the "reasonable" benefit estimate using "appropriate" benefit-estimation procedures (which carries a 100% upward bias) and the completely invalid "high" estimate from the HRC method (which carries a 21,000% upward bias).

To put this in perspective, if we draw upon EPA's own empirical estimates for Brayton Point, remove the most questionable elements — as identified above and below in my comments — from EPA's calculations, but include EPA's 50% rule-of-thumb for non-use value, then EPA's "best estimate of baseline losses" for annual I&E losses at Brayton Point (summing mid-points from appropriately specified ranges) would be $123,000. Thus, EPA's reported "best estimate" for I&E baseline losses (and hence, benefits) — which is almost completely driven by the invalid HRC results — is seen to carry an upward bias of approximately 12,000%!

The Brayton Point Station benefit estimates are part of the national totals, but are not used in the extrapolation to other facilities, despite the fact that EPA's purpose in carrying out the case studies was to develop a basis for extrapolation. No explanation is provided for this decision. Perhaps EPA recognized the absurdity of the Brayton Point results (due to the invalid HRC method), and so decided not to use these numbers as the basis for any part of the national extrapolations. Nevertheless, given the severe problems with the methodologies employed by EPA in this and the other case studies, the national-level estimates of "benefits" are themselves terribly biased, since those national-level estimates are based exclusively on the case study analyses. My comments on this are presented in detail in section IV.B, below.

Overall, while EPA repeatedly asserts in the proposed regulation that its analysis underestimates the true benefits of the regulation, the reality, in fact, is the opposite. Due to the numerous and important errors that are made by EPA in its flawed analysis, EPA has produced benefit estimates that are grossly overestimated, highly misleading, and should not be used as part of the basis for this rulemaking.

EPA Response

EPA disagrees with this conclusion and believes that the methods it used are not biased.

However, in response to this comment and others like it, EPA has reviewed and revised the case study approach to estimating national benefits. For the final section 316(b) Phase II benefits cost-benefit analysis EPA examined impingement and entrainment (I&E) losses, and the economic benefits of reducing these losses, at the regional level. All extrapolation is based on losses per unit of average annual operational flow. The extrapolation takes into account waterbody type and facility characteristics such as equipment in place.

The estimated benefits were then aggregated across all regions to yield a national benefit estimate. The primary objective of the regional approach is to refine the scale of resolution of the benefits case studies conducted for proposal, so that extrapolations were within regions rather than nation-wide. (Please refer to the EBA chapter C1 for a discussion of the regional approach - DCN #6-0002.)

In addition to extrapolating at a regional level only, EPA also collected and analyzed data for a greater number of facilities.

Thus, for the analysis for the final rule, extrapolation was needed for a smaller number of facilities, was based on a broader range of analyzed facilities, and was performed between facilities in the same region and on similar kinds of water bodies.

Regarding the use of Brayton Point results in the extrapolation, in the analysis for the final rule, the results from Brayton Point were used in the extrapolation of benefits for the North Atlantic region.

In addition, for the final analysis, EPA did not include results based on the HRC method; and EPA only extrapolated losses and benefits for recreational and commercial impacts. For these categories, only a single point estimate was reported, so no midpoint was calculated. For EPA's response to comments on the HRC methods please refer to the response to comment #316bEFR.005.035.

Comment ID 316bEFR.005.017

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 7.0

Best Technology Available (BTA)

Site-Specific Determination of Best Technology Available (§ 125.94(c), Proposed Rule, pages 17165-17166)

EPA has invited public comment (page 17166) on the criterion that will be employed by the U.S. Environmental Protection Agency in its site-specific determinations of the best available technological alternatives to be implemented by specific facilities, including the appropriate role for considering benefits and costs. The proposed rule recommends on page 17149 that "rigorous environmental and economic analysis should be performed," and with this I heartily concur.

Four possible criteria for identifying the "best technology" are considered by EPA in the proposed rule:

(1) the wholly disproportionate cost test, whereby the alternative which exhibits the greatest environmental gain without bringing about costs which are "wholly disproportionate" to the benefits (of the environmental gains) is preferred (p.17165)

(2) a modified wholly disproportionate cost test, proposed by Public Service Electricity and Gas Company (PSEG), whereby the alternative which exhibits the greatest net benefits (difference between benefits an costs) without bringing about costs which are "wholly disproportionate" to the benefits is preferred (p. 17166);

(3) a significantly greater cost to benefit test, whereby the alternative which exhibits the greatest environmental gain without bringing about costs which are "significantly greater" than the benefits is preferred (p. 17166); and

(4) a benefits should justify the costs test, proposed by the Utility Water Act Group (UWAG), whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred (p. 17165). <FN 8>

Mainstream economic thinking — as it is taught in any university from Maine to San Diego, from Miami to Seattle — points to one and only one of these alternative criteria as able to lead consistently to decisions that are in the general social interest: alternative (4), which is the so-called "efficiency condition" in economics. Under this standard criterion of economic analysis, universally accepted in economics and routinely practiced by private and public sector entities around the world, those options which exhibit benefits greater than costs are considered to merit further analysis, and of those, the option with the greatest (positive) difference between benefits and costs (positive net benefits) is the best option. <FN 9>

This is the "Kaldor-Hicks test," which is the basis of benefit-cost analysis, and which is the prescribed method in EPA's Guidelines for Preparing Economic Analyses. As the Proposed Rule indicates (page 17166), this criterion also is used in a wide variety of legal and regulatory contexts, including the guidelines which govern Regulatory Impact Analyses (Executive Order 12866, Section 1(b)(6)), as well as a number of statutes, such as the Safe Drinking Water Act.

Footnotes

8 The Proposed Rule's description of the UWAG recommendation incorrectly refers to the ranking as one characterized by "cost-effectiveness," whereas the ranking is actually according to efficiency (page 17165). This mistake is particularly unfortunate, because the distinction between efficiency (choosing a level of environmental protection which maximizes the difference between the benefits of protection and its costs) and cost-effectiveness (choosing the least costly means of achieving some given level of environmental protection, which may or may not be an efficient level) is crucial in later parts of the Proposed Rule.

9 For brief explications of the efficiency condition and its potential use in environmental policy analysis, see: Arrow, Kenneth J., Maureen L. Cropper, George C. Eads, Robert W. Hahn, Lester B. Lave, Roger G. Noll, Paul R. Portney, Milton Russell, Richard Schmalensee, V. Kerry Smith, and Robert N. Stavins. "Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?" Science, volume 272, April 12, 1996, pp. 221-222; and Fullerton, Don and Robert Stavins. "How Economists See the Environment." Nature, volume 395, 1998, pp. 433-434.

EPA Response

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative CWIS technologies.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

Before turning to a more detailed consideration of the merits of this criterion, I will comment briefly on the three other alternatives. Beginning with the first criterion, the wholly disproportionate cost test, it should be noted that whenever the benefits of a proposed action are less than its costs, the world is made worse off as a result of the action. Put simply, more is given up than is gained. The wholly disproportionate cost test thus goes considerably beyond what would already be economically irrational by suggesting that technologies which exhibit costs which are anywhere from one to perhaps ten times (or more) the magnitudes of their benefits ought to be pursued. There is no sound argument in economics in favor of such a decision criterion. This criterion virtually guarantees that social decisions will not be welfare-improving, indeed it guarantees that selected actions will make the world considerably worse off.

The second proposed criterion, the modified wholly disproportionate cost test, will also lead to decisions which make the world considerably worse off. Although this criterion has the admirable feature that the alternative with the greatest net benefits is to be selected, the criterion also allows for any alternative for which the costs are not wholly disproportionate to the benefits to be considered. Hence, this will often lead to the identification of a set of alternatives, all of which have benefits less than costs, with the one with the largest net benefits (but still negative) being selected.

EPA Response

EPA has not adopted the wholly disproportionate or modified wholly disproportionate standard in the final rule. See response to 316bEFR.006.003.

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Author Name Robert N. Stavins
Organization John F.Kennedy School of Government, Harvard University

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RFC: Appropriateness of "significantly greater"

The third criterion, the significantly greater cost to benefit test, makes no more sense than the modified wholly disproportionate cost test. While EPA says that such a test would not be as conservative as a wholly disproportionate cost test, that assurance does nothing to make it economically reasonable. With this criterion, the alternative that provides the greatest environmental gain is preferred from the set of alternatives for which the costs are not significantly greater than the benefits. Hence, the set of alternatives to be considered could all exhibit negative net benefits (benefits less than costs), that is, all alternatives would make the world worse off.

EPA Response

See responses to 316bEFR.006.003, 018.009, and 045.012.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Only the fourth proposed criterion, that the benefits should justify the costs, in the particular manner described in the Proposed Rule, will — by definition — lead consistently to decisions which make the world better off, and will identify the alternative that does so in the greatest magnitude, that is, with the largest net benefits. This is the social net present value criterion. It is in society's interest that a technology be adopted by a company if the present discounted value of anticipated net benefits to society (benefits minus costs, where benefits include environmental benefits) is greater than the anticipated net benefits of alternatives, including the status quo.

In economic terms, cost refers to the real opportunity cost <FN 10> of providing the given level of environmental protection, which may exceed — possibly by a significant amount — the out-of-pocket or accounting costs. The anticipated benefits of environmental protection are equivalent, by definition, to the value of the improvements that are brought about through the protection efforts.

Both benefits and costs typically increase with more ambitious levels of action. When the difference between benefits and costs is maximized, this is the point where society as a whole — including in the case of the 316(b) rule, commercial and recreational fishermen, electricity consumers, individuals owning shares in the company or mutual funds holding company stock, and everyone who benefits from healthy ecosystems — is made best off. This is the efficient level of environmental action that is identified by criterion (4).

Applying these concepts to the choice among alternative cooling water intake structure (CWIS) technologies <FN 11>, it becomes necessary to contrast the benefits of alternative technologies with the respective costs of alternative technologies. The best alternative CWIS technology in economic terms, from a social perspective, is the one which protects the target resources (for example, fisheries) up to the point where the incremental benefit from increased protection just equals the incremental cost of increased protection. Technologies that provide less protection are socially inefficient, because the benefits from additional protection would exceed the cost. Conversely, technologies that provide more protection are socially inefficient, because the cost associated with the increased protection would outweigh the benefits.

In sum, the best practice in economics is to assess the value of alternative technologies based on the difference between their social benefits and social costs. The best technology is the one with the highest net benefits to society. This is the technology that will be identified by the specific form presented in the Proposed Rule of criterion (4) — the benefits should justify the costs test — whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred (p. 17165). EPA should reject the other three criteria.

Footnotes

10 Opportunity cost is an indication of what must be sacrificed in order to obtain something. In the environmental context, it is a measure of the value of whatever must be sacrificed to prevent or reduce the probability of an environmental impact. These costs typically do not coincide with monetary outlays, the accountant's measure of costs. This may be because out-of-pocket costs fail to capture all of the explicit and implicit costs that are incurred, or it may be because the prices of the

resources required to produce environmental quality may themselves provide inaccurate indications of the opportunity costs of those resources.

11 Section 316(b) of the Clean Water Act directs EPA to identify "cooling water intake structures" that "reflect the best technology available for minimizing adverse environmental impact." Although some of the alternatives considered in the draft 316(b) rule for achieving flow reductions (that is, decreasing withdrawals of water for cooling purposes at power plants) involve intake structures and others do not, I employ the statute's designation of cooling water intake structures (CWIS) throughout my comments, except when it is necessary to do otherwise.

EPA Response

The comment suggests that the best way to evaluate the regulation is to use the maximum net benefit criterion. The Agency disagrees, because this could imply consideration only of quantifiable benefits. Cost benefit analysis provides a discussion of the costs and benefits of a regulation or other action, but does not specify any decision criteria or how the benefits and costs are weighted. EPA believes that is should fully consider benefits, even when the benefits are presented only as a qualitative discussion. For detail, see EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

A major problem common to the net benefits test, social net present value test, the benefits greater than costs test, the significantly greater than costs tests, the benefits equals cost test, and the greatest net benefits test is that all of these tests require that both costs and benefits be monetized because the results are reduced to a number. The tests, when defined or applied as a ratio, do not allow the consideration of unmonetized and unquantified benefits in any systematic way.

The traditional approach to quantifying environmental benefits of proposed regulations has focused on active use values, particularly direct use values such as recreational or commercial fishing because these categories of benefits are relatively easy to estimate (i.e. there are standard methods available to evaluate them and some available data to carry out the analysis) in comparison to other categories of benefits. Nonconsumptive uses (such as the importance of fish for aquatic food webs), and passive use or non-use values (including the value of protecting a resource for its own sake), are seldom considered because they are difficult to monetize with available economic methods.

For the 316(b) Phase II regulation, the Agency was not able to monetize benefits for 98.2% of the age 1 equivalent losses of all commercial, recreational, and forage species. (The percentages by region are as follows: California 95.2%, North Atlantic 99.0%, Mid Atlantic 98.4%, South Atlantic 98.1%, Gulf of Mexico 95.8%, Great Lakes 99.8%, and Inland 99.9%.) This means that the benefit analysis represents the benefits associated with less than 2% of the total age 1 equivalents lost due to impingement and entrainment by cooling water intake structures (CWISs)."

The regulation is expected to provide many benefits that were not accounted for in the benefits analysis by reducing impingement and entrainment (I&E) losses of fish, shellfish, and other aquatic organisms and, as a result, increase the numbers of individuals present, increase local and regional fishery populations (a subset of which was accounted for in the benefits analysis), and ultimately contribute to the enhanced environmental functioning of affected waterbodies (rivers, lakes, estuaries, and oceans) and associated ecosystems. The economic welfare of human populations is expected to increase as a consequence of the improvements in fisheries and associated aquatic ecosystem functioning.

Other commenters (e.g. : 316bEFR.206.047) have pointed out that the cost-benefit analysis is designed to weigh the relevant costs of a proposal against the corresponding benefits, and that this process cannot yield a meaningful result unless the calculations of costs and benefits are both complete. In the private sector, a balance sheet that weighs all of a company's income against some of its expenditures does not provide a useful picture of the company's true financial condition. The commenters also state that a comparison of complete costs and incomplete benefits does not provide an accurate picture of net benefits to society. These commenters go on to say that EPA has produced a comparison of complete costs and incomplete benefits in this case. Given that EPA wasn't able to estimate nonuse values for the majority of losses due to cooling water intake structures, the Agency believes that it is appropriate to consider both the qualitative and quantitative benefits associated with the regulation; that a test that simply compares the monetized numbers would underrepresent the true benefits. See also responses to comment #316bEFR.206.047 regarding limitations in EPA's benefits analysis .

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Concept and Measure of Economic Practicability (Proposed Rule, pages 17144-17145)

The Proposed Rule contains a brief discussion of what is characterized as the rule's "economic practicability," a phrase which has no particular definition in economics (pages 17144-17145). EPA has referred to the same issue in other contexts as one of "affordability." EPA appears to be arguing that the rule will not be damaging to the firms (and individuals) which must bear its costs. EPA bases this claim upon empirical examination of the ratio of the annual costs of the rule to the annual revenues of the affected companies. The comparison is utterly irrelevant! <FN 12> It tells us nothing of value for judging this rule, either at the facility or the firm level. Even if the rule's compliance costs were a very small (whatever that might mean) percentage of annual sales, those compliance costs could cause some firms' otherwise profitable business to lose money on an ongoing basis. But by EPA's measure, this would be "economically practicable."

Although neither "economic practicability" nor "affordability" have technical definitions in economics, the criteria discussed by EPA (such as the ratio described above) are clearly intended to be economic in nature. <FN 13> Hence it is relevant and important to ask what these phrases may mean from the perspective of economics. At first blush, the issue would appear to be whether or not a particular technology is "affordable" to the firm.

Firms operating in competitive markets, such as that of electricity generation, are under considerable pressure to maximize their profits. Those which fail to earn maximum profits on their investments are unable to compete; they lose market share and may eventually close down, although before this happens they may be bought out by other firms, which recognize that the target firms are achieving subnormal returns on their investments. Hence, from the perspective of private firms, the question of whether a particular investment is "affordable" is equivalent to the question of whether that investment is consistent with a normal strategy of profit maximization. Therefore, a proper economic analysis (on the part of or on behalf of a firm) of a potential intake technology — or of any investment project, for that matter — will compare the technology's anticipated economic benefits (revenues, as well as cost savings) with its anticipated costs throughout the lifetime of the proposed project, and contrast the project's anticipated net benefits (benefits minus costs) with the anticipated net benefits of other potential projects.

The economically appropriate analysis comparing the timing of the benefits and costs of alternative investment projects is carried out by calculating the net present value (NPV) of each project. The NPV is the value of the benefits of a project, net of all costs, including opportunity costs, expressed in current dollars. This approach discounts benefits and costs that occur in the future, relative to those that occur in the present, and provides the value of the project to the business today. Projects may be considered admissible (that is, meriting further consideration) if their respective NPV exceeds zero (that is, if the present value of benefits exceeds the present value of costs). <FN 14> When comparing alternative projects, a company should invest in the one that has the greatest NPV.

Thus, the economic interpretation of "affordability" in the context of the Proposed Rule yields a decision criterion whereby the NPV of alternative intake technologies are compared, using a discount rate that reflects the individual company's cost of capital for each project under consideration. If one or more of the technologies are profitable (that is, have positive NPV), then considerations of affordability indicate that the company should install the technology with the highest NPV. <FN 15> If none of the projects is profitable, the company should not install any of the technologies, unless it is basing its decision on factors other than what is affordable.

Footnotes

12 For this reason, I have not sought to confirm the costs or revenues used by EPA.

13 A generic and pervasive problem with EPA's analysis of the proposed rule arises here and elsewhere in the relevant documents, namely EPA's tendency to place equal weight on each of a variety of studies cited, despite the tremendous variance in the quality of these underlying studies. When economic theories are being offered, empirical economic research methods described, and/or economic arguments made, it is important that literature cited ought to have — at a minimum — economists as authors and/or economists as editors of respective periodicals.

14 An equivalent way of characterizing a project with positive NPV is that the project's internal rate of return (IRR) exceeds the company's discount rate. The internal rate of return is defined as the discount rate for which the project's NPV is zero. When comparing alternative projects, however, the use of NPV analysis is preferred to a comparison of IRRs, as it provides a more reliable assessment of the impact of alternative projects on the company's profits. See Richard A. Brealey and Stewart C. Myers, Principles of Corporate Finance (4th edition), New York: McGraw-Hill, Inc., 1991, chapter 5 for a detailed discussion of the benefits of using NPV as the investment decision criterion.

15 The appropriate economic analysis would consider all costs and all benefits to the company, including the effect of the technology on the company's tax liabilities and non-monetary costs and benefits, if they can be reliably quantified.

EPA Response

The commenter asserts that EPA bases the claim of the rule's economic practicability upon empirical examination of the ratio of the annual costs of the rule to the annual revenues of the affected companies, a comparison which is "utterly irrelevant."

EPA disagrees with this comment. The cost-to-revenue ratio is only one of several measures used. It is not the main measure used to assess economic practicability of the rule. EPA's main assessment of economic practicability to facilities subject to the rule is the IPM analysis which evaluates facility-level changes in dispatch, operating costs, and revenues in the context of the entire electricity market. As supplements to the IPM analysis, EPA uses other measures, including the cost-to-revenue ratio, to assess the magnitude of likely compliance costs. The limited use of the cost-to-revenue ratio was explicitly described in the beginning of Chapter B2 of the EBA. (EPA provided further clarification in the preamble (section VII) and the supporting documentation of this final rule that the economic practicability of Phase II regulation is based on the electricity market model analyses using the IPM, not the cost-to-revenue ratio.)

The commenter specifically cites the FR section on economic practicability of the rule (67 FR 17144-17145). It should be noted that this section discusses the cost-to-revenue ratio at the facility and firm level and "additional impacts," including "potential effects of the proposed rule on installed electric generation capacity, electrical production, production costs, and electricity prices." The reader is referred to Sections VIII and X.J for more information on these analyses. The economic practicability section concludes with the following statement: "After considering all of these factors, EPA concludes that the costs of the proposed rule are economically practicable." The commenter's claim that EPA based its economic practicability determination only on the cost-to-revenue ratio is therefore incorrect.

The commenter further states that the correct approach to determining “affordability” entails that facilities install the compliance technology with the highest NPV to each facility, and only if the net present value exceeds zero. EPA disagrees with this comment. The suggested approach is correct in the context of voluntary investment decisions but is irrelevant in the context of regulatory requirements.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

EPA may intend to ask a broader question: namely, whether a particular technology is "affordable" for society as a whole. Here the question is whether society can afford the action under consideration, that is, are its anticipated social benefits greater than its anticipated social costs. This leads directly to the criterion of "efficiency," where the efficient set of practices refers to that specific set of technologies and management practices that yields the greatest difference between total social benefits and total social costs, that is, that provides maximum net social benefits. So, economics provides a clear and consistent criterion for comparing benefits and costs in order to determine what is socially affordable: choose that level of effort that maximizes net social benefits. This is the same social net present value criterion (4) discussed above. Although such a socially efficient technology maximizes net benefits to society, it may yield higher costs than benefits to an affected company.

EPA Response

The commenter states that EPA may have intended to evaluate affordability for society as a whole. In this case the technology with the highest positive social NPV should be installed, even if the NPV to an affected facility would be negative. EPA disagrees with this comment. EPA evaluated "affordability to society as a whole" in its benefit-cost analysis. The analysis discussed here evaluated the economic effects on facilities, firms, and the industry. This analysis reflects the affordability concept as conventionally understood and analyzed for OW rulemaking, which is different from an analysis of social costs and benefits.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Facility & firm-level costs/Econ. Practicability

Finally, a question might be posed from an accounting perspective: will a company continue to earn a profit after the action in question is taken, such as adopting some specific technology? From economics, we know that the analysis must be carried out on the margin (that is, focusing on incremental or marginal benefits and costs) to be meaningful. Hence, one could ask whether marginal profits are positive, that is, are marginal benefits to the company greater than marginal costs? This returns us to the NPV criterion developed above. Or, if we are to take a broader, social view of "affordability," then we could ask whether social NPV is positive, and we are returned to the social NPV criterion developed above.

It is also important to examine the actual impacts of increasing costs and reducing profits, that is, the real economic incidence of such effects. First, a reduction in a company's profits would result in a decline in the share price of its parent company. Note, however, that all shares in any company are ultimately owned by individual persons, although some shares may be held by intermediaries. For example, about half of all outstanding shares in electricity generators in the United States are held by individuals, as distinct from institutions. More importantly, institutions — largely mutual funds, pension funds, and retirement accounts — are themselves owned by individuals. In addition to effects on share prices, reduced profits may lead to reduced or eliminated dividend payments, upon which many shareholders rely. Utility stocks have traditionally been held by investors looking for a steady stream of income.

Creditors would also feel the effects of decreased profits First, the market value of an affected company's debt would decline as projected earnings fell. Second, that company's ability to make its interest payments becomes less certain if energy prices fall or costs increase. As with shareholders, creditors ultimately are individuals, either holding corporate bonds directly, or through mutual funds, pension plans, and other investment accounts. Those people who depend on the income stream from interest payments would be harmed.

To the extent that defining electricity generators' "affordability" for a technology does not explicitly protect the financial health of the generator, employees would also be harmed. Direct employee compensation and employee benefits generally are related to the employer's financial health. Moreover, if the profitability of firms is jeopardized, they may have difficulty attracting new employees, and employees' jobs may ultimately become less secure.

Finally, electricity consumers may also be harmed by increased generation costs. As costs of production are increased (for example, due to compliance activities), some of those costs may be reflected in increased product prices. <FN 16> An increase in electricity rates, and a possible decrease in electricity supply, would affect very large populations.

In conclusion, finding that a particular intake technology — or any investment — is or is not "economically practicable" or "affordable" based on its costs relative to the firm's or facility's revenues could not be based upon a decision criterion with any normative standing in economics.

Such an approach would tell us nothing about whether the technology helps to achieve specific objectives, whether it does so at minimum cost, or whether an alternative investment would provide greater net benefits to the company, the environment, or society as a whole.

Footnotes

16 The share of the cost burden that is absorbed by firms in terms of reduced profits, versus the share that is passed on to consumers through increased prices, is determined by the competitiveness of the specific market (and, of course, any relevant regulatory constraints).

EPA Response

The commenter makes three points:

1. From an accounting perspective, a technology should only be installed if the marginal profits are positive. Therefore, the compliance technology with the highest positive NPV should be installed. EPA RESPONSE: The suggested approach is correct in the context of voluntary investment decisions but is incorrect in the context of regulatory requirements. If “positive” is removed from the second sentence of the comment, then the comment would be applicable to the choice among potential compliance alternatives, including shutdown instead of compliance. This, in fact, is the framework that EPA applies in its conventional analyses of likely firm/facility response to regulatory requirements.

2. It is also important to examine the “real economic incidence” of increased costs and reduced profits, including reduced or eliminated dividend or interest payments, reduced market value of the company’s debt, effects on affected facilities’ existing employees, and facilities’ ability to attract new employees. EPA RESPONSE: The requested level of examination far exceeds analyses needed for OW rulemakings. Any impacts in the categories of concern cited by the commenter must start from the finding of a material impact on the business performance of the regulated establishment. The more practical and meaningful focus of the economic impact analysis is thus on the regulated facility and its owning firm.

3. It is important to analyze impacts on electricity consumers due to increases in electricity rates and possible decreases in electricity supply. EPA RESPONSE: The comment is generally valid. However, the commenter apparently overlooked the fact that EPA’s IPM analyses explicitly considered the cited potential effects at proposal, for the NODA, and the final rule.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02

Benefit Estimation Methodology

Methodology of Benefit Analysis (Proposed Rule, page 17191; Case Study Analysis, Chapters A5, A6, A9, A10, A11)

As an essential part of the policy analysis that constitutes the justification for the proposed rule, it is necessary to value economically the changes in environmental quality that may be brought about by the proposed regulation. EPA begins its analysis by noting that changes in the design and/or operation of cooling water intake structures (CWIS) may reduce rates of impingement and entrainment (I&E) of aquatic species, thereby enabling fish and other aquatic organisms to avoid premature mortality. The result, according to EPA, may be an increase in fish stocks, as well as "enhanced environmental functioning of affected waterbodies and associated ecosystems." The crucial posited linkage for economic benefit analysis is a final one, namely that "the economic welfare of human populations is expected to increase as a consequence of the improvements in fisheries and associated aquatic ecosystem functioning" (Case Study Analysis, page A9-1). My comments on the methodologies of benefit analysis are focused on this final linkage.

The Case Study Analysis lays out the crucial foundation for EPA's benefit analysis as follows (page A9-2): "Conceptually, the monetary [economic] value of benefits is the sum of the predicted changes in 'consumer and producer surplus.' These surplus measures are standard and widely accepted terms of applied welfare economics, and reflect the degree of well-being derived by economic agents (e.g., people or firms), given different levels of goods and services, including those associated with environmental quality." Unfortunately, EPA departs from this conceptual foundation in several crucial ways, and that is where my criticisms are focused.

My review of EPA's methodologies for benefit analysis, <FN 17> described below in detail, comes to the following conclusions, among others: (1) EPA's estimates of commercial fishery impacts are severely flawed, due in part to a lack of reliance on standard and accepted bioeconomic models, and adoption of approaches which lack foundation in the scientific literature; (2) EPA's analysis of recreational fishery benefits is likewise flawed, because of reliance on problematic applications of benefits transfer methods, and the use of an arbitrary rule-of-thumb for estimating non-use values as a fixed fraction of use values; (3) EPA's habitat replacement cost (HRC) method represents one of the gravest of errors in economics, actually confusing benefits and costs, and — as such — this method is a completely invalid approach to identifying benefits; and (4) EPA's proposed "societal revealed preference" approach has no foundation in economic theory, is not accepted by economists as a legitimate empirical method of valuation, and — like the HRC method — is no more than a method of cost analysis mistakenly applied to the benefit-side of the ledger.

Footnotes

17 EPA identifies four categories of benefits: (1) market benefits (commercial fisheries); (2) non-market direct uses (recreational fisheries); (3) non-market indirect use (forage species); and (4) non-market non-use (sometimes characterized as existence or passive-use value). I examine all four of these categories of benefits in these comments, but I divide my comments on EPA's benefit assessment methodology into five different sections: methodology for valuing commercial fishing impacts (EPA's category 1); methodology for valuing recreational fishing impacts (EPA's category 2); concept and

methodology for valuing non-use value (EPA's category 4); EPA's proposed additional methodology for "valuing benefits" by assessing the costs of habitat replacement; and EPA's proposed methodology for "valuing benefits" by assessing the historical costs of government-mandated species restoration. I include consideration of EPA's category 3 (forage species) within my examinations of commercial and recreational fishing impacts.

EPA Response

The commenter states that EPA's analyses of commercial fishery impacts, recreational fishery benefits, and non-use benefits presented at proposal are severely flawed.

For EPA's Response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment #316EFR.005.029.

For EPA's Response to comments on the methods used to estimate recreational fishing benefits please see the response to comment #316EFR.075.504.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values, including meta-analysis and the benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment #316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see comment #316bEFR.005.006.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Commercial Fishing Benefits

Methodology for Valuing Commercial Fishing Impacts (Proposed Rule, page 17191; Case Study Analysis, Chapter A5, A6, A9)

In Chapter A9 — “Economic Benefit Categories and Valuation Methods” — of its Case Study Analysis, EPA lays out its methodology for valuing the impacts of impingement and entrainment (I&E) on commercial fish stocks and landings. It notes that the first step of the analysis involves an assessment of the I&E-related changes in commercial landings. A fundamental aspect of the analysis of economic benefits is this first step of analyzing the effects of reductions of impingement and entrainment losses on stock levels of harvested species (and, as explained below, forage species) and the subsequent interactions of these stocks levels with one another and with catch levels over time.

Changes in fish stocks and related catch levels are best analyzed with an appropriate bioeconomic “stock-recruitment model” that captures these complex relationships over time, <FN 18> but EPA chose methods for quantifying the effects of impingement and entrainment on commercial harvests that overestimate actual increases in harvests that could occur if I&E were reduced. I believe that EPA recognizes that a properly-specified stock-recruitment model would be the appropriate method for analyzing these relationships, because it says as much in Chapter A6 of the Case Study Analysis, “Fish Population Modeling the Section 316(b) Benefits Case Studies,” where it devotes six of the chapter’s seven pages to an explication of stock-recruitment models (including the Beverton-Holt and Ricker stock-recruitment relationships).

Footnotes

18 The classic text in this field is: Clark, Colin W. Mathematical Bioeconomics: The Optimal Management of Renewable Resources. Second Edition. New York: Wiley-Interscience, 1990. An earlier survey of the literature is found in: Gordon, H. Scott. “The Economic Theory of a Common-Property Resource: The Fishery.” Journal of Political Economy 62(1954):124-142. A subsequent survey is: Munro, Gordon R. and Anthony D. Scott. “The Economics of Fisheries Management.” Handbook of Natural Resource and Energy Economics, eds. A.V. Kneese and J.L. Sweeney. New York: North Holland, 1985. This is an exceptionally large body of literature. One example of a recent empirical analysis is: Homans, Frances R. and James E. Wilen. “A Model of Regulated Open Access Resource Use.” Journal of Environmental Economics and Management 32(1997):1-21.

EPA Response

Please see EPA's response to Comment 316bEFR.005.009 on fish population modeling.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.01.01

Ecological Risk Assessment

At the end of Chapter A6, after having provided a description of the stock-recruitment models and their use in fisheries management, EPA departs from this accepted scientific approach, and introduces a discussion of what it labels a "precautionary approach." EPA indicates that because of the "uncertainties" involved in the data and the scientific relationships, and because "many fish stocks are at risk," it has chosen to adopt "a precautionary approach to environmental decision-making."

This approach subverts the analysis by introducing what is — if anything — an alternative decision criterion into the estimation of benefits, rather than treating it honestly as an explicit view of how decisions should be reached (in the manner of the four decision criteria discussed in the first section of these comments). In other words, the "precautionary approach" used by EPA to justify the use of conservative models is an approach to public-policy making, not an approach to economic valuation. Embedding a policy choice in a technical analysis intended to justify a regulatory decision would seem to contradict EPA's agency-wide standard that risk assessment should be kept separate from risk management.

EPA Response

EPA agrees that risk assessment should be kept separate from risk management, and did not intend to confuse the two by its unfortunate use of the term "precautionary approach" in the discussion referred to by the commenter. The purpose of EPA's discussion in this section was to note its concern that many fish stocks are at risk from multiple stressors, including cooling water intake structures, and to note that such risks can be difficult to adequately assess and mitigate because of data uncertainties, heightening concerns of resource managers. However, this discussion is not included in EPA's final analysis for the 316b Phase 2 rule. EPA has not applied the precautionary approach in the 316b benefits analysis.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Valuing Forage Species (incl non-use and non-landed)

An important element of the relationship between changes in impingement and entrainment and changes in commercial (and for that matter, recreational) landings is the impact of reductions in I&E on forage species. In the Proposed Rule (page 17191), EPA states that in the case of forage species, it can be difficult to estimate values because — by definition — the species are not targeted directly by commercial (or recreational) anglers, and direct use values are not revealed by market activity as they are in the case of commercial species or by market behavior from which recreational values can be inferred through reliable revealed-preference analytic methods. EPA posits two approaches to value I&E impacts on forage species.

One approach to valuing such impacts on forage species, which makes sense in theory and can provide very good estimates if properly applied with a sufficiently refined model, is to examine the biological consequences of changes in forage species stocks on stock levels of commercial and recreational species. EPA refers to this as the "production forgone approach." It "assigns a value to reduced forage species losses based on their indirect contribution to higher commercial and recreational fishery values." <FN 19>

So, the correct approach is to develop a theoretically sound and empirically valid model of the impacts of alternative CWIS technologies on affected species, including commercial, recreational, and forage species. The biological modeling and the subsequent bioeconomic modeling should then estimate how all of the stocks evolve through time, including the effects of changes in forage stocks on commercial (and recreational) stocks, which are then valued through appropriate market-based methods. Sound biological and bioeconomic models will include forage species and will fully provide for food web effects on commercially and recreationally harvested species. That is the correct way to account for the value of effects on forage species.

Footnotes

19 If there are other values of forage species — not associated with commercial or recreational impacts — then such values are presumably non-use values, the proper estimation of which I consider below in section III.C.

EPA Response

EPA agrees that valuing impacts on forage species is best accomplished by examining the impacts of forage species on commercial and recreational species. In the analyses for the NODA and the final rule, EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E (DCN #6-0003)

See also EPA's responses to comments on the unlanded fraction of fish spared from I&E (316bEFR.336.009), commercial fishing (316bEFR.005.029), recreational fishing (316bEFR.075.504

and 316bEFR.041.452), population modeling (316bEFR.005.009), and detecting ecological impacts (316bEFR.306.092).

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's other proposed approach for valuing forage species — inference from hatchery costs — is not a valuation method at all, and should be deleted from the analysis. The benefits of increasing the stocks of forage species cannot be estimated in economic terms by observing the costs of developing and introducing hatchery fish into wild populations. In economic terms, the benefits of some action are equivalent to the aggregate of the willingness to pay (WTP) by the affected human populations for that action or outcome. In the case of the benefits of an increase in the stocks of forage species, a reasonable approximation of this WTP can be estimated by examining the biological impacts of the forage species stock increase on the stocks of commercial (and recreational) species, and then using a theoretically correct and empirically reliable method to estimate the WTP for the commercial (or recreational) species. This is essentially EPA's first approach, described above. But an attempt to short-circuit such an approach by examining the costs of re-stocking forage species incorrectly substitutes costs for benefits in a completely illegitimate manner. <FN 20>

This critical error of confusing benefits and costs by attempting to substitute some estimate of "avoided cost" for a valid measure of real benefits inevitably biases the benefit estimates upward. This same error also occurs with EPA's proposed "habitat replacement cost" (HRC) method, which plays an even more important role quantitatively in the overall analysis (in the Brayton Point Station case study). Hence, I defer further discussion of this extremely important error (of confusing benefits and costs) until section III.D, below.

Footnotes

20 The two methods proposed for valuing impacts on forage species are also discussed in the Case Study Analysis. The generic discussion is on pages A5-7 through A5-9.

EPA Response

In the cost-benefit analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E (DCN #6-0003).

EPA agrees that there are differences between costs and benefits but maintains that understanding and considering the replacement costs is an important tool in the regulatory process.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Once the effects of reductions in impingement and entrainment on commercial landings have been correctly identified (which, as I've emphasized above, EPA has not done), the next step in the economic benefits analysis is to assign an appropriate market value to the changes in landings. This is relatively straightforward, as long as reasonable estimates of future market values are employed.

EPA next seeks to convert the dockside market value of changes in commercial landings into a measure of the economic surplus that constitutes social benefits. In principle, this is not unreasonable, but EPA notes (on page A9-5 of the Case Study Analysis) that "to do this with primary analysis would be an extremely complex process..." A sensible approach instead might simply be to use the valuation of landings, recognizing that this provides an upper bound estimate of respective producers surplus, since some part of this revenue covers associated costs. <FN 21>

But EPA chooses to adopt a set of rules-of-thumb that cannot be said to have any basis in economic theory and which are based — at best — upon a very limited set of empirical examples. Using these rules of thumb, EPA proceeds to multiply commercial valuations by a minimum of 1.8 and a maximum of 3.2 to establish its estimated range of social benefits from commercial fisheries impacts. In some situations, it can be desirable to examine general equilibrium (or at least, multi-market) rather than partial equilibrium impacts, <FN 22> but there are four significant problems with EPA's approach.

First, as suggested above, it is arbitrary and not founded upon economic theory nor upon a broad survey of empirical research.

Second, it is not clear what is the nature of the secondary economic benefits that EPA wishes to estimate. In the context of 316(b), the correct measure of the commercial value is the in situ (in place) value of an increase in catch due to reduced I&E losses. The commercial value to seafood processors or retailers are not appropriate measures, since those values include value added from use of labor, capital, and other inputs to process, preserve, and transport fish, once caught. The appropriate value is the in situ value of an increase in catch, reflecting willingness to pay for the additional harvest, measured by the landed price, assuming that there is no significant change in fishing effort. <FN 23>

Third, in order for there to be significant changes in consumers surplus associated with changes in commercial fishery landings, there would have to be induced changes in retail prices, which would only occur if there were significant aggregate supply effects <FN 24> for individual species. EPA has not presented evidence that the very small anticipated changes in landings would result in anything other than trivial changes in market prices.

Fourth, if an appropriate multi-market or general equilibrium analysis of the benefit side were carried out, then the same reasoning about multi-market, general equilibrium effects should be estimated on the cost side, which is not done in current analysis. <FN 25> Hence, this, like all the problems I note, imparts a bias in EPA's analysis toward inflating estimated benefits of the proposed regulation relative to its costs.

Footnotes

21 That would represent a true upper bound. In fact, the one empirical study cited by EPA that examines an Atlantic coast fishery (Norton et al. 1983) found that producers surplus was approximately 15% of dockside revenues, not the 40-70% assumed by EPA. Furthermore, the open-access conditions which characterize most fisheries indicate that in the long term, new entry will dissipate much of any producers surplus. On the first point, see: Norton, V., T. Smith, and I Strand, eds. Stripers: The Economic Value of the Atlantic Coast Commercial and Recreational Striped Bass Fisheries. Maryland Sea Grant, UM-SG-TS-83-12. 1983.

22 Economists frequently analyze policies with a partial equilibrium approach, where only a part of the economy (such as a single product market or a single industrial sector) is examined, using the simplifying assumption that conditions in the rest of the economy are unchanged or trivial. More difficult — both conceptually and empirically — is general equilibrium analysis, in which an entire economic system is modeled, allowing for simultaneous determination of prices and quantities of all goods and services in the economy.

23 A conceptually correct and empirically feasible approach would be to employ general equilibrium derived-demand functions, as suggested by: Thurman, Walter N. and J. E. Easley, Jr. "Valuing Changes in Commercial Fishery Harvests: A General Equilibrium Derived Demand Analysis." Journal of Environmental Economics and Management 22(1992):226-240. In the present context, the welfare impacts that would thereby be derived may be approximated by the product of the landed price and the harvest rate. See: Just, Richard E. and Darrel L. Hueth. "Welfare Measures in a Multimarket Framework." American Economic Review 69(1979):947-954.

24 For the various affected species, the relevant markets are not local, but regional, national, or international.

25 In addition to the imbalance that is imparted by accounting for multi-market effects on the benefit side, but not the cost side, there is considerable opportunity for double-counting of benefits if the analysis is not carried out correctly. In this regard, EPA's own description of "secondary benefits" is cause for concern (Proposed Rule, page 17192). For example, EPA lists "property values" as an important category of secondary benefits. But property values capitalize amenity values, such as proximity to improved fishing opportunities. For this reason, one category of benefit estimation methods (econometric "hedonic property value methods") assesses the value of local environmental improvements by observing the variance in property values among areas with various levels of the environmental amenity in question. Thus, if EPA were to value improvements in recreational fishing through a RUM or benefit-transfer analysis, for example, and then add to it related increases in property values, at least some of the same values would likely be counted twice.

EPA Response

This comment questions many of the methods used by EPA in estimating commercial fishing benefits. Other commenters raised many of the same points. The key topics in these comments are addressed below. Further detail on the methods EPA used to estimate commercial fishing losses and benefits in the analysis for the final rule is provided in the regional study document prepared for the analysis for the final Section 316(b) Phase II rule (DCN #6-0003). For response to comments regarding methods used to translate impingement and entrainment data into measures of fish used to estimate benefits, see EPA's response to comments #316bEFR.005.009, #316bEFR.025.015, #316bEFR.029.105, #316bEFR.206.065, #316bEFR.305.003, and #316bEFR.306.506.

1) Rule-of-Thumb Approach to Estimating Economic Surplus Lost

Dr. Stavins notes that for the proposed rule EPA estimated total current losses in the commercial fishing sector by multiplying the estimated loss of gross commercial fishing revenues by a minimum of 1.8 and a maximum of 3.2. EPA developed these estimates in two steps. First, EPA estimated lost producer surplus by multiplying gross revenues lost by a minimum of 0.4 and a maximum of 0.7, based on evidence from the empirical literature indicating that producer surplus ranges from 40% to

70% of gross revenues in the commercial fishing industry. Second, also based on evidence from the literature, EPA assumed that producer surplus accounted for 22% of total economic surplus. Thus, EPA multiplied the estimated producer surplus lost by 1/0.22, or 4.55, to estimate total economic surplus. Applying this value to the 40% to 70% range results in a range of 1.8 (0.4 x 4.55) to 3.2 (0.7 x 4.55).

Dr. Stavins and other commenters felt that this method over-stated current losses of economic surplus in the commercial fisheries. Based on these comments, EPA reviewed and ultimately updated many of the empirical relationships used to estimate lost economic surplus due to impacts on commercial fisheries. The revised methods are described below in sections 2 through 4.

2) Producer Surplus

Based on a more thorough review of the empirical literature, EPA updated the assumptions used to estimate producer surplus lost due to impingement and entrainment. EPA still applies a benefits transfer-based rule-of-thumb method to estimate producer surplus as a range of percentages of gross revenues lost. However, based on a more comprehensive review of the empirical literature, EPA now assumes a ratio of 0% to 40% of gross revenues rather than the ratio of 40% to 70% applied at proposal.

2) Consumer Surplus

Changes in consumer surplus will arise if the change in commercial landings affects retail market prices for the impacted fish. After reviewing the estimated losses in landings due to impingement and entrainment at baseline -- and their expected reduction under the rule -- EPA does not expect the magnitude of changes in the commercial catch to be large enough to significantly affect prices for commercially caught fish. Without a change in prices, there is no change in consumer surplus as a result of this rule. Thus, in the analysis for the final Section 316(b) Phase II rule EPA estimates the change in lost consumer surplus to be zero.

3) Surplus in Secondary Markets

In the analysis of benefits for the proposed rule, EPA assumed that producer surplus in the commercial fishing sector accounted for 22% of the total economic surplus. This estimate included economic surplus that accrued to secondary consumers such as seafood processors and retailers. Without a change in prices, these secondary benefits will not be realized. Thus, in the analysis for the final Section 316(b) Phase II rule EPA estimates the change in economic surplus in secondary markets to be zero.

4) Short-run vs. Long-run

Many commenters suggested that benefits of reduced impingement and entrainment only accrue to the commercial fishing sector in the short run. These commenters note that in the long run in an unregulated fishery the potential to realize economic rents will attract additional fishing effort (e.g., via new boats added to the fleet or increased efforts by existing boats) until rents are reduced to zero. Thus, these commenters felt that long-term economic rents are only sustainable in a fishery where increased effort is restricted.

Since this is a national rule, it will affect both regulated and unregulated fisheries. The revised range that EPA uses to estimate producer surplus effectively captures both cases. The lower bound assumption that producer surplus is 0% of gross revenues reflects the case of zero long run benefits in an unregulated fishery. The upper bound assumption of 40% indicates that losses of producer surplus may be reduced by up to 40% of the reduction in gross revenues lost.

The 0% lower bound also captures the case of a fishery in which quantity is limited by demand rather than supply. If there is no demand for the additional catch resulting from reductions in impingement and entrainment, then the quantity supplied to the market will not change and the change in producer surplus will be zero.

It should also be noted that Office of Management and Budget guidance for conducting economic analysis in support of executive order 12866 recommends that sensitivity analysis be performed around the baseline assumption of the world as it is today. It can be argued that fisheries management agencies (e.g., regional fisheries management councils) have been tasked with designing strategies to improve efficient use of our fishery resources, and that benefits associated with this final rule could be affected by those fishery management decisions as they affect open access.

5) Discounting

Though it is not addressed directly in this comment by Dr. Stavins, his other comments on the analysis for the proposed rule indicate the need to discount benefits and costs. Other commenters also suggested that benefits estimates should be discounted because the benefits and costs of the rule will, in some instances, occur in different years. Specifically, these commenters noted that the costs of installing new technologies to reduce impingement and entrainment will be incurred before the benefits are realized in the form of increased commercial or recreational landings.

For the section 316(b) Phase II rule, the need to discount arises from two sources. First, at many facilities there will be a delay between the time the rule is enacted and the time facilities attain compliance and begin to reduce impingement and entrainment impacts. EPA addressed the need for this type of discounting in the analysis for the final rule - it is assumed that there will be a one year lag from the time that costs are incurred to the time that benefits begin to be realized. Second, some fish saved today will require one or more years to grow to a size at which anglers will harvest them. EPA also addressed the need for this type of discounting in the analysis for the NODA as well as in the analysis for the final rule. The estimated time it is assumed that it will take to reach a beneficial age is a function of biological factors and varies by fish species.

Further detail on the discounting methods used by EPA is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A14: Discounting Benefits (DCN #6-0003).

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Recreational Fishing Benefits

Methodology for Valuing Recreational Fishing Impacts (Case Study Analysis, Chapters A9, A10, A11)

There is a long-standing and extensive literature in environmental economics on the valuation of recreational activities, including those associated with fisheries. These valuation methods have the same objective as any and all valuation methods in economics, namely to provide unbiased and precise (low-variance) estimates of people's true willingness to pay for particular recreational experiences. The methods fall into two categories.

First, there are revealed preference methods, in which people reveal (unintentionally) their demand (willingness to pay) for non-marketed goods and services through observable behavior in other markets. These methods are well-regarded in economics, and tend to be econometric (that is, statistical) in nature. When the most sophisticated of these methods are appropriately applied, the results are thought to be quite reliable. Examples of revealed-preference methods in environmental economics include the hedonic property method, hedonic wage method, the so-called (but inappropriately named) travel cost method, and the random utility model. <FN 26> The last two have been applied frequently to value recreational fisheries, and — when correctly applied — these approaches can provide relatively reliable estimates.

The travel cost model may be thought of as examining the demand for the services of a site over some period of time, whereas the random utility model may be thought of as examining how individuals choose among a group of possible recreational sites each time a choice is made. Neither of these models is preferable in all situations; rather, there is a set of characteristics of the recreational fishery (or fisheries) in question that will determine which approach is likely to be better. <FN 27> Problems exist with both models, <FN 28> but it can fairly be said that the random utility model is the current state of the art for many applications.

Footnotes

26 One other revealed-preference approach is under development for valuing recreational fisheries. With this new approach, the demand for freely-available public goods, such as a recreational fishing experience, is estimated through analyzing the demand for a privately-traded option (that is, a fishing license) to use that public good. See: Stavins, Robert N. "Private Options to Use Public Goods: The Demand for Fishing Licenses and The Benefits of Recreational Fishing." Paper presented at the Allied Social Science Associations meetings, New Orleans, January 1997.

27 The gain with the random utility model in the ability to explain choices among sites as a function of the characteristics of available sites comes at the expense of an inability to explain the total demand for a recreational activity, such as the number of activity days in a season. See: Freeman, A. Myrick. The Measurement of Environmental and Resource Values: Theory and Methods. Washington, D.C.: Resources for the Future, 1993.

28 See the early discussion by: Bockstael, N.E., K. E. McConnell, and I. E. Strand. "Recreation." Measuring the Demand for Environmental Quality, eds. J. B. Braden and C. D. Kolstad. Amsterdam: North Holland, 1991.

EPA Response

EPA agrees that the random utility model (RUM) is the current state of the art for recreational fishing valuation, and that it can provide reliable estimates of recreational benefits. For the final Phase II 316b analysis, EPA has increased its reliance on RUMs to estimate recreational fishing benefits. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. In addition, benefit function transfer based on a revealed preference study is used for the North Atlantic region. For detail, see Chapter A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through H of the final Phase II Regional Studies document (DCN #6-0003).

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Stated preference (Contingent Valuation)

The other category of methods used to estimate peoples' willingness to pay for recreational experiences (and other environmental amenities) is known generally as stated preference methods, in which people are asked through surveys to state their willingness to pay for particular amenities, such as access to recreational fisheries with particular attributes. The first thing to be said about stated preference or survey methods — which often go under the label of "contingent valuation" — is that they are not universally accepted by economists. Indeed, it is fair to say that these methods are controversial within the economics community. <FN 29>

There is a consensus view in economics that when an appropriate and reliable revealed-preference approach is available for valuing a particular environmental amenity, then that approach should be used, rather than resorting to a stated preference approach, such as contingent valuation. On the other hand, it should also be acknowledged that for one class of environmental values — so-called non-use value — revealed preference methods are not available, and stated preference methods are the only possible alternative. I return to this in section III.C, below, on valuation methods for non-use value.

Footnotes

29 See, for example: Hausman, Jerry A., ed. Contingent Valuation: A Critical Assessment. Amsterdam: North-Holland, 1993. The authors of critiques in this volume include a remarkable set of leading economists, two of whom are Nobel laureates. For a more recent (and more balanced) view of the debates still raging among economists, see the following three articles: Portney, Paul R. "The Contingent Valuation Debate: Why Economists Should Care." Journal of Economic Perspectives 8(1994):3-17; Hanemann, W. Michael. "Valuing the Environment through Contingent Valuation." Journal of Economic Perspectives 8(1994):19-43; and Diamond, Peter A. and Jerry A. Hausman. "Contingent Valuation: Is Some Number Better than No Number?" Journal of Economic Perspectives 8(1994):45-64. All three articles are reproduced in: Stavins, Robert N. Economics of the Environment. Fourth Edition. New York: W. W. Norton & Company, 2000.

EPA Response

EPA agrees with Dr. Stavins, that revealed preference approaches should be used when available, and that stated preference methods (or benefit transfer based on stated preference methods) are the only alternative for valuing non-use values. For the final Phase II 316b analysis, EPA has increased its reliance on revealed preference methods to estimate recreational fishing benefits. EPA has estimated RUM models for four coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. In addition, benefit function transfer based on a revealed preference study is used for the North Atlantic region. For detail on recreational fishing benefits analysis, see Chapter A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through H in the Regional Case Study report (DCN #6-0003).

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Random Utility Model (RUM)

In the case studies that comprise EPA's empirical analysis of the recreational benefits of the proposed rule, the Agency uses random utility models for part of its analysis for three cases: Delaware Estuary Watershed, Tampa Bay Watershed, and Ohio River Watershed. But in none of these cases are the results of the original RUM analyses employed in EPA's ultimate benefit calculations. In four other cases (Brayton Point Station Facility, Pilgrim Facility, J. R. Whiting Facility, and Monroe Facility), EPA relies partly on an approach which is not a benefit-assessment method at all, which is without conceptual foundation, and which is empirically biased. This is the so-called Habitat Replacement Cost Analysis (HRC) method, which I discuss in section III.D, below.

EPA Response

For the final Phase II 316(b) analysis, EPA has increased its reliance on revealed preference methods to estimate recreational fishing benefits. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. In addition, benefit function transfer based on a revealed preference study is used for the North Atlantic region. Values from these analyses are included in the final benefit calculations. For detail on recreational fishing benefits analysis, see Chapter A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through H in the Regional Case Study report (DCN #6-0003).

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment # 316bEFR.005.035."

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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General/Benefit Transfer

Furthermore, for each and every one of the case studies, EPA relies — wholly or in part — on empirical results that were not derived from actual analyses of the cases in question. Instead EPA uses a benefits transfer approach, which simply means drawing upon results of previous studies of recreational fishery benefits for other fisheries in other locations. It is important to recognize that there are several careful steps that must be taken to develop reliable benefit transfer results, as documented in EPA's Guidelines for Preparing Economic Analyses.

First, the results of the benefit transfer approach can only be as reliable (at best) as the results of the underlying studies, which in the case of the 316(b) proposed rule are a combination of contingent valuation, travel cost, and random utility modeling. Second, if the original studies involve different resources in different locations, as is the case in many of the 316(b) benefit transfers, then the values themselves are problematic for transfer, even if the numbers were valid for the original applications. <FN 30>

In developing its benefit transfer values, EPA uses several studies to develop a range of results. But developing a range of values through benefit transfers, as EPA does, can be highly misleading because a range of results implies to most readers a uniform distribution of uncertainty across the entire range. It is much more likely that the relevant probability distribution is not uniform and quite possibly not symmetric. Furthermore, ranges developed from methods and studies of highly varying quality are particularly misleading, since equal weight is given to all methods and studies, regardless of their relative soundness and reliability.

Moreover, as noted in EPA's Guidelines for Preparing Economic Analyses, four alternatives benefit transfer methods are available: point estimate, benefit function, meta-analysis, and Bayesian (page 87). The simplest approach, point estimate, is — according to the EPA Guidelines -- "not generally recommended," but this is essentially the approach that EPA employs in the 316(b) economic analysis. Thus, EPA's implementation of the benefit transfer method appears suspect, both with regard to the analysis of individual studies and with regard to the specific method employed.

In the documentation supporting its proposed rule, EPA refers to a category labeled "Indirect Use Benefits" (Case Study Analysis, page A9-9), which are primarily benefits related to impacts on forage species. As with the case of commercial valuation, so too with recreational valuation, EPA proposes (page 17191) to use a highly problematic method for valuing forage species. EPA posits two approaches to value impacts on forage species. One approach, which makes sense in theory and can provide reasonable estimates if properly applied with a sufficiently refined model, is to examine the biological consequences of changes in forage species stocks on stock levels of recreational species. EPA refers to this as the "production forgone approach." <FN 31>

So, the correct approach is to develop a theoretically sound and empirically valid model of the impacts of alternative CWIS technologies on affected species, including forage species. The biological modeling and the subsequent bioeconomic modeling should then estimate how all of the stocks evolve through time, including the effects of changes in forage stocks on recreational stocks, which are then valued through appropriate revealed-preference methods, as discussed above.

EPA's other proposed approach for valuing forage species — inference from hatchery costs — is not a valuation method. The benefits of increasing the stocks of forage species cannot be estimated in economic terms by observing the costs of developing and introducing hatchery fish into wild populations. As explained previously, employing the costs of re-stocking forage species incorrectly substitutes costs for benefits. The approach is both theoretically unsound and likely to lead to upward biased benefit estimates.

Footnotes

30 These two key conditions for a reliable benefit transfer have been characterized, respectively, as "soundness" and "similarity." For a detailed investigation of benefit transfer methods, see the following study, cited in EPA's Guidelines for Preparing Economic Analyses: Desvousges, William H., F. Reed Johnson, and H. Spencer Banzhaf. Environmental Policy Analysis with Limited Information: Principles and Applications for the Transfer Method. Northampton, Massachusetts: Edward Elgar, 1998. The criterion of "similarity" is particularly challenging in the context of natural resource impacts, such as in the 316(b) context. This is because the value of goods and services associated with natural resources are inherently dependent upon their location.

31 A comment I made earlier in the context of commercial species also applies here. If there are values of forage species not associated with recreational (or commercial) impacts, then such values would be non-use values. The proper estimation of these is discussed below in section III.C of these comments.

EPA Response

The commenter states that in estimating recreational fishing benefits at proposal EPA relied on the simplest benefit transfer approach that is "not generally recommended" by the EPA Guidelines. Thus, EPA's benefits transfer method "appears suspect". For detail on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed generally accepted procedures, and has carefully applied benefit transfer methods.

For the North Atlantic region, EPA's benefit transfer uses the benefit function from the Hicks, et al., study recommended by several of those who commented as the most appropriate study for benefit transfer for the North Atlantic region. By using benefit function transfer, EPA was able to make appropriate adjustments to Hicks' model to estimate values for relevant changes in catch rates. This benefit function transfer follows accepted methods and was performed carefully to provide the best available estimates of values for changes in catch rates for the North Atlantic region.

For the Inland region, EPA did a benefit transfer using values from several studies. EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) in developing a benefits transfer approach for the Inland region. The steps were followed as recommended in the Guidelines when using BT: (1) describe the policy case; (2) identify existing, relevant studies; (3) review available studies for quality and applicability; (4) transfer the benefit estimates; and (5) address uncertainty. Further information on the methods EPA used to estimate recreational fishing benefits is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter H4: Recreational Fishing.

The commenter further states that the Agency used "highly problematic" methods for valuing forage species, including production foregone and inference from hatchery costs.

EPA provides its rationale for selecting the methods it used to evaluate I&E in Chapter A5 of the final Phase II Regional Study Document (DCN #6-0003). For harvested species, which represent less than 2 percent of total I&E losses, EPA used a simple, static model of foregone harvest that assumes that I&E losses of harvested species result in a reduction in the number of harvestable adults in years after the time that individual fish are killed by I&E and that future reductions in I&E will lead to future increases in fish harvest. The approach does not require knowledge of population size or the total yield of the fishery; it only estimates the incremental yield that is foregone because of the number of deaths due to I&E.

EPA recognizes that the assumption that the key parameters in its yield model are static is an important one that is not met in reality. However, by focusing on a simple interpretation of each individual I&E death in terms of foregone yield, EPA concentrated on the simplest, most direct assessment of the potential economic value of eliminating that death.
Although EPA's approach to modeling yield requires estimates of a large number of stage-specific growth and mortality parameters, the use of more complex fish population models would rely on an even larger set of significant data uncertainties and would require numerous additional and stronger assumptions about the nature of stock dynamics that would be difficult to defend with available data. Additional data uncertainties of population dynamics models include the relationship between stock size and recruitment, and how growth and mortality rates may change as a function of stock size and other factors. Obtaining this information for even one fish stock is time-consuming and resource intensive; obtaining this information for the many species subject to impingement and entrainment nation-wide was not possible for EPA's national benefits analysis.

In addition to a lack of data, there are numerous issues and difficulties with defining the size and spatial extent of fish stocks. As a result, it is often unclear how I&E losses at particular cooling water intake structures can be related to specific stocks. For example, a recent study of Atlantic menhaden (Brevoortia tryannus), one of the major fish species subject to impingement and entrainment along the Atlantic Coast of the U.S., indicated that juveniles in Delaware Bay result from both local and long distance recruitment (Light and Able, 2003). Thus, accounting only for influences on local recruitment would be insufficient for understanding the relationship between recruitment and menhaden stock size. Geographic stock delineation is a significant, ongoing problem in fisheries management.

Another difficulty in developing more complex models of harvested species is that it is fundamentally difficult to demonstrate that any particular kind of stress causes a reduction in fish population size. All fish populations are under a variety of stresses that are difficult to quantify and that may interact. Fish populations are perpetually in flux for numerous reasons, so determining a baseline population size, then detecting a trend, and then determining if a trend is a significant deviation from an existing baseline or is simply an expected fluctuation around a stable equilibrium is problematic. Fish recruitment is a multidimensional process, and identifying and distinguishing the causes of variance in fish recruitment remains a fundamental problem in fisheries science, stock management, and impact assessment (Hilborn and Walters, 1992 (DCN #2-019A-R11); Quinn and Deriso, 1999(DCN #2-019A-R45); Boreman, 2000 DCN #2-018A)). This issue was beyond the scope and objectives of EPA's § 316(b) benefits analysis.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Valuing Forage Species (incl non-use and non-landed)

Methodology for Estimating Non-Use Value (Proposed Rule, page 17193; Case Study Analysis, Chapter A9)

In its analysis of the proposed rule, EPA notes the potential importance of the category of non-use (or passive use) value, which refers to the aggregate of individuals' willingness to pay for an environmental amenity, apart from its direct or indirect use, because individuals derive utility (welfare) simply from knowledge of the amenity's existence. Such non-use value is controversial in economics <FN 32> and notoriously difficult to estimate. The only available methods for estimating non-use value are the stated preference methods, which — as emphasized above — are themselves controversial, not particularly reliable, and potentially biased. With these methods, people are asked through surveys to state their willingness to pay for particular amenities, such as access to recreational fisheries with particular attributes.

EPA maintains that due to budget and other constraints, it was unable to carry out any original stated preference surveys of non-use value. <FN 33> Instead, EPA proposes two surrogate approaches, and in doing so, it sacrifices any semblance of accuracy and reliability in estimating "benefits." First, EPA uses a rule-of-thumb in which non-use values are assumed to be equal to 50 percent of use values. There is no direct basis in economic theory for such an approach, and it is not supported by EPA's Guidelines for Preparing Economic Analyses. Nonetheless, EPA has used such metrics in other analyses, and similar approaches were employed in early studies two decades ago by some environmental economists. <FN 34>

It is now widely recognized by environmental economists that this so-called "50%-rule" is not a sound basis for benefit estimation, a fact which EPA appreciates. On page A9-10 of the Case Study Analysis, EPA recognizes three significant concerns with regard to this approach: (1) the very dated nature of the literature on which the ratio is based; (2) key differences among the underlying studies (and the current application); and (3) problems of applying the results in a consistent manner. EPA correctly identifies these significant problems with using this simple ratio technique, and notes that it intends in the future to revisit the literature and explore how best to apply benefit transfer methods for non-use value. This is commendable, but EPA proceeds to apply the "50% rule" in its current analysis of the proposed regulation.

Use of the 50% rule-of-thumb is particularly problematic in the present context, because the "rule" is based largely upon a literature review (carried out nearly twenty years ago by Fisher and Raucher, 1984) which did not include any studies which addressed the circumstances relevant for the proposed rule, namely non-use values linked with I&E impacts and/or CWIS impacts. Furthermore, it is very doubtful that non-use values in the I&E/CWIS context could be significant. The reason is that the anticipated I&E impacts of changes in CWIS technology cannot reasonably be characterized as affecting the existence of unique resources with high public awareness levels. <FN 35> There is surely no justification whatsoever for EPA's claim that its 50% rule-of-thumb provides "conservative" estimates (Proposed Rule, page 17193).

The other alternative approach EPA proposes for estimating non-use value is one of employing "restoration-based costs as a proxy for the value of the change in stocks." EPA uses this habitat restoration cost approach in several of its case studies. As mentioned above and as explored in detail in the next section of my comments, such an approach is completely invalid, without any foundation in economics, and likely to lead to highly biased and misleading results. This approach makes one of the gravest of errors in economics, confusing benefits and costs. Because of the importance of this error, I dedicate a complete section of comments to it, and turn now to consideration of EPA's claimed new method for valuing "benefits" — habitat replacement cost analysis. <FN 36>

Footnotes

32 See, for example: Hausman, Jerry A., ed. Contingent Valuation: A Critical Assessment. Amsterdam: North-Holland, 1993. Although the title of the volume refers to the empirical method for attempting to estimate non-use value, a number of the essays in the volume actually critique the underlying theoretical construct.

33 On page A9-10 (section A9-5 on "Nonuse Benefits") of the Case Study Analysis, EPA states: "In the case of the §316(b) proposed existing facilities rule, no primary research was feasible within the budgeting, scheduling, and the other constraints faced by the Agency."

34 Early studies by environmental economists developed and employed such rule-of-thumb ratios to estimate non-use values, including: Fisher, Ann and Robert Raucher. "Intrinsic Benefits of Improved Water Quality: Conceptual and Empirical Perspectives." Advances in Applied Microeconomics, Kerry Smith and Ann Dryden White, eds. Greenwich, Connecticut: JAI Press, 1984.

35 Contrast the anticipated marginal changes in fish stocks due to implementation of new CWIS technologies with, for example, the uniqueness and the high public awareness of the Grand Canyon or, for that matter, a built resource such as the Statue of Liberty, classic examples of resources for which non-use value is assumed to be a significant component of total value.

36 A third alternative noted by EPA (Case Study Analysis, page A9-11) for estimating non-use values in the absence of original empirical research is another benefit transfer approach, in which willingness-to-pay estimates for non-use value per household are employed. An early study which employed such an approach was: Stavins, Robert N. The Tuolumne River: Preservation or Development? Berkeley, California: Environmental Defense Fund, October 1983. Two major problems with this approach are: (1) identifying the appropriate willingness-to-pay measure per household for non-use (knowledge of existence, for example) value for the specific fishery and/or other ecological impacts of concern; and (2) identifying the appropriate number of households to which the benefit-transfer number should be applied. EPA takes note of the second problem, and consequently does not employ this approach.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. As stated in the NODA, EPA agrees with the commenters that the 50% rule relies on outdated studies. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis (DCN #4-0003).

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method"

(DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Use of Replacement Costs (HRC and hatchery-based)

Proposed Methodology for "Valuing Benefits": Habitat-Based Replacement Cost Analysis (Case Study Analysis, Chapter A11)

EPA notes that there may be willingness to pay for preservation of forage species because of their impacts on harvested commercial and recreational species. As explained above, the proper way to account for this is through an appropriate stock-recruitment model that correctly accounts for food web effects. Likewise, EPA notes that willingness to pay may exist among some individuals in society for I&E impacts not valued through the use value associated with commercial or recreational fisheries. Putting aside the serious concerns that exist regarding the concept of non-use value (see above), and putting aside as well the considerable controversy that exists regarding empirical (stated preference) methods for estimating non-use value, the fact remains that the only feasible means to attempt to estimate such non-use values is through one of the stated-preference methods, such as contingent valuation or conjoint analysis.

Unfortunately, in some of its case studies, EPA turns away from both of these approaches and employs instead a completely illegitimate method of analysis, which it claims is an alternative method for valuing benefits, but is actually nothing of the kind. EPA's "Habitat-Based Replacement Cost (HRC) Method" is — pure and simple — a measure of costs, not benefits. The habitat replacement costs are the design, implementation, administration, maintenance, and monitoring costs of various identified means of restoring under-water habitats in the hopes of producing the same in situ services and service flows that are associated with the various technological alternatives under consideration (Case Study Analysis, page A11-7). In other words, these are the costs of another alternative — and a very costly alternative — for achieving the same functions as targeted by the proposed regulation. While mitigation, restocking, and/or habitat restoration may be acceptable approaches as alternatives to the installation of specific technologies in order to offset I&E losses, the cost of such alternatives is in no sense whatsoever a reasonable proxy for the value (that is, the benefit) of reducing I&E.

It is very important that the approach taken by EPA with its completely invalid HRC method not be confused with legitimate applications of "defensive expenditure" or "averting behavior" methods of estimating benefits. Those methods are based upon observed actions, that is, individual behavior. In particular, a necessary condition for using defensive expenditures or averting behavior for purposes of benefit estimation is that the researcher observes people revealing their preferences by actually (and voluntarily) incurring costs to avert (or tolerate) the environmental disruption in question. <FN 37> This is obviously not the case with the hypothetical habitat replacement activities that EPA uses to develop its cost estimates. Indeed, EPA makes no claims that such activities have actually and voluntarily been carried out by individuals.

So, this method yields, at best, the cost of yet another alternative, not the benefit of the original alternative(s). EPA acknowledges this: "In other words, the HRC valuation estimate reflects the cost now for increasing the production of I&E species at an average annual level that would offset the losses in the current year and all future years, all else being equal" (Case Study Analysis, page A11-

8). On the same page, the document notes that the motivation for employing this new analytical method is “the explicit recognition that I&E losses [may] have impacts on the aquatic ecosystem and the public’s use and enjoyment of that ecosystem beyond that estimated by reduced commercial and recreational catches.” As emphasized above, I have no quarrel with the notion that if there are other use-values, they should be estimated with theoretically sound and empirically valid revealed-preference methods. Likewise, if there are legitimate “non-use values,” they should be estimated with original applications of the best stated-preference methods (or failing that, EPA could employ benefit-transfer methods, if appropriate studies are available for transfer purposes, as discussed above). But in neither case does the possible existence of excluded use values or unassessed non-use values justify the employment of this invalid approach, which is not a method of benefit estimation in any legitimate sense whatsoever.

In the Case Study Analysis (page A11-1), it is claimed that “the HRC method can be used to value a broad range of ecological and human service losses...” False. It is also asserted that “it can be used as an alternative to conventional valuation approaches that are based on recreational and commercial fishing impacts.” False. And it is stated that “in addition, HRC can supplement conventional valuation results...” False.

EPA has severely undermined proper economic analysis by examining the cost of habitat restoration and calling that cost a “benefit.” <FN 38> This sort of “avoided-cost method of benefit estimation” has long been recognized as fatally flawed. Applying it would mean that any proposed project (whether the project is good or bad for the environment) will appear to be desirable. By taking the next most costly approach of achieving an objective and calling that the project’s benefits, one will always find that “benefits” — so measured — exceed costs. This completely flawed reasoning will come back to haunt EPA when others use it to push for actions the Agency opposes. <FN 39>

Let us be clear. What EPA is proposing is not just an inferior method of benefit estimation (valuation); it is not a method of benefit estimation at all. All that can be demonstrated with this approach is that other approaches for reducing I&E, such as closed cycle cooling, are less costly or more costly than habitat restoration, not that the benefits of closed cycle cooling are greater than its costs. <FN 40> Note that the lengthy discussion of the Habitat-Based Replacement Cost Method in Chapter A11 of the Case Study Analysis, in particular the text on page A11-2, is not about the method at all, but about the concept of non-use value. There is a list of 28 references on this page, which might lead the unsuspecting reader to believe that there is a scholarly basis for the avoided-cost method of “benefit” estimation. In fact, every one of those references — some solid, some not — is on a different topic, non-use value; none consider, let alone validate EPA’s proposed methodology.

It is very disappointing to see this in the 316(b) analysis. Needless to say, such an approach is not supported by EPA’s Guidelines for Preparing Economic Analyses, nor by any sound guide to benefit-cost analysis or environmental economics, more broadly. <FN 41>

Footnotes

37 See: Freeman, A. Myrick. The Measurement of Environmental and Resource Values: Theory and Methods. Washington, D.C.: Resources for the Future, 1993; and Abdalla, C., B. Roacham, and D. Epp. “Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination.” Land Economics 68(1992):163-169.

EPA Response

EPA does not use the HRC approach as part of its benefit cost analysis for the final rule. More information can be found in Chapter A11 from the Case Study Analysis at proposal, that can be found in the docket (DCN #4-0003).

For the 316(b) Phase II regulation, the Agency was not able to monetize direct use benefits for 98.2% of the age 1 equivalent losses (the percentages by region are: California 95.2%, North Atlantic 99%, Mid Atlantic 98.4%, South Atlantic 98.1%, Gulf of Mexico 95.8%, Great Lakes 99.8% and Inland 99.9%). This is because the vast majority of I&E losses are of forage species that are not fully accounted for by the Agency's commercial and recreational fishing analyses.

To address this difficulty, the HRC results presented at proposal were intended to provide a way to quantify all I&E losses and provide an estimate of the cost to offset these losses through habitat restoration. Dr. Stavins rightly points out the HRC approach is not a benefits "valuation" estimation method or a proper measure of the proposed rule's economic benefits. EPA agrees, and to avoid any misunderstanding on this point, EPA has not included HRC results in its final analysis for the Phase II rule. Nonetheless, the Agency notes that an HRC analysis is a way to evaluate impingement and entrainment losses by considering the cost to offset these losses through habitat production.

HRC is related to approaches such as Habitat Equivalency Analysis (HEA) used by federal and state agencies to monetize damages in cases where physical impacts are otherwise difficult to value. As such, it provides useful information for the 316(b) rulemaking and related permitting activities.

HRC information can be properly used within the policy context for which it is well suited and originally intended -- as a useful mechanism for understanding the physical and monetary magnitude of the physical injury caused by impingement and entrainment. Indeed, EPA Region 1 has used this correct perspective and context for HRC as part of the permit for the Brayton Point facility.

Note that replacement costs based on fish stocking are used routinely to monetize the damages associated with fish kills, including fish losses resulting from impingement and entrainment (e.g., by the Maryland Power Plant Program). While all parties acknowledge that these hatchery-based replacement "costs" are not true "benefits values" per se, in the absence of information on public values, these are accepted and used as the only available alternative for monetizing damages. In fact, in its publication presenting estimates of fish replacement costs, the American Fisheries Society (1993 - DCN #4-1302) states that such costs can be considered a "proxy for value."

HRC is an alternative to this stocking-based estimate of replacement cost. It is based on the premise that stocked fish are not an exact replacement of fish lost from natural habitats. The HRC approach estimates replacement costs based on the production of wild fish as opposed to the artificial propagation of fish in hatcheries.

As both Dr. Stavins and EPA's Guidelines indicate, there are certain conditions under which replacement or avoidance costs can be appropriately used as a lower bound measure of value, such as when actions are undertaken voluntarily. In fact, many of the restoration options identified by local experts in the HRC analyses presented at proposal are voluntary actions and therefore, according to Dr. Stavins's own criteria, indicate "value."

While the Agency agrees that the HRC and hatchery costs are costs of replacement and not benefits, the Agency believes that understanding what it would cost residents in an area to replace CWIS losses is a very useful tool in the regulatory process and also informs decisions on the use of restoration. The HRC, like HEA, is a process that requires the analyst to quantify all losses of organisms caused by a CWIS and then consider the steps that would be necessary to offset these losses by means of habitat restoration. This is a useful tool in considering the environmental effect of CWIS losses.

Additional discussion of the HRC method and its uses is provided in the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003).

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

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Revealed preference

Proposed Methodology for "Valuing Benefits": Cost of Threatened and Endangered Species Restoration (Case Study Analysis, Chapter A12)

Related to but distinct from EPA's proposed Habitat Replacement Cost method is a proposed approach for valuing threatened and endangered (T&E) species (see Case Study Analysis, Chapter A12). EPA characterizes this approach as "societal revealed preference." The proposed method is not a revealed-preference method, has no foundation whatsoever in economic theory, is not accepted by economists as a legitimate empirical method of valuation, and is — like the HRC method — no more or less than a method of cost analysis mistakenly applied to the benefit-side of the ledger.

In its discussion of economic valuation methods for threatened and endangered species, EPA correctly indicates that "the only available way to directly estimate non-use values for special status species is through applying stated preference methods, such as the contingent valuation method (CVM)" (Case Study Analysis, page A12-13). EPA states, however, that it "cannot apply this approach to the 316(b) rulemaking because [of] the time and cost associated" with such methods. EPA then turns to an explication of the use of benefits transfer approaches (which I have discussed, in general, above). Despite the problems with such benefit transfer approaches, if properly done they would constitute a second-best alternative to original CVM studies in the current context.

It is very troubling, however, that EPA then indicates that "for the case study analysis, EPA pursued an innovative alternative to infer societal WTP [willingness-to-pay] to preserve T&E species" (Case Study Analysis, page A12-18). This "innovative alternative," like the HRC approach, is a totally invalid, non-economic approach for "benefit" estimation. It takes the historical cost to restore particular species under various government mandates (which were themselves adopted without any systematic benefit/cost analysis) as "an indication of societal revealed preference to preserve and protect these species" (page A12-18), thus using program costs as a measure of benefits.

This is a complete corruption of the notion of a revealed-preference method, an essential characteristic of which is that the benefits — the willingness to pay — is revealed by those individuals who are doing the paying, not by the judgement of others (in this case, legislatures, executive departments and agencies, and/or courts). There is no sound logic behind taking the costs that are incurred in achieving various government programs and policies as being indicative of the true benefits of those programs and policies.

The very purpose of a benefit-cost analysis is to assess projects, programs, and policies by comparing their benefits and their costs. The proposed methodology completely reverses this, and takes the fact that a project, program, or policy exists as evidence that its benefits exceed its costs (and therefore that its benefits can be proxied by its costs, at a minimum).

Use of this approach would imply that any project, program, or policy that is approved by a legislature, executive agency, or court has true benefits at least equal to its costs, and — presumably

— that failure of the government to carry out any project, program, or policy indicates that its social benefits are less than its costs. This makes a complete sham of the very process in which the proposed 316(b) rule is being considered. <FN 42> It also would render meaningless requirements for benefit/cost analysis, such as those imposed under Executive Order 12866.

Footnotes

42 This method of “valuation” is employed by EPA in its case study of the San Francisco Bay/Delta Estuary.

EPA Response

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

For EPA’s response to comments on the SRP, please see the response to comment #316bEFR.005.006

For EPA's response to comments on the limited feasibility of doing original Stated Preference work, please see the response to comment ##316bEFR.306.105.

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Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.03.05

Brayton Point

The Brayton Point Station Case Study Analysis (Proposed Rule, pages 17193-17200; Case Study Analysis, Chapter F1, F2, F3, F4, F5, F6, F7; Economic Analysis, Chapter C1, C2)

My comments in this section are based largely upon my review of "Part F: Brayton Point Station Case Study," pages F1-1 through F7-1 of the Case Study Analysis document. As I emphasized at the very beginning of these comments, the fact that I do not comment on any specific aspect of the various documents should not be taken as indicating that I find the methodologies or empirical applications therein to be valid. Thus, I focus my commentary on Part F on specific elements of the analysis, without thereby suggesting that areas on which I do not comment meet with my acceptance.

First of all, it is interesting that the case study identifies a considerable list of "major environmental stressors" of Mount Hope Bay, the body of water that may be affected by the Brayton Point facility, including: habitat alteration, dredging, coastal development, over-fishing, industrial pollution, nutrient pollution, wastewater runoff, climate change, and cooling water intake structure (CWIS) surface water withdrawals. It is striking that no attempt is made in the analysis to attribute quantitatively any of the claimed degradation of the commercial and recreational fisheries to any of the aforementioned factors, with the exception of Brayton Point Station's CWIS.

In part, EPA estimates the economic value of forage species impacts by estimating the replacement cost of these fish if they were restocked from hatcheries. As previously explained, this is inappropriate; it provides an estimate of costs, not of economic damages or economic benefits. This critical mistake of substituting some estimate of "avoided cost" for a valid measure of real benefits also occurs with EPA's proposed "habitat restoration cost analysis" (HRC), which plays an even more important role quantitatively in the Brayton Point analysis.

Once the effects of reductions in impingement and entrainment on commercial landings have been correctly identified — which EPA has not done — the next step is to assign an appropriate market value to the changes in landings. This is relatively straightforward, as long as reasonable estimates of future market values are employed. But EPA next seeks to convert the dockside market value of changes in commercial landings into estimates of the economic surplus that constitute social benefits. As EPA notes (on page A9-5 of the Case Study Analysis), "to do this with primary analysis would be an extremely complex process..." EPA's flawed substitute approach is to adopt a set of rules-of-thumb that have no basis in economic theory and which are based — at best — upon a very limited set of empirical examples.

Using such rules of thumb, EPA proceeds to multiply the commercial valuations by a minimum of 1.8 and a maximum of 3.2 to establish its estimated range of social benefits from commercial fisheries impacts. First, this approach is arbitrary and not founded upon economic theory nor upon a broad survey of empirical research; second, the appropriate measure is the in situ value of the induced increase in catch; third, there is no reason to anticipate that price changes would be induced by the relatively trivial quantity impacts of commercial landings in Mount Hope Bay; and fourth, if the benefit side of the analysis is to be treated in this fashion, then the same reasoning about multi-market, general equilibrium effects should be estimated on the cost side.

For purposes of valuing impacts on recreational fishing in the Brayton Point Station case study, EPA relies upon the benefits transfer approach, drawing upon results of previous studies of recreational benefits for other fisheries in other locations, where the methodologies employed were simple travel cost models and contingent valuation. <FN 44> Chapter F4 describes EPA's valuation of I&E impacts using benefit transfer methods. As I noted previously, obtaining reasonably reliable results using such benefit transfer techniques creates a number of challenges, which EPA has not met. In the Brayton Point Station case study, EPA transferred results from previous studies of other areas in which the methodologies employed included a simple travel cost model and contingent valuation. Since the original studies were of different resources, the values themselves are, at best, problematic for transfer, even if the numbers were valid for the original applications.

This is particularly striking because EPA could have drawn upon a much more appropriate source for its recreational benefit transfer method, namely a recent National Oceanographic and Atmospheric Administration (NOAA) study conducted by Hicks, et al. (1999) of the National Marine Fisheries Service (NMFS). <FN 45> The Hicks, et. al. (1999) study is the most appropriate source for benefit transfers of recreational fishing values for this work since it provides estimates of the value of a marginal increase in catch for relevant species groups for the affected geographic area. The methodology employed in that study was a random utility model.

The Brayton Point Case Study also includes an estimate of "non-use value." EPA did not carry out a stated-preference survey for the Brayton Point impacts. Instead it used a rule-of-thumb in which non-use values are assumed to be equal to 50 percent of use values. As I discussed above, there is no basis in economic theory for such an approach, and it is not supported by EPA's Guidelines for Preparing Economic Analyses. Furthermore, there is no justification for EPA's claim that its 50% rule-of-thumb provides "conservative" estimates (Proposed Rule, page 17193).

At this stage of the analysis, EPA estimates — using the methods identified above — that the annualized economic value of the losses due to I&E at the Brayton Point facility ranges from \$169,899 to \$308,257. If the most questionable elements — as identified above — are removed from the calculations, the range becomes \$95,731 to \$112,565, for a midpoint (mean) value that is less than half of the EPA midpoint. If EPA's 50% rule-of-thumb for non-use value is employed, then the range becomes \$107,579 to \$133,371. <FN 46>

Apparently not satisfied with these results, EPA employs its completely illegitimate method of analysis. The "Habitat-Based Replacement Cost (HRC) Method" — applied to the Brayton Point case in Chapter F5 (pages F5-1 through F5-39) — is a measure of costs, not of benefits. The habitat replacement costs are the costs of what is essentially another alternative — and a very costly alternative — for achieving the same functions as targeted by the proposed regulation.

The Brayton Point Station case study reveals the absurdity of this approach, which violates the most basic principles of economics. The document states (on page F5-1): "The HRC method is a supply-side approach for valuing I&E losses in contrast to the more typically used demand-side valuation approaches." Economic benefits, by definition, are measured as the area under a demand curve; economic costs, by definition, are measured as the area under a supply curve. This claimed method of benefit estimation is without foundation, is misleading, and imparts a horrendous bias to the results, as I document below. <FN 47> The so-called HRC valuation method should be removed from the regulation, and the “values” thereby calculated should be subtracted from all benefit estimates, including those carried out for the Brayton Point facility.

For the most part, I will not comment on the development of the empirical estimates of habitat-replacement costs — restoring submerged aquatic vegetation, restoring tidal wetlands, creating artificial reefs, improving anadromous fish passages, further improvements in water quality, and reducing fishing pressures (pages F5-2 through F5-34) — because those calculations are completely irrelevant and inappropriate for the purpose for which they are used in the Case Study, that is, for estimating benefits. <FN 48>

Table F5-39 (Case Study Analysis, page F5-35) sums up the total habitat replacement costs that would — according to EPA — be required to replace the species affected by entrainment and impingement due to cooling water withdrawals at the Brayton Point facility. The total is over $1 billion annually. <FN 49> EPA may have recognized the absurdity of these calculations. It proceeds to eliminate the largest component (artificial reef creation), leaving $28 million of costs annually. <FN 50> Not only is this a biased estimate of the costs of habitat replacement to achieve the specified purposes, but it is completely irrelevant to the calculation of the benefits of the technologies specified in the rule for achieving reductions in I&E at the Brayton Point facility. If EPA demonstrates anything with this calculation it is simply that various technological approaches under consideration — such as closed cycle cooling, which EPA characterizes as a CWIS technology — are less costly than various forms of habitat restoration, not that the benefits of such closed cycle cooling are greater than its costs.

In the penultimate chapter of the Brayton Point Station Case Study (Part F of the Case Study Analysis), EPA summarizes the results of its so-called “benefits analysis.” As should be clear by this point, the results reported in Table F6-1 (page F6-1) are biased and less than useless; they are misleading. In this table, EPA takes the midpoint <FN 51> of the standard estimates of benefits from Chapter F4's benefits transfer analysis <FN 52> (drawing upon previous revealed-preference and stated-preference analyses of benefits from other cases), and labels these as the minima of ranges of impingement and entrainment benefits. Then it takes the annualized HRC estimates from Chapter F5, and labels these as the maxima of ranges of impingement and entrainment benefits. This makes no sense. The “minima” of the ranges of “benefits” are the mid-points of EPA’s benefit estimates, and the “maxima” of the ranges are EPA’s cost estimates (for the most costly alternative method of achieving the rule’s objectives)!

Using EPA’s own calculations of benefits (from Chapter F4), without the invalid HRC estimates, the final row in Table F6-1 (“Total Baseline Economic Loss from I&E, 2000$, Annually”) should read as follows:

	Impingement	Entrainment
Range	$6,591 to $11,637	$163,362 - $296,620

If we remove the most questionable elements — as identified previously — from EPA’s calculations in Chapter F4, the final row in Table F6-1 would read as follows:

Impingement Entrainment
Range $3,769 to $4,450 $91,962 - $108,115

If we remove the most questionable elements but include EPA's 50% rule-of-thumb for non-use value, then the final row in Table F6-1 would read:

Impingement Entrainment
Range $4,297 to $5,319 $103,282 - $128,052

Importantly, the misleading results reported by EPA in Table F6-1 in the Case Study Analysis are carried over (apparently with adjustments for year 2001 dollars) into the Proposed Rule, Exhibit 19, on page 17199 of the Federal Register. There EPA reports annual average baseline losses (for Brayton Point) due to impingement of $9,000 to $890,000, and $200,000 to $28.3 million due to entrainment! These terribly biased and misleading results should read as follows, if the corrected range above were employed, updated to year 2001 dollars, <FN 53> and approximated by rounding as in EPA's reported figures in the Federal Register: $4,000 to $5,000 for impingement, and $105,000 to $131,000 for entrainment.

Returning to the Brayton Point analysis reported in Chapter F6 of Part F of the Case Study Analysis, we find that the results reported in Tables F6-2 and F6-3 are misleading, because EPA has again taken the midpoints from the standard estimates <FN 54> of benefits from Chapter F4's benefits transfer analysis, and labels these as the minima ("low") of ranges of impingement and entrainment benefits. Then it takes the annualized HRC cost estimates from Chapter F5, and labels these as the maxima ("high") of ranges impingement and entrainment benefits. This is mixing legitimate benefit estimates with cost estimates (of an exceptionally costly alternative method of achieving the rule's objectives) and falsely labeling those as "benefits."

A pictorial representation of a set of analytic procedures can be useful, and in the case of Figure F6-1 on page F6-3 of the Case Study Analysis, EPA provides an image of both the valid and the invalid methods it has applied to the Brayton Point Facility Case Study analysis. If this figure is intended to represent the calculation of the true economic values associated with impingement and entrainment at the Brayton Point Station, as the figure's title claims, then —at a minimum — the dollar amounts (of benefits) in the boxes labeled 4, 5, 6, and 7 need to be corrected as indicated above, and box 8 needs to be eliminated altogether. For similar reasons, the graphics and text in Figures B6-2 (a typographical error presumably, it should read F6-2) and F6-3 are misleading. These two figures should be eliminated.

In Table F6-4, EPA provides what it characterizes as a summary of omissions, biases, and uncertainties. EPA claims— quite incredibly — that every simplifying assumption and omission has led to understatement of benefits (or to unresolvable uncertainty), suggesting in the accompanying text here and elsewhere that the overall results provide an underestimate of the true benefits. This is patently false. To the contrary, note that the upward biases involved in EPA's reported estimates of the annual economic values of losses caused by impingement and entrainment at Brayton Point Station (and thus the benefits of reducing those losses) are absolutely massive. Referring to the results discussed above that are reported in Exhibit 19, on page 17199 of the Federal Register (and the more precise estimates on page 17204, Exhibit 26), we find that the total loss numbers (combining impingement and entrainment) reported by EPA for its "low" case are more than 100% greater than what EPA's own analysis would produce if incorrect elements of its analysis were eliminated, <FN 55> and approximately 21,000% (that is not a typographical error on my part, twenty-one thousand percent) greater than the correct elements of EPA's analysis would produce for its "high" case (EPA's "high" case employs its bogus HRC cost proxies instead of real value/benefit estimates). <FN 56>

Finally, in Chapter F7, EPA provides a brief summary of the conclusions it wishes to draw from the Brayton Point Facility Case Study. Given that the summary statistics provided are extracted from the calculations in the previous chapters of this case study, it goes without saying — based upon my comments above — that this brief chapter of conclusions is incorrect and misleading. As I have explained, EPA's benefit estimates (values of I&E losses) overstate what EPA could claim to be a reasonable estimate <FN 57> by up to 21,000% (twenty-one thousand percent). <FN 58>

Footnotes

44 The two key conditions, described previously, for a reliable benefit transfer are "soundness" (of the original study) and "similarity" (of the original study's target benefits and the actual application's apparent benefits). As explained above, EPA's benefit transfer in the Brayton Point case study fails on both criteria.

44 Hicks, Robert, Scott Steinback, Amy Gautam, Eric Thunberg, 1999. "Volume II: The Economic Value of New England and Mid-Atlantuc Sportfishing in 1994." U.S. Dept. of Commerce, National Oceanographic and Atmospheric Administration, National Marine Fisheries Service, NOAA Technical Memorandum NMFS-F/SPO-38 (August).

46 Sources for the numbers are as follows: value of commercial loss for entrainment (page F4-6 of the Case Study Analysis) and impingement (page F4-5); value of recreational loss for entrainment (page F4-5) and impingement (page F4-4); and non-use value for entrainment (page F4-9) and impingement (page F4-9).

47 The only situations in which such an estimate could be interpreted as providing benefit information would be one in which the aggregate of affected parties had revealed through their own market behavior that they were willing to pay this amount for the services (or knowledge) in question. This is obviously not the case here.

48 It should nevertheless be noted that these estimated costs of habitat restoration are wholly and grossly disproportionate to the real benefits as estimated by EPA. So, according to EPA's analysis, habitat restoration is not a viable alternative. There are numerous ways in which EPA has clearly over-estimated habitat restoration costs, as others will no doubt comment. Hence, from the existing analysis, it cannot be concluded that (some degree of) habitat restoration is an inappropriate approach to achieving the objectives of Section 316(b) in the case of the Brayton Point facility.

49 The exact amount is $1,045,218,361, which is an annualized amount, not a present value!

50 The exact amount is $28,306,491 per year.

51 EPA mis-calculated at least one of the "midpoints." Its benefit transfer mid-point for impingement is $9,114, not $9,077, as indicated in Table F6-1.

52 Although these estimates reflect, in part, theoretically sound benefit concepts and standard methods of estimating such benefits, there are also considerable problems with elements of EPA's calculations, as I indicated in my commentary on Chapter F4, and as I summarize below.

53 Adjustment from year 2000 to year 2001 dollars is carried out with EPA's inflation rate of 2%.

54 As I explained above, these estimates reflect, in part, sound benefit concepts and standard methods of estimating such benefits, but there are significant problems with elements of EPA's calculations, as summarized in my previous comments. These two tables exhibit another problem with EPA's benefit estimation procedures. Note that the results presented in Tables F6-2 and F6-3 are based on simple, linear proportionality, as if a given percentage reduction in flows would necessarily result in the same percentage change in benefits. On the contrary, it is necessary to estimate the impacts of any change in flows on actual entrainment and impingement, estimate the effects of such entrainment and impingement on mortality, estimate the effects of mortality of target and forage species on available catch through an appropriate stock-

recruitment model, and then estimate the real benefits of respective changes in commercial and recreational fishing opportunities, plus any appropriate changes in non-use values.

55 Compare $109,731 (from the final table in my comments above, allowing for EPA's 50%-rule estimate of non-use value and adjusting from year 2000 to year 2001 dollars at EPA's 2% inflation rate) with EPA's estimate of $244,000 (Proposed Rule, page 17204, Exhibit 26). EPA's estimate represents an upward bias of 122%.

56 Compare $136,038 (from the final table in my comments above, allowing for EPA's 50%-rule estimate of non-use value and adjusting from year 2000 to year 2001 dollars at EPA's 2% inflation rate) with EPA's estimate of $29,178,000 (Proposed Rule, page 17204, Exhibit 26). EPA's estimate represents an upward bias of 21,348%.

57 Employing EPA's own analysis, but with the invalid elements removed, in particular the attempt to employ an estimate of the cost of a more expensive way of accomplishing the rule's objectives as a measure of the "benefits."

58 Incredibly, the final paragraph of this concluding chapter of the Brayton Point Facility Case Study states that "EPA believes that the estimates developed here underestimate the total economic benefits of reducing I&E at Brayton Point."

EPA Response

This comment refers to the Brayton Point Case Study presented at proposal. Many of the analyses discussed by the commenter have been modified or eliminated for the benefits analysis for the final 316b Phase 2 rule, as discussed below.

First, EPA notes that the general information on the ecology of Mt. Bay referred to by the commenter was presented as background information only to provide a context for EPA's analysis. It was not EPA's intent to evaluate the relative importance of all environmental stressors affecting aquatic resources in Mt. Hope Bay.

Secondly, EPA notes that it did not use hatchery- or habitat-based replacement costs in its final analysis. For further detail, please refer to the response to comment 316bEFR.005.053 and the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003). This information addresses the commenter's concerns about the appropriate use of replacement costs.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

To estimate recreational fishing benefits for the North Atlantic region for the final rule, EPA applied a benefit-function transfer using a fishing site choice model developed by Robert Hicks from the National Marine Fisheries Service (NMFS), Office of Science and Technology (Hicks, et al., 1999). This study was recommended by the commenter.

EPA's final analysis did not use the 50% rule-of-thumb to estimate non-use benefits, as explained in response to Comment 316bEFR.005.034. For additional discussion of nonuse benefits, please see response to Comment 316bEFR.206.047.

Finally, EPA has not claimed, as the commenter asserts, that all omissions, biases, and uncertainties lead to an underestimate of true benefits. For additional discussion of uncertainty in the context of EPA's analysis, please see Chapter A6 of the Regional Analysis Document (DCN # 6-0003).

Comment ID 316bEFR.005.038

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.04

National Benefits

Extrapolation to National Benefits (Proposed Rule, pages 17203-17208; Economic Analysis, Chapter C3, C4, D1)

In Part C of the Economic Analysis, EPA summarizes the results of its eight case study analyses, and explains how the results from some of these case studies were extrapolated to the more than 500 facilities that are within the scope of the proposed rule. Given the severe problems with the methodologies employed by EPA in the case studies, as I have described above in generic terms in section III and as I have described in specific terms in regard to the Brayton Point Facility Case Study in section IV.A, I do not provide extensive comments here on EPA's attempt to extrapolate such highly biased case study results to the national level.

The summaries of the individual case studies — including but not limited to Brayton Point — provided in the text and tables in Chapters C1 and C2 and the extrapolations of some of those results to aggregates of particular regions and ecologies in Chapter C3 are highly biased and hence misleading in their current form. For example, in the case of the Brayton Point facility, Table C2-5 repeats the same mistakes made in Exhibit 19 and elsewhere, as I discussed in detail above. Chapter C3 adopts midpoints from its case study analyses for purposes of extrapolation and aggregation to national estimates.

Thus, the annual impingement and entrainment "best estimates of baselines losses" in the case of Brayton Point, for example, are claimed by EPA to be $450,000 and $14,261,000, respectively. But these "mid-points" of baseline losses (benefits of eliminating losses) are each calculated as the averages of the somewhat "reasonable" benefit estimates using "appropriate" benefit-estimation procedures (which I noted above, themselves carry a 100% upward bias) and the completely invalid "high" estimates in which EPA used an alternative, high-cost approach of achieving the rule's objectives as a false measure of losses and benefits (which I noted above, carry a 21,000% upward bias).

If, more appropriately, we draw upon EPA's own empirical estimates for Brayton Point, remove the most questionable elements — as identified previously — from EPA's calculations in chapter F4, but employ EPA's 50% rule-of-thumb for non-use value, then EPA's "best estimates of baseline losses" for impingement and entrainment at Brayton Point (mid-points from appropriately specified ranges) are $4,800 and $116,000, respectively. Inflating to year 2000 dollars, as EPA has done, this yields best estimates of $4,900 and $118,000, respectively, indicating that EPA's "best estimates" carry upward biases of 9,084% and 11,986%, respectively, for impingement and entrainment losses. To simplify matters, EPA's total "best estimate" (I&E combined) is reported as $14,711,000 (Proposed Rule, page 17204, Exhibit 26), which contrasts with a sensible estimate, based upon EPA's own numbers, of $123,000, thus indicating an overall upward bias in EPA's final results of 11,860%!

The highly biased Brayton Point numbers become part of the national totals, but are not used by EPA for purposes of extrapolation to other facilities. Considering the fact that EPA's purpose in carrying out the case studies was to develop a set of bases for extrapolation, it is interesting that the Brayton Point results are not used. No satisfactory explanation is provided in any of the documentation for this decision. Perhaps EPA recognized the absurdity of the Brayton Point results (due to the use of the invalid HRC method), and hence decided not to use these fundamentally flawed and highly misleading numbers as the basis for part of the national extrapolations.

In Chapter C4, EPA provides national-level estimates of the “benefits” associated with various regulatory options. The driving numbers behind these estimates are in all cases the national-level estimates of I&E losses, which as I have just explained, are highly biased, since those are based in turn on the case study analyses. Therefore, the results provided on overall regulatory benefits are exceptionally misleading. <FN 59>

For this and other reasons, the comparisons of “benefits” and costs carried out in Chapter D1 of the Economic Analysis — which EPA uses to support the proposed rule — are likewise misleading. All of the biased results from the Economic Analysis are carried over into the Proposed Rule as described in the Federal Register. For example, for the reasons I have explained here — in reference to the Economic Analysis — the results provided in Exhibits 24 (page 17203), 25 (17203-17204), 26 (17204), 27 (17205), 28 (17205-17206), 29 (17206), 30, 31, 32, 33 (17207), and 34 (17207-17208) are unreliable and highly biased, and as such, should not be the basis for this rule-making.

Footnotes

59 Furthermore, simple extrapolation and aggregation of a set of localized analyses is itself highly problematic. For example, even if partial equilibrium estimates of costs are acceptable for facility-level analyses, simple aggregation of such costs is bound to underestimate aggregate costs, because of the significant quantity-induced electricity price effects that would be induced.

EPA Response

In response to this comment and others like it, EPA has reviewed and revised the case study approach to estimating national benefits. The approach described in the comment pertains to the approach applied by EPA at proposal, and is no longer used. As described in the NODA, for the section 316(b) Phase II benefits analysis, EPA examined impingement and entrainment (I&E) losses, and the economic benefits of reducing these losses, at the regional level. All extrapolation is now based on losses per unit of average annual operational flow on a region-specific basis.

The estimated benefits were then aggregated across all regions to yield a national benefit estimate. The primary objective of the regional approach is to refine the scale of resolution of the benefits case studies conducted for proposal, so that extrapolations were within regions rather than nation-wide.

In addition to extrapolating at a regional level only, EPA also collected and analyzed data for a much greater number of facilities for the final rule.

Thus, for the analysis for the final rule, extrapolation was needed for a smaller number of facilities, was based on a broader range of analyzed facilities, and was performed between facilities in the same region and waterbody type.

In regard to the upward bias of results, the commenter's figures have been developed by eliminating methods that the commenter feels are invalid. The most significant of these is the HRC methodology used by EPA to measure the non-use value of fish lost to I&E. Please refer to EPA's response to comments on the HRC methods (316bEFR.005.035).

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis (DCN #6-0002).

Comment ID 316bEFR.005.039

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.0

Role of Trading

Proposed Trading Program (Proposed Rule, pages 17170-17173)

In Section VI.E.2 of the Proposed Rule (pages 17170 to 17173), EPA outlines briefly the possibility of establishing an "entrainment trading program" among Phase II existing facilities for the purpose of achieving overall (aggregate) standards of performance at lower cost. <FN 60> EPA is to be commended for having taken note of the potential of market-based instruments for achieving resource protection, and for having begun the process of thinking carefully about how such an initiative could be incorporated within an existing regulatory program.

Before I turn to the text of EPA's proposal and before I provide responses to some of the questions EPA has posed, I wish to express two general concerns regarding the proposed trading program. My first concern might be said to refer not to the proposal for the trading program itself, but to the broader context in which it arises. Although I have devoted a great deal of time over the past decade and a half to studying and working to implement market-based approaches for environmental protection, <FN 61> I believe it is important to keep in mind that improving the cost-effectiveness of regulations can take us only so far, particularly in the current context of the proposed regulation implementing section 316(b) of the Clean Water Act. Let me explain.

It is important to consider cost-effective means to achieve existing goals, and tradeable permit systems are good candidates for supplying those means. But when the ends — the goals or targets — are themselves highly flawed, we have to beware of "designing fast trains to the wrong station." I am referring to the tremendous inefficiencies that exist in regard to the targets that are established in the proposed rule, as I have discussed in great detail above. In Section 316(b), the environmental concern is the potential for damages due to impingement and entrainment of small fish, larvae, and eggs at water intake structures at power plants. That is a legitimate concern, of course, and common sense — as well as best-practice environmental economics — would tell us to employ technologies or other methods to reduce environmental damages up to the point where we have maximized the difference between legitimate benefits and legitimate costs.

Clearly, this means that the benefits of the technology chosen ought to be (at an absolute minimum) greater than the costs; otherwise we are actually making the world worse off, rather than better off. Under previous implementation of Section 316(b), EPA's approach to identifying the best technology has been to insist that firms undertake increasingly ambitious and expensive solutions until the "costs are wholly disproportionate to the benefits." <FN 62> Furthermore, as I have documented carefully in these comments, EPA's analysis of the benefits of the proposed rule is exceptionally biased.

Thus, in the present context, identifying a cost-effective approach — such as through tradeable permits — for achieving an irrational goal would indeed qualify as "designing a fast train to the wrong station."

Footnotes

60 All references to page numbers in Part V of my comments are to the Proposed Rule, unless otherwise noted.

61 See, for example, the following articles and books written for interdisciplinary and policy audiences: Stavins, Robert N., ed. Project 88 - Harnessing Market Forces to Protect Our Environment: Initiatives for the New President. A Public Policy Study sponsored by Senator Timothy E. Wirth, Colorado, and Senator John Heinz, Pennsylvania. Washington, D.C.: December 1988; Stavins, Robert N., ed. Project 88 -- Round II, Incentives for Action: Designing Market-Based Environmental Strategies. A Public Policy Study sponsored by Senator Timothy E. Wirth, Colorado, and Senator John Heinz, Pennsylvania. Washington, D.C.: May 1991; Hahn, Robert W. and Robert N. Stavins. “Incentive-Based Environmental Regulation: A New Era From An Old Idea?” Ecology Law Quarterly 18(1991):1-42; Stavins, Robert N. “Harnessing the Marketplace.” EPA Journal, Volume 18, Number 2, May/June, 1992, pp. 21-25; Stavins, Robert N. and Bradley Whitehead. “The Greening of Adam Smith.” The New Democrat, October 1992, pp. 15-17; Stavins, Robert N. and Bradley Whitehead. “Market-Based Environmental Policies.” Thinking Ecologically: The Next Generation of Environmental Policy, eds. M. Chertow and D. Esty, pp. 105-117. New Haven: Yale University Press, 1997; Stavins, Robert N. “Market-Based Environmental Policies.” Public Policies for Environmental Protection, eds. Paul R. Portney and Robert N. Stavins. Washington, D.C.: Resources for the Future, 2000; Stavins, Robert N. “Experience with Market-Based Environmental Policy Instruments.” Handbook of Environmental Economics, eds. Karl-Göran Mäler and Jeffrey Vincent. Amsterdam: Elsevier Science, forthcoming 2002; Stavins, Robert N. “Lessons from the American Experiment with Market-Based Environmental Policies.” Harnessing the Hurricane: The Challenge of Market-Based Governance, eds. John Donahue and Joseph Nye. Washington: Brookings Institution Press, forthcoming 2002. For more technical articles on the design and use of market-based instruments for environmental protection, see: Stavins, Robert N. Environmental Economics and Public Policy: Selected Papers of Robert N. Stavins, 1988-1999. Cheltenham, United Kingdom: Edward Elgar Publishing Ltd., 2000.

62 In section I of these comments, I discuss in detail the problems with such a decision criterion, and the attraction of a criterion whereby the (positive) difference between benefits and costs is maximized.

EPA Response

Please see response to comment 316bEFR.005.020 regarding the relationship between costs and benefits. Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.005.040

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.07

RFC: Harmonize of permit reissuance with trading

My second general concern can be characterized as a caution: with tradeable-permit systems, as with any regulatory approach, the devil tends to be in the details. Perhaps some reviewers of EPA's proposed rule will be interested in modifying EPA's tradeable-permit proposal in ways that would appear to lead to greater environmental achievements. There are good ways and bad ways of doing that, and a prominent example of the latter is the "20% rule" which became part of EPA's criteria air pollutant emissions trading program in the 1970's.

In response to the wishes expressed by some reviewers of that proposed tradeable permit mechanism, EPA modified the program so that each time a permit was exchanged, its quantitative value (expressed in tons) would decrease by 20%. The result, of course, was a strong disincentive for trading, and so there was much less trading than there otherwise would have been, and aggregate compliance costs were much greater than they needed to be (and there was little improvement in environmental quality, since the only way it would take place was when there was a trade).

The alternative and vastly preferable approach is to avoid any such "taxes" or ratios on trading. If it is desired to reduce aggregate pollution levels simultaneously with the instigation of a tradeable permit program, then the cost-effective way to do so is with a system of permits that themselves decrease in magnitude over time (in the case of a cap-and-trade program). In this way, the desired environmental improvement is actually achieved (unlike in the ratio approach, which discourages trading and hence discourages improvements) and it is accomplished cost effectively, since a high level of trading is not discouraged.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.005.041

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.0

Role of Trading

Having expressed these two caveats and concerns, I wish to note that a well-designed trading program could provide greater flexibility to permitees and so facilitate the achievement of reasonable targets (not those contained in the current rule, in my judgment) at substantial cost savings by providing greater incentives for voluntary reductions, technology innovation, and diffusion. <FN 63> Experiences with trading programs, both in the United States and elsewhere, have confirmed our theoretical expectations that aggregate targets can be achieved cost-effectively if clear legal authority for trading is provided (well-developed property rights), well-defined fungible units of trade are established, transaction costs are minimized by avoiding requirements for prior government approval of trades, <FN 64> clear protocols established to quantify units to be traded, and reasonable mechanisms for compliance are established. <FN 65>

So, although the proposal for entrainment trading is new in some ways, the degree of its innovation should not be exaggerated, lest we fail to learn from previous experience. For example, EPA indicates on page 17170 that the trading program "differs from previous trading strategies implemented by EPA because it involves trading living resources rather than pollutant loads." This may be true (and EPA is to be commended), but we should not lose sight of the fact that tradeable permit programs have a very long history of use in the natural resources realm in tradeable development rights (TDRs), wetland mitigation banking, and individual transferable quotas (ITQs) for fisheries, many of which programs predate more recent applications of trading mechanisms to reducing pollutant emissions.

Footnotes

63 See, for example: Stavins, Robert N., Adam B. Jaffe, and Richard G. Newell. "Technological Change and the Environment." Handbook of Environmental Economics, eds. Karl-Göran Mäler and Jeffrey Vincent. Amsterdam: Elsevier Science, forthcoming 2002.

64 See: Stavins, Robert N. "Transaction Costs and Tradeable Permits." Journal of Environmental Economics and Management 29(1995):133-148.

65 Penalties for non-compliance should not be so large as to fail to be credible, but should be set greater than the anticipated equilibrium price of permits, that is, the marginal cost of compliance.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.005.042

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Turning to some of the specific issues that EPA raises, it asks whether the trading program should be expanded to include impingement (as well as entrainment) of aquatic organisms. My answer is yes, because numerous technological and process alternatives affect both entrainment and impingement.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.005.043

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.03

Spatial scale for entrainment trading

What should be the spatial scale for trading? EPA considers various alternatives: limiting trading to specific waterbodies, specific watershed, or general waterbody types. There are arguments in favor of each approach, but the rebuttable presumption in my view ought to be to establish the largest geographic limits feasible in order to provide maximum flexibility (and thus greater cost-effectiveness). Concerns about localized impacts can then be addressed in a manner parallel to the approach taken in the sulfur-dioxide allowance trading program under the 1990 Clean Air Amendments wherein only those trades are allowed that do not violate emission rate limits found in individual plant permits (included in corresponding State Implementation Plans, which are designed to achieve and maintain ambient air standards).

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale for trading.

Comment ID 316bEFR.005.044

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.04

RFC: Potential trading units/ credits

What should be the unit for regulation? This question arises with any environmental regulation, not just with trading. At the extreme, risks associated with environmental end-points might seem to be the appropriate units for regulation and thus for trading with any environmental problem. But this is virtually never done, because the implementation costs are excessive to the point of infeasibility. In the pollution context, one step down is exposure, and another step down is ambient concentration, then emissions, and then inputs (such as the lead content of gasoline). A level for trading should be chosen not because it is closest to what might seem to be the theoretical ideal of the environmental end-point, but because that level of trading will result in achieving given targets at the lowest cost over time, taking into account not only technological costs of meeting the program requirements but also monitoring and enforcement costs.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading. EPA cannot see how trading risk, exposure, ambient concentration, emissions or inputs in the context of section 316(b) could possibly be implemented. The author of this comment has not provided adequate information for EPA to consider these units of trading. However, the decision whether to approve a trading program under § 125.90(c) will be made on a case-by-case basis.

Comment ID 316bEFR.005.045

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.05

RFC: Include Phase I facilities in trading program

What about new facilities? This is another question that arises with virtually any environmental regulatory program, including trading programs. New facilities should be allowed to engage in trade for precisely the reason that EPA notes, the greater scope for trading (thicker market) will have the effect of lowering compliance costs, which will make it easier for sources to meet performance requirements.

EPA Response

The section 316(b) Phase I New Facility Rule did not authorize trading. EPA has elected not to make any amendments to the New Facility Rule to allow for trading. Thus, the Phase I rule does not authorize new facilities to trade with each other to comply with the underlying technology-based standards.

Comment ID 316bEFR.005.046

Subject Matter Code 20.0

Role of Trading

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Finally, it should be recalled that EPA identifies (in the Brayton Point and other case studies) a considerable list of "major environmental stressors" of the waterbodies in question, including: habitat alteration, dredging, coastal development, over-fishing, industrial pollution, nutrient pollution, wastewater runoff, climate change, and cooling water intake structure surface water withdrawals. If the desire is to achieve real environmental improvements while keeping costs down, then surely greater cost-effectiveness could be achieved by expanding trading beyond power plants to include potential offsets from other sources of the major environmental stressors.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule. Section 316(b) of the Clean Water Act intends to minimize the adverse environmental impact associated with cooling water intake structures. In order to qualify as an alternative regulatory requirement under § 125.90(c), a State's voluntary trading program would need to result in environmental performance within a watershed that is comparable to the reductions of impingement and entrainment that would otherwise be achieved under the requirements established at § 125.94. A trading program that includes other stressors such as habitat alteration, dredging, coastal development, overfishing, industrial pollution, nutrient pollution, wastewater runoff, and climate change might not satisfy the requirements of § 125.90(c) because these types of trades could introduce comparability and implementation challenges that would be difficult to overcome. EPA also questions whether such a program would be consistent with the recent Water Quality Trading Policy. Thus, it is doubtful whether such a program would not meet the requirements for approval.

Comment ID 316bEFR.005.047

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

The proposed 316(b) rule and the analysis used by EPA to support it are of great importance for two reasons. First, 550 facilities nation-wide will be subject to the Phase II rule, accounting for 56% of nation-wide electric generation. Second, generic methodologies employed in support of the proposed rule, such as those used for estimating benefits and costs, may well be employed for other rules in the future.

EPA Response

Please refer to the response to comment 316bEFR.005.002 in subject matter code 9.03.

Comment ID 316bEFR.005.048

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

First, in regard to EPA's discussion of alternative decision criteria, all of the alternatives would assess the value of CWIS technologies based on their benefits and costs. The best technology, from an economic perspective, is the one with the highest net benefits (positive difference between benefits and costs) to society. This is the technology that will be identified by the specific form presented in the Proposed Rule of criterion (4) — the benefits should justify the costs test — whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.005.049

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Second, I examined EPA's consideration of "economic practicability" and "affordability," and identified how these concepts can be interpreted to yield economically sensible and operational decision criteria. For the firm this led to the standard net present value (NPV) criterion, in which the firm should adopt a technology if the present discounted value of the anticipated net returns from that technology is greater than the present discounted value of anticipated net returns from alternatives, including the status quo. For a society-wide perspective, the result was the social net present value criterion, in which it is in society's interest that a technology be adopted by the firm if the present discounted value of anticipated net social benefits (including environmental benefits) is greater than the present discounted value of anticipated net social benefits from alternatives, again including the status quo. In comparison, EPA's apparent definition of "economically practicable" or "affordable" — based on a technology's costs relative to a firm's or facility's revenues — could not be based upon a decision criterion with any normative standing in economics. Such an approach would tell us nothing about whether the technology helps to achieve specific objectives, whether it does so at minimum cost, or whether an alternative investment would provide greater net benefits to the company, the environment, or society as a whole.

EPA Response

Please refer to the responses to comments 316bEFR.005.021, 316bEFR.005.022, and 316bEFR.005.023 in subject matter code 9.01.

Comment ID 316bEFR.005.050

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.02

Commercial Fishing Benefits

In the third section of my comments, I examined EPA's methodology for evaluating the benefits of the proposed 316(b) regulation. First, I examined EPA's methodology for valuing commercial fishing impacts. Such changes in fish stocks and related catch levels are best analyzed with an appropriate bioeconomic "stock-recruitment model" that captures these complex relationships over time, but EPA departs from this in ways that impart a significant bias to its results. One is the so-called precautionary approach described by EPA, and another is the attempt to value impacts on forage species outside of a properly specified stock-recruitment model, such as by examining hatchery costs. Another problem with EPA's approach to valuing commercial fisheries impacts is its unfortunate adoption a rule-of-thumb by which it multiplies commercial valuations in a misguided effort to identify general equilibrium effects. This, like all of the problems I noted, imparts a bias in EPA's analysis toward inflating estimated benefits of the proposed regulation relative to its costs.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use hatchery replacement costs or the 50% rule-of-thumb to estimate non-use benefits. For a discussion of fish population modeling in the context of EPA's 316(b) analysis, please see response to Comment 316bEFR.005.009. For a discussion of the term "precautionary approach," please see response to Comment 316bEFR.005.026.

Comment ID 316bEFR.005.051

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.01

Recreational Fishing Benefits

I also considered EPA's methodology for valuing recreational fishing impacts, where I noted that there is a long-standing and extensive literature in environmental economics on the valuation of recreational activities, including those associated with fisheries. EPA relies — wholly or in part — on empirical results that were not derived from actual analyses of the cases in question, drawing upon results of previous revealed-preference and stated-preference studies of recreational fishery benefits for other locations. In my comments, I reviewed the problems with using such benefit transfer techniques.

EPA Response

For detail on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed generally accepted procedures, and has carefully applied benefit transfer methods.

For the North Atlantic region, EPA's benefit transfer uses the benefit function from the Hicks, et al., study recommended by several of those who commented as the most appropriate study for benefit transfer for the North Atlantic region. By using benefit function transfer, EPA was able to make appropriate adjustments to Hicks' model, to estimate values for relevant changes in catch rates. This benefit function transfer follows accepted methods and was performed carefully to provide the best available estimates of values for changes in catch rates for the North Atlantic region.

For the Inland region, EPA did a benefit transfer using values from several studies. EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) in developing a benefits transfer approach for the Inland region. The steps were followed as recommended in the Guidelines when using BT: (1) describe the policy case; (2) identify existing, relevant studies; (3) review available studies for quality and applicability; (4) transfer the benefit estimates; and (5) address uncertainty. Further information on the methods EPA used to estimate recreational fishing benefits for the Inland region is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter H4: Recreational Fishing.

Comment ID 316bEFR.005.052

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA notes the potential importance of non-use value, which is controversial in economics and notoriously difficult to estimate. EPA did not carry out any original surveys of non-use value, but employed two alternatives in the 316(b) analysis. First, EPA used a rule-of-thumb in which non-use values are assumed to be equal to 50 percent of use values. There is no basis in economic theory for such an approach, and there is no justification for EPA's claim that its 50% rule-of-thumb provides "conservative" estimates.

EPA Response

For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.005.053

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Despite the significance of these problems and outright errors, those mistakes pale by comparison with EPA's attempt to introduce what it characterizes as an alternative method of valuation and benefit estimation, namely the "Habitat-Based Replacement Cost (HRC) Method," which is not a method of valuation or benefit estimation at all, but a method of assessing costs. This method estimates the costs of another alternative — and a very costly alternative — for achieving the same functions as targeted by the proposed regulation. If there are omitted use-values, they should be estimated with theoretically sound and empirically valid revealed-preference methods. If there are legitimate "non-use values," they should be estimated with original applications of the best stated-preference methods. But in neither case, does the possible existence of excluded use values or unassessed non-use values justify the employment of this wholly invalid approach, which is not a method of benefit estimation in any legitimate sense.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see EPA's response to comment #316bEFR.005.035. Please also see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method.

For the cost-benefit analysis for the final rule, the angling index was not used. Thus, all extrapolations were done based on flow. (Please refer to EPA's response to comment #316bEFR.041.037 for details on the use of flow as a basis for extrapolation.) In addition, for the final analysis, EPA only extrapolated losses and benefits for recreational and commercial impacts. For these categories, only a single point estimate was reported, so no midpoint was calculated.

Comment ID 316bEFR.005.054

Subject Matter Code 10.03.05

Brayton Point

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

In the fourth major section of my comments, I reviewed EPA's application of its "benefit assessment" methods for the analysis of case studies, which form the sole basis of its national-level benefit estimates. My comments focused on the Brayton Point Station Facility Case Study. Using flawed methodologies for estimating commercial and recreational values, combined with the wholly invalid HRC method of using the cost of a very expensive alternative means of achieving the rule's objectives as an increment to benefits, EPA comes up with estimates that are not just highly biased upward, but truly absurd. The total loss numbers (combining impingement and entrainment) reported by EPA for its "low" case are more than 100% greater than what EPA's own analysis would produce if incorrect elements of its analysis were eliminated, and approximately 21,000% (twenty-one thousand percent) greater than the correct elements of EPA's analysis would produce for its "high" case (EPA's "high" case employs its invalid HRC cost proxies instead of real value/benefit estimates). EPA's "best estimate" of baseline I&E losses (and hence, benefits) at the Brayton Point Station facility carries an upward bias of approximately 12,000%!

EPA Response

The results of the HRC analysis referred to by the commenter are not included in EPA's analysis for the final 316b Phase 2 rule. For additional discussion of HRC, please refer to the document entitled "Habitat Based Replacement Cost Method" (DCN # 6-1003) and response to Comment 316bEFR.005.035.

Comment ID 316bEFR.005.055

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.07

RFC: Harmonize of permit reissuance with trading

Finally, in the fifth major section of my comments, I reviewed EPA's proposal for an entrainment trading program. I noted that EPA is to be commended for having begun the process of thinking carefully about how market-based instruments, such as a trading program, could be incorporated within the 316(b) regulatory structure. But identifying a cost-effective approach — such as through tradeable permits — for achieving the goal indicated in the current Proposed Rule would qualify as "designing a fast train to the wrong station."

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.005.056

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code 20.0

Role of Trading

On the positive side, I noted that a well-designed trading program could provide greater flexibility to permitees and thus facilitate the achievement of reasonable targets (not those contained in the current rule) at substantial cost savings by providing greater incentives for voluntary reductions, technology innovation, and diffusion.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.005.057

Author Name Robert N. Stavins

Organization John F.Kennedy School of Government, Harvard University

Subject Matter Code OPP

General Statement of Opposition

In summary, the comparisons of "benefits" and costs carried out in the Economic Analysis and the Case Study Analysis — which EPA uses to support the Proposed Rule in the Federal Register — are biased and misleading. The analysis is extremely flawed, and biased toward greatly exaggerating the rule's implementation benefits relative to its costs. EPA claims that its various assumptions and omissions lead to significant underestimates of true benefits, but there is no basis for this claim. On the contrary, through mistakes and outright faulty analysis, EPA has produced estimates of benefits that are highly upward biased, and should therefore not be used as part of the basis for this rule-making.

It was clearly challenging for EPA to carry out this large-scale and detailed analysis. But it is very disappointing to see flawed reasoning, confused concepts, and fundamentally invalid research methods in what is purported to be a reasonable and unbiased analysis. Needless to say, such approaches are not supported by EPA's Guidelines for Preparing Economic Analyses, OMB's Guidelines, nor any other sound guide to benefit-cost analysis or to environmental economics more broadly. Good analysis is good analysis, and bad analysis — by any other name — is just that.

I close these comments on a personal note. I have invested a considerable amount of time and effort over the past decade working with EPA to help its dedicated and talented staff of economists and policy analysts use correct conceptual frameworks for economic analysis and the best empirical methods for developing unbiased estimates of benefits and costs. For this reason, it has been disappointing, troubling, and ultimately painful to review this analysis and provide these comments.

I believe that the numerous, serious problems I have identified would not have occurred had the proposed rule and its economic analysis been subjected to wide internal review by EPA's economics staff. As I said at the outset, I believe that EPA's leadership recognizes the importance of using the best scientific and economic analysis for this and all other rules. It is my hope that the comments I have offered will help foster the execution of a sound economic analysis of the proposed rule and the development of an environmentally and economically sensible rule for implementation of Section 316(b) of the Clean Water Act.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Paul E. Reynolds

On Behalf Of:

Hoosier Energy Rural Elect. Co-op

Author ID Number:

316bEFR.006

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.006.001

Author Name Paul E. Reynolds

Organization Hoosier Energy Rural Elect. Co-op

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Lakes and Ponds Hoosier

Energy built a cooling lake (Turtle Creek Reservoir) expressly for the purpose of complying with restrictions on heat rejection rates. EPA should consider this lake a treatment system and not “Waters of the United States” thereby exempting this facility from the 316(b) regulations. Even if EPA decides not to designate this lake a treatment system, EPA should determine that this cooling system constitutes a “closed cycle recirculating system” and is, therefore, in compliance with the 316(b) rules.

EPA Response

See section II.C. of the preamble to the final rule. As noted in that section, the determination of whether a particular cooling pond is or is not “waters of the United States” is to be made by the permit writer on a case-by-case basis. Such an approach is most appropriate given the many criteria and site-specific factors that must be considered and assessed when applying the relevant definitions and regulations to specific existing facilities. Similarly, whether use of a specific pond or reservoir meets the definition of a closed-cycle, recirculating system, as well as whether a specific cooling pond is considered a waste treatment system, also will be determined on a case-by-case basis.

Comment ID 316bEFR.006.002

Author Name Paul E. Reynolds

Organization Hoosier Energy Rural Elect. Co-op

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Cost - Benefit Test

The cost-benefit test is the key to the successful implementation or failure of this rule. If EPA adopts their framework as proposed, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

EPA has included a site-specific compliance option based on cost-benefit considerations.

Comment ID 316bEFR.006.003

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Author Name Paul E. Reynolds

Organization Hoosier Energy Rural Elect. Co-op

"Significantly Greater"

The proposal provides for a site-specific determination of the "best technology available" if the costs of compliance at a site would be "significantly greater" than either the benefits of meeting the performance standards or the cost of what the agency considered. EPA must provide a clear definition of what is meant by "significantly greater." To maximize net benefits to society, economic theory would dictate that this should be interpreted to mean any cost benefit ratio greater that 1:1. This reflects the most cost-effective, performance-based outcome.

EPA Response

Under § 125.94(a)(5), a Phase II existing facility may seek a site-specific determination of best technology available if the Director determines, based on the facility's demonstration, that its compliance costs would be significantly greater than the costs determined by the Administrator in establishing the final rule performance standards, or if its costs of compliance are significantly greater than the benefits of complying with the performance standards at the facility. As discussed in the proposed rule at 67 FR 17145 - 17146 (April 9, 2002), EPA has adopted the significantly greater cost-cost standard, rather the wholly disproportionate standard used in the Phase I rule, based on the fact that new facilities, regulated under Phase I, have greater flexibility than existing facilities, regulated under Phase II, in selecting the location of their intakes and technologies for minimizing adverse environmental impact so as to avoid potentially high costs, and it is therefore appropriate to push such facilities through use of a more stringent economic standard. In contrast, Phase II existing facilities encounter more substantial retrofit challenges (e.g., retrofitting an existing facility requires special consideration of various factors, including but not limited to the adequacy of space to accommodate a technology, approval and special conditions to locate such technology, potential redesign of intake, piping and cooling system components, often unique construction concerns, and secondary effects) and associated costs, and thus warrant somewhat broader flexibility. In addition, in contrast to the Phase I rule, the Phase II rule affects a significant portion of existing electric generating capacity. Thus, EPA believes it is appropriate to set a lower cost threshold in this rule to avoid economically impracticable impacts on energy prices, production costs, and energy production that might otherwise occur.

EPA has not expressly defined the term "significantly greater" in this rule. The Agency believes that a general standard, to be applied by the Director on case-by-case basis, is more appropriate for application in this rule since such a standard preserves reasonable discretion for the Director to compare assessments of costs and/or benefits, and make determinations that ensure that the costs of the rule are economically practicable or that there is a reasonable relationship between the costs of cooling water intake technology and the environmental benefits associated with its use. Numerous factors are considered in assessing costs and benefits, and use of a general standard allows an appropriate consideration of the totality of these factors under the rule. EPA notes that the "wholly disproportionate" standard applied historically, and as used in the Phase I rule, are not explicitly defined. The former has proven workable and, although it is too early to assess, the latter appears equally useful.

Also see response to 316bEFR.018.009 and 045.012.

Comment ID 316bEFR.006.004

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Paul E. Reynolds

Organization Hoosier Energy Rural Elect. Co-op

Application to Existing Facilities

The proposal should include a process for approving existing intake technologies as “best available” if it can be shown that the facility is not causing adverse environmental impact or the technologies have been deemed “best available” by the state. Such a process is reasonable since Section 316(b) has been in effect since 1972 and has been implemented case-by-case at many sites. There are many electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impact or that it has already installed the best technology available. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for either further studies or for additional intake technology.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today’s final rule, however existing data that is reflective of current conditions may be used to support application studies. Please see response to comment 316bEFR.040.001 for details.

Additionally, under compliance alternative 2 (see 125.94(a)(2)), a facility may demonstrate that it already meets rule requirements if its existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards at 125.94(b) and/or the restoration requirements in 125.94(c).

Comment ID 316bEFR.006.005

Subject Matter Code 7.02
Performance standards

Author Name Paul E. Reynolds
Organization Hoosier Energy Rural Elect. Co-op

Compliance Assessment

Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the ‘best available,‘ the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

EPA has attempted, in a variety of ways, to account for the variability of aquatic environments and the various performance factors that can influence the overall success of a design and construction technology, operation measure, and or restoration measure option. Today's final rule allows a facility to demonstrate its existing technology or operation meets the performance standards with respect to impingement mortality and entrainment reduction. First, EPA has expressed the performance standards in terms of ranges. Second, EPA authorizes the use of several different compliance alternatives. Third, EPA authorizes the use of a Technology Installation and Operation Plan. If the existing technology or operational measures does not meet the performance standards, the facility must select one of the other compliance alternatives authorized in today's rule. Adaptive management is also part of this rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Ernst Peebles

On Behalf Of:

College of Marine Science, University of South Florida

Author ID Number:

316bEFR.007

Comment ID 316bEFR.007.001

Subject Matter Code 10.03.03

Tampa Bay

Author Name Ernst Peebles

Organization College of Marine Science, University of South Florida

The last sentence on page D3-25 of the Case Study Analysis states

"To a lesser extent, the concurrence between the two sets of results also supports the use of records from Big Bend as a basis for extrapolation of entrainment rates to other facilities in Tampa Bay, and the use of larval densities to estimate potential entrainment at facilities that have not conducted monitoring studies, including new facilities."

However, the presence of distinct spawning grounds within Tampa Bay creates spatial gradients in the egg and larval densities of many species, including spotted seatrout (McMichael and Peters 1989), red drum (Peters and McMichael 1987), bay anchovy (Peebles et al. 1996, Peebles 2002) and others (Peebles, unpublished data). These gradients cause densities to vary substantially within short distances (several km). Therefore, extrapolation of entrainment rates from one monitored site to other locations may produce highly inaccurate results. In the case study (section DC-10, pages D3-24 and D3-25), the two data sets were similar only because the second set intentionally bracketed the geographic location of the first. From a logical perspective, observed similarity within a specific region of Tampa Bay does not support extrapolation of larval densities to other (unmonitored) regions.

The case study could be interpreted as support for using unrealistic data extrapolations during implementation of the rule.

EPA Response

The purpose of this analysis was to examine the potential relationship between ambient larval densities and entrainment rates. The analysis was not used in any way in EPA's section 316(b) benefits analysis and was not included with EPA's materials in support of the final Phase II rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Terry Graumann

On Behalf Of:

Otter Tail Power Company

Author ID Number:

316bEFR.008

Comment ID 316bEFR.008.001

Author Name Terry Graumann

Organization Otter Tail Power Company

Subject Matter Code 2.04

EPA's legal authority to:

EPA Lacks Authority to Apply 316(b) to Facilities Subject Only to a NPDES Storm Water Permit

EPA is proposing to apply section 316(b) to all facilities that are covered by NPDES permits, including those subject only to NPDES storm water permits. The Federal Water Pollution Control Act Amendments Section 316 Thermal Discharges paragraph (b) states the following:

Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structure reflect the best technology available for minimizing adverse environmental impact.

Section 301 establishes the requirement for adoption of effluents limitations for all point sources. Section 306 establishes requirements for best demonstrated control technology and a list of source categories that must comply with standards of performance for new sources within the category. Those standards were subsequently adopted and implemented as the Steam Electric Point Source Effluent Guidelines in 40 CFR Part 423.

Thus, the 316(b) requirements apply to only to those facilities that are subject to sections 301 and 306 and not to facilities that are required to have storm water permits under section 402.

Furthermore, Otter Tail does not believe that EPA has the authority under section 402 to issue a general NPDES permit that would include section 316(b) requirements. Nor does it have the authority to amend existing individual or general storm water permits to include section 316(b) requirements without amending the storm water rules and corresponding permit requirements.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII. In addition, see response to 316bEFR.035.001 and 041.127.

Comment ID 316bEFR.008.002

Author Name Terry Graumann

Organization Otter Tail Power Company

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

EPA's Operational Performance Standards Penalize Certain Geographical Regions

EPA is proposing to establish performance standards in section 125.94(b) that would offer facility owners several options for compliance including the option to reduce "intake capacity to a level commensurate with the use of closed-cycle, recirculating cooling system;?"

Otter Tail is concerned that the existing performance standard does not offer sufficient latitude to accommodate all closed-cycle, recirculating facilities in all geographical regions. Some facilities that are located in more arid regions have on-site cooling ponds and pumping facilities that are designed to appropriate large amounts of water from waters of the U. S. over a limited time period during, for example, spring run-off. Such facilities have a higher pumping capacity, but the pumps would operate for only a portion of any calendar year. States have considered and mitigated possible impacts by limiting pumping based on site-specific permit conditions.

It is unreasonable for EPA to establish performance standards based strictly on an intake capacity comparison with closed-cycle, recirculating cooling systems while ignoring the annual amount of water pumped.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.008.003

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Terry Graumann

Organization Otter Tail Power Company

EPA's Attempt to Cover All Situations with a One-Size Fits All is Costly

In EPA's attempt to cover all situations regarding cooling water intake structures (CWIS) with a broad sweeping, one-size fits all rule, the result will be a more complicated and costly program to State agencies, utilities, and their customers. Just as there are many types of aquatic ecosystems in the U.S. waters, so are there different CWIS. One-size definitely does not fit all.

A structured, site-specific approach is the only way to accurately choose the best technology for each CWIS. Many states have existing programs, which should be utilized by EPA to provide the greatest amount of protection, while implementing the best technology for each site. EPA should not try to rewrite what the States have already accomplished. Rather, they should codify that expertise into a flexible system that will meet all needs. Revamping the entire program would be very costly to State agencies.

Sound science is also necessary for complete evaluation of each site. Not all sites have the same potential for impact on aquatic life. This is yet another reason why a site-specific approach is the best approach.

EPA Response

EPA disagrees that the final rule is insufficiently flexible. EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. (see § 125.90(c)).

Comment ID 316bEFR.008.004

Author Name Terry Graumann

Organization Otter Tail Power Company

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

The 1977 Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316 b) P.L. 92-500 (U.S. EPA, 1977) states that the best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis. [This is stated in the proposed rule's Preamble.] This Draft Guidance should be the basis for the 316(b) Phase II requirements. Since each state may have very different water issues based on climate and other water uses, the States have more knowledge of what is needed to protect the aquatic environment in their particular region.

One-size-fits-all may be the easy fix, but the costs will most likely not justify the benefits to the environment.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mo Shafii

On Behalf Of:

Arkansas Dept of Environmental Quality

Author ID Number:

316bEFR.009

Comment ID 316bEFR.009.001

Author Name Mo Shafii

Organization Arkansas Dept of Environmental Quality

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

Adverse Environmental Impact (AEI) — The Proposed Rule does not define AEI and removes it as a deciding factor for applicability of 316(b). Facilities with an intake volume of 50 MGD are subject to the rule regardless of whether they are causing AEI. If a facility can demonstrate it does not cause AEI — should it still be required to go through the 316(b) studies and analyses?

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.009.002

Author Name Mo Shafii

Organization Arkansas Dept of Environmental Quality

Subject Matter Code 21.08

Burden on permitting agencies (general)

Costs of 316(b) — The Proposed Rule contains estimates of employee hours, labor costs and other direct costs associated with the rule. State agencies may want to assess how accurate these figures appear and compare them to current hours/costs associated with permitting.

Cost estimates in the Proposed Rule (p. 17210 of Proposed Rule) for States are:

employee hours = 1,174 hours per facility
labor = $44,540 per facility
other direct costs = $500 per facility

EPA Response

No response required.

Comment ID 316bEFR.009.003

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Author Name Mo Shafii

Organization Arkansas Dept of Environmental Quality

If a technology can be proven to be infeasible for a facility through engineering analysis, should they still have to go through the cost tests?

EPA Response

See preamble to the final rule for a discussion of how the cost-cost test will work.

Comment ID 316bEFR.009.004

Subject Matter Code 21.03
Monitoring requirements

Author Name Mo Shafii
Organization Arkansas Dept of Environmental Quality

The Proposed Rule calls for a mandatory two year monitoring period for requirements in the permit. This is a site-specific issue and should be approached in the same way as the technology evaluations.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Carl Michael Smith

On Behalf Of:

Dept of Energy

Author ID Number:

316bEFR.010

Comment ID 316bEFR.010.001

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code SUP

General statement of support

On April 9, 2002, the U.S. Environmental Protection Agency (EPA) proposed regulations (68 FR 17122) that would establish requirements for cooling water intake structures (CWIS) at existing power producing facilities (known as the Phase II rule). These regulations, when adopted, will implement Section 316(b) of the Clean Water Act (CWA). The U.S. Department of Energy (DOE) commends the EPA for developing and proposing regulatory approaches which will achieve the CWA's environmental protection objectives while minimizing the economic and energy impacts of mitigation measures. We believe that EPA has correctly dismissed dry cooling towers as a retrofit option as this agrees with the results of the enclosed DOE report. We also agree with EPA's proposal not to require wet cooling towers due to the high costs and energy impacts. In addition, the current proposal includes limited flexibility for States to comply with the proposed regulations with comparable existing 316(b) programs. DOE recommends that the final rule expand this flexibility in order to be consistent with the general policy statements of the CWA.

EPA Response

No response necessary.

Comment ID 316bEFR.010.002

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Finally, the proposal also recognizes the need for site-specific evaluations in terms of the variances provided. However, we remain concerned that variances are often difficult to obtain. We encourage EPA to examine its experience with previous variance provisions and ensure that the final rule includes a pragmatic approach.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.003

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.01.03

Option 3--Site-specific determination

DOE believes that all 316(b) determinations should be made on a site-specific basis. A site-specific approach is most consistent with the CWA, as well as current EPA regulatory policy, and we believe is the least costly way to provide the required environmental protection. We also support inclusion in the site-specific "Sample Rule" of an appropriate definition of adverse environmental impact such as the preamble's "Alternative Definition" focused on population effects.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.004

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 17.06

Option: Site-specific determination of BTA

A site-specific regulatory approach is most consistent with the Clean Water Act's mandate for "best technology available for minimizing adverse environmental impacts" and economic achievability requirements set forth in the legislative history and cited in previous EPA rule makings. DOE believes that a site-specific approach is the least costly and most cost-effective way to accomplish the Act's goals under Section 316(b). Moreover, conversion of a cooling system to a wet cooling tower should only be required if that is the conclusion of a site-specific analysis.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.005

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

DOE supports a final rule that is based on the site-specific Sample Rule including a definition of Adverse Environmental Impact (AEI) that encompasses broad environmental impacts and energy impacts. The definition should be scientifically based.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.006

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.02

Performance standards

Although DOE does not recommend a regulatory structure that includes national performance standards, if such a structure is selected by EPA in the final rule, we recommend use of single-value performance limits, rather than ranges of limits.

EPA Response

No response necessary.

Comment ID 316bEFR.010.007

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

DOE supports providing States maximum flexibility in implementing the essential requirements of Section 316(b). Such flexibility should influence EPA regulatory provisions on accepting comparable existing regulatory programs, in the evaluation of variances, and in the determination of “best technology available” in site-specific evaluations of compliance proposals.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.008

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

DOE supports provisions which provide the regulated community with the option of using restoration measures and trading, because these ensure equivalent environmental protection with reduced economic and energy impacts.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.009

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

DOE has a number of suggestions and requests for clarification regarding the assumptions and methodologies employed in EPA's costs and benefits assessment of different regulatory options.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.010

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 2.04.05

Implement a site-specific alternative

Site-Specific Approach is Required - Section 316(b) of the Clean Water Act (CWA) requires, in standards established under sections 301 and 306 of the CWA, that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact" (33 U.S.C. 1326(b)). To implement this mandate, EPA has proposed impingement mortality and entrainment performance standards, based on generalized determinations of adverse environmental impact (AEI), that would apply to all in-scope existing facilities, subject only to limited cost-based variances. EPA does not propose to mandate the use of any specific technology for minimizing AEI. As stated on page 17124, the proposed performance standards constitute a departure from the approach EPA adopted in its 1977 draft guidance which was based on the judgment that "[t]he decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis." As a matter of both law and policy, DOE believes that the only viable approach to implementing section 316(b) is a site-specific approach. Consequently, DOE urges EPA to adopt such a site-specific approach rather than the across-the-board performance standards and generalized determination of "adverse environmental impact" suggested in the notice of proposed rule making.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.011

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 18.03

Process for determining site-specific BTA

In our view, EPA's proposed performance standard approach lacks the precision needed to satisfy the statute's command that cooling water intake structures (CWIS) reflect the best technology available for minimizing AEI. EPA states (at page 17141) that it –

"is proposing to set performance standards for minimizing adverse environmental impact based on a relatively easy to measure and certain metric – reduction of impingement mortality and entrainment. EPA is choosing this approach to provide certainty about permitting requirements and to streamline and speed the issuance of permits."

Although we appreciate EPA's desire to streamline the permitting process, we firmly believe that as a matter of both fact and statutory mandate, determinations of the best technology available for minimizing AEI must be based on an assessment of the full range of environmental impacts related to particular CWIS. As the preamble to the Phase I regulations states, "it is reasonable to interpret the phrase adverse environmental impacts as including a range of impacts, including impingement and entrainment, diminishment of compensatory reserve, stresses to the population or ecosystem, harm to threatened or endangered species, impairment of state water quality standards. . ." (66 FR 65314). Our comments on the definition of "adverse environmental impact" also identify non-aquatic impacts that are encompassed by the term (see Comment 16 below). EPA's proposed reliance on generalized determinations based on anecdotal nationwide or water body type information is not consistent with the determination contemplated by section 316(b); that is, a determination of best technology available for minimizing AEI based on an assessment of all environmental impacts at a particular facility in light of the unique environmental situation at that facility.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.012

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Our view that "best technology available for minimizing adverse environmental impact" must be determined on a site-specific basis is bolstered by the provision for variances from thermal discharge effluent limitations in section 316(a). It is highly unlikely that Congress, having provided for variances from thermal effluent limitations on a showing that alternate limitations would "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water," intended that EPA impose CWIS requirements that do not include a site-specific assessment. Under EPA's proposed performance standard approach, an existing facility that has been granted a variance under section 316(a), based on the "balanced, indigenous population" test, might be required to install expensive equipment to satisfy the proposed performance standards. Such a result would be inconsistent with the text and intent of section 316.

Further, we believe legislative history indicating Congress intended "best technology available" to be interpreted to mean the best technology available commercially at an economically practicable cost (referenced in the preamble to the 1976 final rule, 41 FR 17388) points to a site-specific assessment. What is economically practicable depends on highly site-specific factors, such as the existing CWIS features and location, as well as a localized evaluation of the precise adverse environmental impact to be avoided.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.013

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 17.06
Option: Site-specific determination of BTA

Also from a policy standpoint, DOE believes the site-specific approach is superior, and DOE's specific comments which follow identify problems with the proposed performance standards that would be avoided by using a site-specific approach. More generally, DOE believes that a site-specific rule is both the least expensive and most cost effective approach. Only by evaluating the specific attributes of a regulated source, and its receiving water body, can the most economical method to achieve environmental objectives be determined. Other regulatory approaches being considered by EPA contain elements of site-specific analysis, but only a rule that is completely site-specific can take full advantage of the additional information generated in assessing both the CWIS and the water body.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.014

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Finally, beginning on page 17159 of the proposal, EPA considers several versions of site-specific approaches as alternative regulatory options, but does not propose these as its preferred option. DOE continues to believe it is critical for the final rule to embody a site-specific approach. This will allow regulators to equitably tailor the degree of changes to the level of AEI caused by the intakes. The preamble describes four different site-specific approaches – a Sample Rule, an approach based on EPA's 1977 guidance, the Utility Water Act Group (UWAG) approach, and the Public Service Electricity and Gas Company (PSEG) approach. Each of these centers on site-specific evaluations, but includes different methodologies. DOE is generally supportive of all four approaches but notes that the details of implementation are most clearly spelled out for the Sample Rule approach. Regardless which site-specific approach is adopted, it should contain a definition of AEI. As EPA notes, the preamble's Sample Rule does not provide a definition of AEI. We address this critical feature of a site-specific rule in specific comments that follow, particularly Comment 16.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.015

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Carl Michael Smith

Organization Dept of Energy

Performance Ranges Are Problematic - EPA proposes performance standards for reduction of impingement mortality and, in some water body types, reduction of entrainment. As noted in Comment 1 above, DOE believes that a site-specific approach is required under Section 316(b). However, if EPA decides to adopt its current proposal or some other regulatory strategy that incorporates impingement and entrainment (I&E) performance standards, we believe that those standards should be expressed as single-number limits and not as ranges.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.016

Subject Matter Code 7.02

Performance standards

Author Name Carl Michael Smith

Organization Dept of Energy

DOE recommends against the use of performance ranges for several reasons. First, not all locations within a water body type have the same potential for impingement and entrainment harm. Further, the level of performance of fish protection technologies varies with the type of water body and the aquatic organisms that are present at each specific location. The use of a constant performance standard across all estuaries, tidal rivers, Great Lakes, and oceans ignores the fact that some locations in those types of water bodies contain large concentrations of organisms that might be impinged or entrained, while other locations have relatively few organisms that might be affected.

EPA Response

No response necessary.

Comment ID 316bEFR.010.017

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Carl Michael Smith

Organization Dept of Energy

We reiterate our premise that the appropriate means of implementing Section 316(b) is through a site-specific determination of whether adverse environmental impact is occurring and the best technology available for minimizing such impact, taking into account features of the CWIS and the cost and efficacy of additional technologies.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.018

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.02

Performance standards

Second, we do not believe that EPA has provided any rationale for selecting the numerical values that are included in the proposed performance ranges. Why is the impingement range set at 80-95 percent instead of 75 percent or 90 percent? Any performance range or single-number performance limit would need to be based on the performance needed to minimize adverse environmental impact. EPA has not documented that AEI occurs at all facilities operating outside of the performance ranges proposed. The type of AEI being addressed by the proposed rule does not lend itself to a performance-based approach because of the wide diversity of the biological systems at the specific locations affected by the proposed rule.

A third reason for not employing a performance range is that this would be inconsistent with other enforcement approaches imposed in National Pollutant Discharge Elimination System (NPDES) permitting. It is not clear if EPA intends for NPDES permits to include an enforceable performance range. If so, this would be the only example, outside of a pH range, of which DOE is aware, in which range-type limits are imposed in NPDES permitting. The use of pH ranges is different in that either too-high or too-low pH is undesirable. Other than that exception, the use of any numerical limit that is not clearly defined as a single-limit minimum presents compliance and enforcement concerns. On the other hand, if EPA envisions that the permit writer will choose a single value from within the promulgated range, then EPA would need to provide guidance on how the permit writer could justify anything higher than the minimum value. We do not see this type of guidance referenced in the preamble.

The proposed rule (page 17141) states that " EPA is proposing performance ranges rather than a single performance benchmark because of the uncertainty inherent in predicting the efficacy of a technology on a site specific basis." DOE agrees that the efficacy is definitely a site-specific issue. However, DOE continues to feel strongly that the ranges will only create more uncertainty for the State permit writer and the permittee. The preamble then goes on to state that "the lower end of the range is being proposed as the percent reduction that EPA, based on the available efficacy data, has determined that all facilities could achieve if they were to implement available technologies and operational measures on which the performance standards are based." DOE believes that if a single limit must be set at all, it should be set at a value no higher than what facilities can actually do (i.e.; no higher than the lower end of the range). However, while possible from an engineering perspective, that approach would not be consistent with the focus on AEI in section 316(b) of the Clean Water Act, which requires that "cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."

EPA Response

No response necessary.

Comment ID 316bEFR.010.019

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.02.01

RFC: Req. greatest possible reduction within range?

We believe that most companies will probably implement control measures that will be more stringent than the minimum limit. This is done as a matter of engineering practice so that they have a cushion between the limit and the actual performance and therefore do not risk compliance problems. There is no value to adding an upper end to the range; it will only create uncertainty.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.020

Subject Matter Code 21.02

Director's role in determining requirements

Author Name Carl Michael Smith

Organization Dept of Energy

On page 17142, EPA requests comments on whether decisions about appropriate performance levels should be left to the discretion of a State Director. We believe that this is the correct approach. EPA does not need to adopt strict overarching national regulations, but rather should set up a regulatory framework that allows flexibility and judgment by the agencies issuing NPDES permits. These agencies will be knowledgeable about the site-specific issues that should dictate performance levels.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.021

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.02

Performance standards

Proposal Relies Too Heavily on Extrapolation of Performance - For the proposed rule, EPA established a baseline level of performance as a shoreline intake with no impingement or entrainment controls installed. The performance standards are expected to be measured as reductions compared to the baseline. DOE believes that EPA chose a reasonable baseline. However, many existing facilities have already installed some degree of improvement beyond baseline (e.g., intake canal, traveling screens, fish return troughs, etc.). In order to determine the baseline level of performance, the facility must project or extrapolate backwards to estimate how much more impingement and entrainment would be occurring under a baseline configuration at the plant as compared to the current configuration. Facilities must then extrapolate forward to estimate the percentage reduction that a proposed suite of controls would yield over the baseline configuration. DOE agrees that these extrapolations should be the responsibility of the facility.

Both of these steps will involve making some assumptions and probably running some fisheries models. By having to model/project impacts in both directions, the potential for inaccuracy is compounded. Even under the best of assumptions and models, the ability to get within 10-20 percent of real-world performance would be quite fortunate. This degree of uncertainty could present real compliance issues. If a facility runs a legitimate fisheries model and installs and operates technologies properly but still misses the performance target by 20 percent or more, it could be out of compliance. These forecasting uncertainties need to be recognized.

EPA Response

No response required.

Comment ID 316bEFR.010.022

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 21.04

Determination of compliance

On page 17143, EPA discusses the situation under which a facility designs, installs, operates, and maintains intake technologies or restoration measures properly yet still is unable to achieve the performance standards outlined in the permit. Is that facility out of compliance? EPA solicits comments on an approach that would consider properly designed, installed, operated, and maintained facilities to be in compliance until the permit is reissued. DOE supports this approach as offering a solution to the uncertainty described above. If the permitting agency concurs that a suite of controls included in a permit should achieve the target and the facility has made a good faith effort to meet the performance standards then the facility should be considered in compliance for the permit term. If EPA adopts the proposed regulatory approach using performance standards, we believe that this type of compliance interpretation and protection is essential.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.023

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

When examining biological systems, it is important to note that populations fluctuate naturally from season to season and from year to year. These fluctuations can be substantial. To the extent that restoration measures are made part of a facility's compliance strategy, there is additional concern over how and when to measure the effectiveness of the restoration. Many types of restoration measures take years to reach their full benefit potential. After two years of monitoring, they may not show the full level of performance that they will achieve after 5 or 10 years. If EPA elects to adopt a performance-standard regulatory approach, these types of temporal variation must be somehow considered by the rule. By adopting a site-specific option for the final rule, EPA would be better able to take these temporal variations into account and also avoid the problems associated with extrapolation discussed above.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.024

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Variances Must Be Viable - DOE is generally supportive of the variance provisions that EPA has included in the proposed rule or lead option, although we firmly believe the site-specific approach is the most appropriate way to implement section 316(b). If EPA elects to adopt the lead option approach in the final rule, the variance provisions would provide a necessary measure of flexibility and allow for consideration of site-specific factors. DOE supports the concept of the cost-to-cost and cost-to-benefit variances. However, DOE recommends that provisions be included in the final rule to make variances more realistically obtainable. In other words, the variances must truly be a viable mechanism. DOE notes that several other types of CWA variances have been very difficult for applicants to obtain even though the CWA allows their use. For example, a 1994 article (Veil, J.A., "Using Clean Water Act Variances as Economic Incentives," Journal of Environmental Regulation, Spring 1994, pp. 281-291) indicates that through 1993, EPA had approved only 7 of 249 “fundamentally different factor” variance requests, 19 of 64 301(g) variance requests, and 51 of 111 301(h) variance requests that had been submitted to EPA. We want to ensure that the cost-to-cost and cost-to-benefit variances can be obtained in a reasonable amount of time and that State or regional permit writers, who can appreciate the site-specific nature of any AEI, will have the final say on variances rather than having the decision-making reside with the Federal government.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.025

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Significantly Greater Than - Pages 17145 and 17166. DOE welcomes the shift in decision-making criteria from "wholly out of proportion," as used in the new facilities rule, to "significantly greater than," in the proposed cost-to-cost and cost-to-benefit variances. This should provide a greater opportunity for affected facilities to demonstrate that the proposed I&E reductions are not appropriate. Yet we note the proposed rule does not define or expand upon the meaning of "significantly greater than." We want to make sure that the term is interpreted and implemented in such a way that the cost variance is truly a viable mechanism for plants with a legitimate case. Therefore, DOE recommends that the interpretation of "significantly greater than" be left to the State permit writer, who is in a better position to make variance decisions.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.026

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 19.0

Dry Cooling

Dry Cooling Is Not Best Technology Available - On page 17168, EPA states that it does not consider dry cooling a reasonable option for best technology available on a national basis for existing facilities. This determination is based on the high cost of dry cooling and the energy penalty impacts of using a less efficient form of cooling. We strongly support this position, and further add that dry cooling towers would probably be infeasible in certain locations. For instance, the turbine back pressure could increase beyond recommended manufacturer specifications for a number of existing units and would require severe curtailment of normal operations, or a redesign of the circulating water system and associated equipment. From a technical and economic perspective, such attempts to force a dry cooling tower system into typical power plants would result in an inability to continue operations. ASPEN modeling done by DOE/NETL shows that during hot weather the dry cooling tower would not be able to safely (due to the operation of the existing turbines above back pressure design limits) supply sufficient cooling at a significant number of existing power plants .

Even if a company were able to use dry cooling as a retrofit option, the land area footprint would be very large and create other land use, construction issues, and other environmental issues of concern, such as noise and increased air emissions. For instance, a representative dry cooling tower installation at an existing power plant located in the Eastern United States would have a footprint area that is 50 percent to 100 percent the size of a typical power plant footprint. For a number of existing power plant facilities, this amount of additional space is simply not available.

DOE, NETL, and ANL have analyzed the energy penalties and air emissions resulting from retrofitting a power plant with once-through cooling to both wet and indirect-dry cooling towers ("Energy Penalty Analysis of Possible Cooling Water Intake Structure Requirements on Existing Coal-Fired Power Plants" June 14, 2002). A copy of this report is enclosed and the issues above are analyzed in detail. The report concludes, based on a wide range of assumptions, that dry cooling towers are not a viable option to be used as retrofits for once-through cooled plants. The primary reasons for such a stark assessment of this technology option are as follows: at the peak time of summer electricity demand many of the existing power plants' turbines could not perform safely; energy penalties associated with a dry cooling tower retrofit could range from 9 to 16 percent at times of peak electricity demand; the dry cooling tower system may require significant plant modifications to retain the integrity of power plant operations; secondary impacts of increased air emissions are significant (could be as great as 4 to 8 percent higher) for a dry cooling tower system; and, retrofit difficulty in a number of plant locations would be too great to warrant continued operations of the power plant.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.027

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 17.03.02
RFC: EPA rationale to not require closed-cycle

Wet Cooling Towers Should Not Be Required Except on a Case-by-Case Basis - Although EPA's proposed rule does not directly require any facilities to convert their cooling systems to wet cooling towers, some of the alternative options presented do require wet towers or their flow-based equivalents at some subset of facilities. DOE does not believe that the Phase II rule should require any particular class of facilities to convert to wet towers. We acknowledge that some existing, once-through cooled plants are causing AEI and will need to make some changes to their current operations. These changes could involve a combination of new intake technologies, or voluntary operational changes, and restoration measures. Some companies may elect to install wet cooling towers in order to minimize AEI. We believe that these cases will be infrequent, however.

In most cases, the costs to retrofit wet cooling towers will far exceed the costs to employ other remedies. We are pleased that EPA states on page 17155 that it did not select wet cooling towers as the best technology available for existing facilities because of the high costs of the retrofits and the potential for energy shortfalls related to concurrent retrofits at multiple plants. Even though we agree with EPA's decision, we feel that for several reasons the EPA projections of the costs and energy impacts of retrofit to wet towers have been underestimated. EPA presents their estimate of the cooling system conversion capital costs to be $53 per kW (moderate) to $62 per kW (high)--(Appendix C, Phase II Technical Development Document (TDD), page C-5). In comparison NETL has developed retrofit cost estimates through a draft study by its contractor, Parsons Infrastructure and Technology Group. That draft report (forthcoming), entitled "An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants," estimates wet cooling tower retrofit costs at four sites. The site-specific nature of wet cooling system retrofits at existing facilities is further underscored by the wide range of the cost estimates for the four sites in that draft study which are $66 per kW to $128 per kW. These estimates are on a similar basis as the EPA estimates.

Neither the EPA nor the NETL cost estimates take into account certain site specific factors such as plume abatement. DOE feels that the Agency should have made some assumptions in their cost estimates for a range of site-specific factors affecting the costs of retrofits at existing facilities. These factors include, but are not limited to, the necessity for plume abatement and/or drift control for facilities located in urban areas or in close proximity to highways or airports, and the location of existing underground utilities that may have to be re-routed to accommodate the recirculating system's piping lay-out. For one of the sites in the NETL draft study, the capital cost of the cooling tower alone would double should the local permitting authority require the use of plume abatement. This was not included in the costs presented in the study. However if 1 out of 4 sites studied may have needed plume abatement, we believe EPA should have assumed that a certain number of facilities in their national cost estimate included site-specific retrofit costs such as plume abatement (see Comment 26).

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.028

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.0

Costs

Further, conversions from once-through cooling to wet towers imposes an energy penalty, albeit not as large as the energy penalty associated with dry cooling. In the enclosed DOE study, the annual average energy penalty associated with conversion of a once-through cooling system to a wet cooling tower varied between 1.1 percent and 2.1 percent of the power plant output and the peak summer energy penalties were estimated to be 2.4 percent to 4.0 percent of the power plant output. EPA, on the other hand, estimates the annual average energy penalty associated with conversion of a once-through cooling system to a wet cooling tower between 1.5 to 1.8 percent with corresponding peak penalties ranging from 1.4 to 2.0 percent. DOE's annual average energy penalties are similar to those calculated by EPA, but the EPA estimates of peak summer energy penalties are considerably lower than DOE's estimate. The reasons for this discrepancy are detailed at Comment 38 below. However, we are pleased that the Agency reports (page 5-35, Phase II, TDD) that it "... views the DOE estimates to be reasonable for a variety of retrofit scenarios at existing facilities and will reconsider this subject in the analysis of regulatory options for the final rule."

The costs and other types of environmental impacts associated with cooling towers must be carefully considered on a site-by-site basis before a regulatory agency requires facilities to retrofit wet cooling towers. We strongly believe that EPA's national Phase II regulation should not include any requirement that has the effect of forcing any class of facilities to install wet cooling towers.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.029

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Cost Uncertainty May Lead to Plant Shut-Downs - A significant degree of uncertainty surrounds multiple aspects of EPA's cost estimation, including estimates of administrative costs, capital costs, and economic impacts and a complete lack of any assumptions for site-specific retrofit factors. (Please see specific Comments 23-37 below for detailed discussion of DOE's concerns with EPA methods). First, EPA's presentation of "maximum" NPDES permit and re-permit application costs optimistically refers to certain costs as "one-time" with minor follow-up costs only to be incurred every five years. There is no apparent allowance for costs that would arise in the event of disputes between facility operators and regulatory authorities and environmental interest groups. Second, although capital costs reflect the largest single cost element in facility compliance strategies (Table B1-7), EPA does not report confidence levels for the estimates. Consequently, DOE has no basis other than EPA's assertions to judge whether compliance with the proposed rule will involve plant closures over and beyond those that would have occurred in the absence of the rule(see Comment 27.) EPA should develop a full market analysis using their modeling tools of the proposed rule.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.030

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 7.02

Performance standards

Impingement and Entrainment Benefit Estimation is Flawed - An examination of the case studies underlying the benefits estimates of the EPA's proposed 316(b) rule reveals at least two issues of concern. The first concern addresses arbitrary application of ecology-based models instead of economic models in certain water body types without any rational documented explanation. Use of ecology-based models increases benefits estimates by over 27 percent. The second concern addresses apparent major differences in EPA's various estimates of the efficacy of the non-dry cooling tower technologies in reducing I&E. The lack of clarity in the methodology stymies attempts to analyze the proposed rule across facilities. DOE has had limited time to review and discuss the apparent discrepancies with EPA. In the proposal at page 17141, EPA states that all facilities could use the technologies being considered for the proposed rule to meet at least the bottom of the performance ranges. However the efficacy estimates or "performance targets" for both the proposed rule, option (3), and the "all plants retrofit to wet towers"option (4) do not imply that even the bottom of the range for impingement of 80 percent could be achieved in most water body types. Similar problems exist in the entrainment estimates. This apparent inconsistency needs explanation. The two issues are discussed further below.

EPA Response

No response necessary.

Comment ID 316bEFR.010.031

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 10.02.01.02

Random Utility Model (RUM)

The EPA case studies attempt to apply economic models to assign values to certain levels of recreational fish and consequently to benefits to anglers. The EPA states that these models, among them the "Random Utility Model" (RUM), are well-accepted in the "recreation demand" literature. <FN 1> The underlying premise of the RUM model is that if more fish exist, more fish can be caught; if more are caught, anglers are happier and, would therefore take more fishing trips. The discussion of the model in Chapter C2 (of the economic study) explains that EPA attempted to estimate demand curves for recreational fishing. Changes in I&E affect the parameters that identify the location of an angling demand curve. I&E reduction thus leads to increases in consumer welfare (greater angler happiness). In its comments, the industry implicitly accepts the model per se, focusing criticism on faulty or thin data used by EPA modelers. <FN 2> For its part, EPA considers RUM estimates "conservative" because, for instance, some of the fish-level data used is from a period (the1970's) when water quality was relatively poor. <FN 3> Depleted fish stocks do not show as big a response to I&E reduction as otherwise would happen had 1) the preceding centuries of American economic development not taken place (lumped together as "other stressors"), or 2) more modern data reflective of water quality improvements been available.

Footnotes

1 See Chapter C2-2.
2 See "UWAG Questions on Existing Facility Proposal"
3 See Chapter C2-6.

EPA Response

No response necessary.

Comment ID 316bEFR.010.032

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 10.02.03
Use of Replacement Costs (HRC and hatchery-based)

In certain cases, however, EPA dispenses with RUM (or other economic models') estimates of baseline losses from I&E (or benefits from no I&E) without any rationale for doing so. EPA uses the alternative, ecology-based "habitat restoration cost" (HRC) models to obtain value for I&E reductions by centering on the cost of the actions required to provide an offsetting increase in the existing populations of those species in their natural environment.

The HRC model's standard is the one presumed to exist if no impingement and entrainment occur. EPA states that HRC models represent "supply-side," rather than demand-side, methods of valuing I&E losses. <FN 4> However, EPA does not attempt to find any point where supply (of I&E reduction) meets demand; instead, estimates of losses derived from HRC models – the sum of the costs across the categories of preferred habitat restoration alternatives at each facility – are simply added to the benefits-transfer model estimates. <FN 5> EPA only says that HRC is used to provide "more comprehensive" estimates of losses, but doesn't distinguish when such a need arises.

To determine the effect of using HRC estimates, one must examine how EPA constructs its extrapolation of losses. EPA divides the power plant industry by water body: Estuary – Non-Gulf, Estuary – Gulf Coast, Freshwater, Great Lake, and Ocean. Estimates of losses from plant(s) in each area are used to extrapolate to all plants within such categories. Section C3-2 of Chapter 3 presents tables detailing national estimates of baseline losses that vary depending upon extrapolation method. In three of the areas, Estuaries-Gulf, Estuaries – non-Gulf, and Freshwater, benefits-transfer model estimates (impact on fishing) are used. Results are presented using lower bound, mean, and upper bound estimates. For the remaining water body types, Great Lakes and Oceans, the midpoint of the angling-based model is used as the lower bound, whereas the lower and upper bounds of the HRC estimates are presented as the mid-point and upper-bound estimates of losses. For "best estimates" of losses, EPA presents mid-points for estuaries and freshwater, but high-end estimates of HRC for Great Lakes and Oceans. EPA provides no explanation for this apparent arbitrary use of the HRC estimates in certain water body types. The increase in loss estimates due to using high-end HRC estimates in two categories, rather than benefit-transfer midpoints in all categories, can be deduced simply:

Benefits Estimates:
[see hard copy for table]

EPA's use of HRC, in two categories, augments total impingement losses nearly 39 percent and total entrainment losses over 26 percent compared to using economic loss models (overall losses increase over 27 percent). Note that the inflation occurs at a facility level and then is extrapolated to the water body category, before being summed nationally.

Footnotes

4 See Federal Register, April 9,2002, at FR 17197.
5 Whether the costs and benefits can be combined (i.e. added) is addressed by UWAG, "Desvouges' Questions" no.6 (p.6).

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.033

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 7.02
Performance standards

Reduction targets in EPA's proposed rule and current technological performance do not appear consistent. It is unclear to DOE what these targets represent and how they may be utilized. We hope it is just a problem that is unclear to us due to the lack of documentation and explanation. The proposed rule states that facilities must reduce impingement losses by 80 percent to 95 percent of their baseline calculation, and entrainment losses by 60-90 percent. However, the estimated reductions shown in tables in Chapter C4 are often out of those ranges. Consider option 3 (the proposed rule or lead option), option 4 (all wet cooling towers), and option 5 (dry cooling towers):

Impingement	Option 3	Option 4	Option 5
Estuary - Non Gulf	33.2%	41.4%	97.5%
Estuary -Gulf	27.1%	45.3%	96.7%
Freshwater Systems	47.2%	58.9%	98.0%
Great Lake	80.0%	88.6%	96.3%
Ocean	50.1%	58.9%	87.6%

Entrainment	Option 3	Option 4	Option 5
Estuary - Non Gulf	48.5%	79.4%	97.5%
estuary -Gulf	47.2%	79.3%	96.7%
Freshwater Systems	12.4%	72.8%	98.0%
Great Lake	57.8%	88.6%	96.3%
Ocean	44.1%	72.8%	87.6%

Source: Tables C4-1 and C4-3

Under option 3, in which EPA surmises that most facilities will not adopt wet cooling towers, only Great Lake facilities seem close to the ranges in the proposed rule, probably because the baseline losses are relatively small to begin with. <FN 6> The low impingement reduction estimates for wet cooling towers, option 4, seem to imply that more impingement controls would be necessary. Only option 5, dry cooling towers, reduces impingement to levels associated with the proposed rule's performance ranges.

Attempts to resolve the apparent inconsistency have not been successful. In conversation, EPA staff has implied that if facilities have some controls in place, then installation of more controls will not reduce I&E to the same extent as would have occurred in the absence of controls. This presumably means that the number of facilities at which no action will be undertaken affects the results, in the opposite direction of the adoption of more stringent controls (i.e.; the type of controls adopted directly affect the estimated reductions above). Calculations demonstrating these effects have not been published. Efforts to reconcile estimated reductions under the proposed rule with the distribution of proposed controls across facilities have been unsuccessful. The following table reports the distribution of controls, by water body type, both as presented in Table A1-1 of EPA's Economic and Benefits Report (EBA) and as gleaned from Appendix A to the TDD. The appendix lists the technology modifications, by facility, that EPA projects will be adopted under option 3.

Facility Distribution of Projected Controls, Proposed Rule

Water body Type	EBA Table A1-1 (option 3)	TTD Appendix A	Difference
Cooling tower (i.e. recirculating systems, no action)			
Freshwater Lakes	Unknown	29	
Freshwater Rivers/Streams	Unknown	41	
Total	69	70	+1
Impingement only (fish handling/return)			
< 15% capacity	53	Unknown	
Freshwater Lakes	94	74	
Freshwater Rivers/Streams	94	64	
Great Lakes	0	3	
Estuaries/Oceans	0	14	
Total	241	155	-86
Impingement & entrainment (both fine mesh+fish handling and fine mesh traveling screen only)			
Freshwater Lakes	0	0	
Freshwater Rivers/Streams	107	86	
Great Lakes	13	13	
Estuaries/Oceans	109	90	
Total	229	189	-50
No modifications necessary, non-recirculating systems			
Freshwater Lakes	0	31	
Freshwater Rivers/Streams	0	69	
Great Lakes	0	0	
Estuaries/Oceans	0	25	
Total	0	125	+125

Source: Table A1-1, p.A1-9, and TDD, Appendix A (Author counts)

Merely counting facilities by proposed technology modification yields the result that 125 more facilities do nothing, as compared to totals presented in the economic study. Whether the model results in Appendix A of the technical document bear any relation to the distribution in the economic study seems questionable. It would be of great benefit to resolve these inconsistencies. Analysis of the proposed rule across facilities can not proceed without more straightforward documentation.

Without a clear understanding of how EPA arrived at the technological performance estimates detailed above, it is unclear how the non cooling-tower I&E technologies could meet the performance ranges in the proposed rule. If option 3 is the preferred option, then the threshold of success should be lowered (with lowered ranges, or no ranges but site-specific solutions).

Footnotes

6 See Table C4-2 and C4-3.

EPA Response

No response required.

Comment ID 316bEFR.010.034

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 3.07

Special definitions

Minimize - Page 17130. EPA defines minimize as "to reduce to the smallest amount, extent, or degree reasonably possible." EPA offers further explanation on page 17168 as follows: "EPA interprets the use of the word 'minimize' in section 316(b) in a manner that allows EPA the discretion to consider technologies that very effectively reduce, but do not completely eliminate, impingement and entrainment and therefore meet the requirements of section 316(b)." DOE supports that interpretation. We believe that there are a variety of highly effective control mechanisms that can reduce impingement and entrainment to a very low level but that do not completely eliminate them. This interpretation allows use of such mechanisms.

EPA Response

No response necessary.

Comment ID 316bEFR.010.035

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Mortality - Page 17136. EPA notes on this page that the mortality of entrained organisms varies from 2 to 97 percent. The existing scientific evidence, although not extensive, clearly shows that not all entrained organisms are killed. Yet on page 17149, EPA notes that it has based its proposal on reducing entrainment rather than on reducing entrainment mortality. DOE does not see any justification for this and we find that it runs counter to the intent of the Clean Water Act that "cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." The focus should be on the adverse environmental impact that is being caused (i.e.; mortality) and not on a more easily determined, but less relevant, parameters such as entrainment. We recognize that the studies needed to demonstrate entrainment mortality at a facility could be complicated and expensive. We believe that each permitted facility should be given the opportunity to evaluate entrainment mortality or, if the effort and cost are considered excessive, to assume that there is 100 percent mortality. As proposed, companies would not have that opportunity.

We further note that the site-specific Sample Rule on page 17160 (preferred by DOE) would allow consideration of entrainment mortality [125.94 (c)(2)].

EPA Response

No response necessary.

Comment ID 316bEFR.010.036

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 8.04
Proposed standards for tidal rivers and estuaries

Estuaries and Tidal Rivers Are More Sensitive - Page 17140. The proposed rule states that "estuaries and tidal rivers have a higher potential for adverse impact because they contain essential habitat and nursery areas for the vast majority of commercial and recreational important species of shell and fin fish, including many species that are subject to intensive fishing pressure. Therefore, these areas require a higher level of control that includes both impingement and entrainment controls." We agree that, taken as a whole, estuaries and tidal rivers are very productive water bodies and contain much useful habitat. We strongly disagree with EPA's presumption that a facility located on any portion of any estuary or tidal river will have high potential for causing adverse impact. In our view, the science does not bear this out. Just as people are not uniformly distributed across all square miles of our country, fish and other aquatic species are not uniformly distributed across estuaries and tidal rivers. Fisheries managers can provide indications on the locations of fish populations and the highest concentration of eggs and larvae at different times of the year. It is not unreasonable to believe that power companies can find locations in estuaries and tidal rivers at which intakes will affect far fewer organisms than at others. We oppose any regulatory scheme that assumes that all facilities located on certain bodies of water will be harmful and must summarily be forced to apply very costly remedies. We request that EPA either provide scientific justification for these important assumptions or revise the proposal to remove them.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.037

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 14.01
RFC: 5% threshold and supporting documents

5 Percent Flow Threshold - Page 17151. EPA states that if a facility withdraws 5 percent of annual stream flow, the facility will entrain 5 percent of the entrainable organisms within the zone of hydraulic influence of the intake. EPA does not believe that an intake should impact more than 5 percent of the organisms within the zone of hydraulic influence of the intake and therefore imposes entrainment controls on those facilities that withdraw more than 5 percent of the mean annual flow.

DOE believes that the science does not support this interpretation. The population of concern to the ecosystem is not necessarily those organisms that fall within the zone of hydraulic influence. For many species, the population of concern occupies an entire watershed or a stream segment. A facility's intake may have been intentionally located at a position and depth that would entrain fewer than the average density of organisms. Yet under EPA's arbitrary 5 percent threshold, this is not taken into account.

EPA provides no justification for why it sets the threshold at 5 percent rather than at a higher percent flow. The only accurate means to assess AEI is to use a site-specific approach to evaluate the effect of a CWIS on populations of concern in the water body from which cooling water is taken.

EPA Response

No response necessary.

Comment ID 316bEFR.010.038

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

State Program Equivalence - Page 17151. The proposed rule seeks comments on whether EPA should allow States to apply to EPA for approval of their existing section 316(b) programs, either as currently in effect or with minor revisions, as providing comparable reductions of impingement and entrainment to the new rules--on a watershed basis.

The Clean Water Act establishes a strong Congressional intent for States to carry the primary responsibility for managing the Nation's water resources and states:

It is the policy of the Congress to recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, to plan the development and use (including restoration, preservation, and enhancement) of land and water resources, and to consult with the Administrator in the exercise of his authority under this chapter. It is the policy of Congress that the States manage the construction grant program under this chapter and implement the permit programs under sections 1342 and 1344 of this title. It is further the policy of the Congress to support and aid research relating to the prevention, reduction, and elimination of pollution and to provide Federal technical services and financial aid to State and interstate agencies and municipalities in connection with the prevention, reduction, and elimination of pollution.

DOE believes that such language creates an imperative for EPA to extend the maximum possible flexibility to States, as they implement Federal requirements under the Act.

DOE strongly recommends that EPA allow States to continue implementing their successful State programs, but does not understand why this must be done on a watershed basis. We believe that comparability may be demonstrated on a Statewide basis. We encourage EPA to show flexibility in determining comparability.

As a model for how this might work, we point out the paradigm for Underground Injection Control (UIC) Class II well programs. Section 1422 of the Safe Drinking Water Act allows EPA to delegate the UIC program to States in cases where States have developed regulations as strict as EPA's national regulations. Congress went out of its way to add a separate Section 1425 that applies to underground injection programs dealing with oil and gas fluids. Section 1425 allows States to receive program delegation by submitting programs that meet the general criteria of Section 1422 without having to incorporate all the elements of Section 1422. Most oil and gas producing States that have UIC delegation have obtained it through Section 1425. This approach allows the States greater flexibility and saves costs to the operators.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.039

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 21.08

Burden on permitting agencies (general)

Costs to States May Be High - Page 17153 and 17167. EPA notes that a detailed site-specific evaluation process, such as required under a site-specific approach or under the cost-to-cost or cost-to-benefit variances in the proposed rule, may lead to time delays and extensive costs to State permitting authorities. DOE recognizes that a careful evaluation of data and studies will take time and resources, but it is not unreasonable to expect a permitting agency to devote significant analytical resources when the outcome of its decision may result in expenditures of millions to tens of millions of dollars for an existing facility employing technologies, operational changes, and restoration measures. Therefore in light of this and DOE's earlier comments on the need for the site-specific variances in the proposed rule, we feel strongly that the negative statements at the end of page 17152 (last 4 paragraphs) should be omitted from the final rule.

EPA Response

No response necessary. DOE is an EPA Federal partner.

Comment ID 316bEFR.010.040

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 18.03

Process for determining site-specific BTA

Determination of AEI - Page 17164. EPA seeks comments on several possible approaches for determining AEI. We believe that the presence or absence of AEI and its magnitude can only be assessed through a site-specific evaluation. We do not disagree with the approaches summarized in (4) (d) and (e) on page 17164 (use of conservative decision criteria and structured AEI decision process, respectively). However, DOE prefers a slightly different approach that is described in a recent (attached) journal article [Veil, J.A., M.G. Puder. D.J. Littleton, and N. Johnson, A Holistic Look at Minimizing Adverse Environmental Impact under Section 316(b) of the Clean Water Act, The Scientific World Journal, 2002(2)]. The approach would consider all types of environmental impacts associated with the intake and any proposed controls. After balancing the impingement, entrainment, energy penalty, air emission, water consumption, and other impacts, the regulatory agency would determine which approach minimizes AEI.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.041

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

DOE does not support any approach that assumes that any degree of impingement or entrainment constitutes AEI. In past permitting decisions, EPA has applied the AEI standard in a way that would indicate damage to individuals is not the proper test, and in at least one case, a reviewing court has suggested that focus should be on whether a CWIS affects the ability of a species to propagate and survive. (See William A. Andersen & Eric P. Gotting, Taken In Over Intake Structures? Section 316(b) of the Clean Water Act, 26 Colum. J. Envtl. L. 1, 43-44 (2001).) An "any impingement or entrainment" or "one dead fish" approach would create needless tension with section 316(a), which provides for variance from thermal discharge effluent limitations if the owner or operator of a facility can demonstrate that such effluent limitation is more stringent than necessary to assure the protection and propagation of "a balanced, indigenous population of shellfish, fish, and wildlife" in or on the affected body of water (42 U.S.C. 1326(a)). The AEI standard in section 316(b) is broader than that in section 316(a), in that it allows for consideration of non-aquatic impacts. But with respect to aquatic impacts, interpreting AEI to refer to population-level impacts would be consistent with Congress' concern for populations in section 316(a).

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.042

Subject Matter Code 18.01.04

RFC: Alternative definition of "AEI"

Author Name Carl Michael Smith

Organization Dept of Energy

The Alternative Definition of AEI presented by EPA in the preamble to the proposed rule (page 17163) is appropriately focused on population-level effects. DOE would support including the Alternative Definition of AEI in the final rule if it were modified to encompass non-aquatic impacts (i.e.; energy penalties, air emissions, and water consumption). And as stated earlier, DOE would prefer to see the Sample Rule, site-specific option, with this type of AEI definition as the final rule for the Phase II existing facilities.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.043

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Carl Michael Smith

Organization Dept of Energy

Restoration - Pages 17168-17170. DOE is highly supportive of the use of restoration measures as a strategy or as part of a strategy for meeting 316(b) requirements. We believe that the decision to use these should be strictly voluntary, although if a company agrees to restoration as part of a 316(b) program, the permit writer should include those restoration requirements in the permit. Restoration offers a direct means of benefitting the environment and minimizing AEI and should be fully embraced.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.044

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 11.11

RFC: Mandatory restoration approach

We do not agree with the approach outlined on page 17169, b (1), which would allow a Director to specify restoration measures at his or her discretion. We oppose the idea of mandatory restoration [page 17169, b (2)]. The decision to undertake restoration must be made by the company.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.045

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 11.12

RFC: Restoration banking

We support the use of the banking mechanism for restoration (page 17170). Further, the DOE continues to support other water quality improvements as a restoration measure that would offset I&E performance goals.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.046

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 11.11

RFC: Mandatory restoration approach

To reiterate, DOE does not believe that the regulatory agency should have the authority to unilaterally impose operational changes or require restoration measures. To the extent that the facility proposes these types of changes as part of a compliance program, the agency should be able to place these voluntary measures into a permit.

EPA Response

No response is necessary.

Comment ID 316bEFR.010.047

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Trading - Pages 17170-17173. DOE is pleased to see that EPA has put so much effort into the trading concept. We believe that there is merit to raising trading issues to a national audience. Although we endorse the concept of trading as part of a 316(b) determination, we caution EPA to limit the number of rigid national conditions placed on trading. Trading of impingement or entrainment allowances has never been tried before. Companies are often reluctant to place their means of compliance in the hands of another entity because they lose control of their destiny. Trading must offer truly significant cost savings for companies to try it. We are concerned that national-level restrictions on a section 316(b) trading program could scare companies away from trying it.

EPA Response

No response necessary.

Comment ID 316bEFR.010.048

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 20.06

Voluntary adoption of trading by States and Tribes

We support flexibility and recommend that decisions on how to set up and administer trading programs be left to State- or watershed-level decision makers. In particular, we do not think the national 316(b) rules should specify geographic limits on trading. This should be left to State or local discretion. We also do not believe that trading programs should be mandatory. The decision on whether to undertake trading programs should be left to States. We believe that if trading programs are authorized, they should include both entrainment and impingement trading as well as water quality improvements trading for I&E .

EPA Response

No response necessary.

Comment ID 316bEFR.010.049

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 20.05

RFC: Include Phase I facilities in trading program

The proposed rule discusses the concept of extending the trading program to new facilities (page 17172). The proposed rule suggests that new facilities could implement controls beyond what is required in the Phase I, new facility rule. We believe that is not practical. Our understanding of Track I controls in the new facility rule is that facilities must implement closed-cycle cooling or equivalent flow reductions, reduce intake velocity, meet proportional flow requirements, and on top of these, undertake appropriate intake technologies. We do not see how there would be any room left for additional control measures that could provide a means for trading.

EPA Response

No response necessary.

Comment ID 316bEFR.010.050

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 6.08

Non-aquatic impacts

Thermal Discharge Implications - Page 17193. EPA states that thermal impact reductions associated with conversions of once-through cooling systems to closed-cycle cooling systems will yield benefits. This is an argument that ignores the positive impacts of heated discharges in some ecosystems. For example, we cite the example described in a February 19, 2001 letter from the Marine Mammal Commission to EPA that deals with the dependence of manatees on heated discharges from several Florida power plants to survive winter cold spells. The letter states: "If one or two of those outfalls were eliminated, many manatees that have learned to rely on those power plant outfalls to survive cold winter periods would likely die of cold stress before they could find an alternative warm-water source. If all of those outfalls [at 10 power plants] were eliminated, it is possible that the Florida manatee population would undergo an initial precipitous decline in numbers followed by a substantial long-term decline."

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.051

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.01

EBA related comments

Industry Sectors Descriptions - Section A3, Page1.1. The 1st paragraph of the section, Industry Sectors, is confusing, with corrections needed. Fuel cells and geothermal power generation are left out entirely. DOE suggests EPA consider the following rewrite:

"The generation sector includes power plants that produce or "generate" the electricity.2 Electric power is usually produced by a mechanically driven rotary generator. Generator drives, also called prime movers, may be internal combustion machines such as gas turbines or diesels or turbines that extract mechanical energy from a stream of moving fluid such as wind, water from a hydroelectric dam, or steam from a boiler. Most power boilers are heated by direct combustion of fossil or biomass-derived fuels, or waste heat from the exhaust of a gas turbine or diesel engine, but heat from nuclear, solar and geothermal sources is also used. Electric power may also be produced without a generator by using electrochemical, thermoelectric, or photovoltaic technologies."

EPA Response

No response necessary.

Comment ID 316bEFR.010.052

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.01

EBA related comments

System Descriptions - Section A3, Page1.2. The system descriptions in the section, Prime Movers, also need corrections. DOE suggests that EPA consider the following rewrite:

“Steam Turbine: Steam turbine or “steam electric” units are driven by steam produced in a boiler. A boiler is a heat exchanger in which water is heated to generate steam, using hot gases from combustion of some type of fossil or biomass-derived fuel, hot coolant from a nuclear reactor, waste heat from another power system or an industrial process, solar energy or geothermal heat. Individual steam electric units range in size from 30 to 1500 megawatts and are generally baseload units that are run continuously to serve the minimum load required by the system. Steam electric units provide the majority of the electric power generated in the U. S.

Simple-Cycle Gas Turbine: A gas turbine, also called a combustion turbine, is an internal combustion machine wherein a compressor supplies air to a combustion chamber where fuel is burned to produce hot, high-pressure gases, which are expanded through a turbine to produce mechanical energy. The turbine produces enough power to drive both the compressor and a mechanical load, in this case an electric generator. Simple-cycle gas turbine power plants, which consist of a single gas turbine and generator, range in size from 5 to 330 megawatts, have efficiencies ranging from 28 to 42 percent on a Lower Heating Value (LHV) basis, and are generally used for peak load operation serving the highest daily, weekly, or seasonal loads. The LHV is the standard practice for reporting efficiencies of gas turbines. (Using the LHV the efficiency is defined as the amount of energy produced divided by the amount of energy consumed, based on the energy’s lower heating value.) Gas turbines usually operate on distillate oil or natural gas fuel, but can also burn crude oil, residual oil, and synthetic fuels produced from coal or biomass.

Gas Turbine Combined-Cycle: Combined-cycle units utilize both steam and gas turbines to generate power while achieving high plant efficiency. Hot exhaust gases from the gas turbine are directed to a heat recovery boiler, also called a heat recovery steam generator (HRSG). The steam produced in the HRSG generates additional power when it is expanded through a steam turbine. A combined cycle system achieves higher efficiency than is possible with a gas turbine alone by producing additional power from heat that would otherwise be released to the atmosphere. The HRSG may be fired or unfired. In an unfired system, the boiler produces steam solely through the recovery of gas turbine exhaust heat. In a fired system, additional fuel is burned upstream of the HRSG to increase the temperature of the exhaust gas and thus augment its steam generating capacity. Combined-cycle plants are usually configured in a “single shaft” arrangement with a single gas turbine, a single HRSG, and a single steam turbine, with the steam turbine and gas turbine driving opposite ends of a single generator. Larger plants can be configured with multiple gas turbines; each equipped with its own HRSG, where all the HRSGs feed into a single large steam turbine. Combined plants range in size from 7 to 400 megawatts for systems with a single gas turbine and from 28 to 800 megawatts for systems having 2 or 3 gas turbines. Combined-cycle plants range in efficiency from 38 to 60 percent (LHV basis), and are mainly used for intermediate loads.

Reciprocating Engines: This type of internal combustion machine utilizes multiple cylinders and is usually fired on natural gas or distillate oil, but can also burn crude oil, residual oil, and synthetic fuels produced from coal or biomass. Reciprocating engines may be naturally aspirated or turbocharged, and utilize spark or compression ignition. These units are generally less than 20 megawatts in size, and are capable of rapid installation and startup. Like simple-cycle gas turbines, reciprocating engines are generally used only for peak loads.

Hydraulic Turbine: These units extract power from a stream of moving water, usually generated by a hydroelectric dam. Individual units vary in size from a few kilowatts to several hundred megawatts. Hydroelectric systems are used for all types of loads.

Alternative Systems: These systems utilize unconventional prime movers, such as windmills or biomass-fired steam or internal combustion systems, or no prime mover at all as in direct conversion systems utilizing electrochemical, thermoelectric, or photovoltaic technologies. Alternative systems currently represent only a tiny percentage of U.S. generating capacity, but their role may expand in the future because recent legislation includes incentives to encourage their use."

EPA Response

No response necessary.

Comment ID 316bEFR.010.053

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.01

EBA related comments

Prime Mover Names - Section A3, Table A3-1. DOE recommends EPA change the prime mover names listed in Table A3-1 to agree with the above changes. They should read, in order: steam turbine, gas turbine – combined cycle, gas turbine – simple cycle, reciprocating engine, hydraulic turbine, other.

EPA Response

No response necessary.

Comment ID 316bEFR.010.054

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.0

Costs

Industry Sectors Descriptions - Section B1, Page B1-5. Condenser costs are estimated as the "depreciated" costs of replacing a condenser with the useful remaining life given as a measure of premature replacement. This approach reduces the capital cost of the retrofit. Although this approach has some merit, it is not consistently applied to other cost areas. The concept of replacement cost for a depreciated asset is reasonable but must be used consistently. For instance, the cooling water pump is a depreciated asset. As stated on page B1-5, under Intake Pumping Costs, "The Agency estimated, based on a set of example cases, that existing intake structures could be reused for the circulating cooling systems and that a portion of the existing pumping system would be reused." If any credit is taken for the pump, then this credit must properly account for its depreciated value.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.055

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.01

EBA related comments

Private Sector Compliance Costs - Section B1, Page B1-16. EPA estimates private sector post-tax compliance costs as the pre-tax compliance cost less the tax savings that would result from these compliance costs. EPA calculates tax savings as the annualized compliance cost multiplied by the total tax rate. Using this methodology, the post-tax compliance cost is less than two-thirds of the pre-tax compliance cost. It is unclear, however; if EPA has taken into account the corporate tax structure in developing "post-tax" compliance liability for each facility. DOE would argue that compliance costs proportionally reduced by the tax rate is a simplification that may understate the "post-tax" compliance costs. For example, EPA uses the wholesale price of electricity to estimate energy costs associated with compliance for long-term "energy penalty" costs. This cost estimation procedure is a good example of how the "post-tax" compliance cost would be underestimated. In essence, the wholesale price of electricity should already have built-in post-tax costs and this "compliance cost" is further reduced in EPA's post-tax compliance methodology. It should be noted that EPA believes that the post-tax compliance costs are probably overestimated (see footnote 6 on page B1-16). DOE prefers that the pre-tax compliance cost and post-tax compliance cost be provided together so that the magnitude of the assumptions made by EPA is more transparent. DOE disagrees with EPA’s assumptions in estimating post-tax compliance costs.

EPA Response

No response necessary.

Comment ID 316bEFR.010.056

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Administrative Costs - Section B1, Page B1-9. EPA estimates administrative costs for post-promulgation NPDES permit application. A list of activities and associated costs are identified. Some of these activities are considered one-time efforts while other activities recur for each NPDES permit renewal. The Agency's cost estimate seems to imply that impingement and entrainment (I&E) characterization studies are a one-time cost. As such, DOE interprets this as meaning that no additional I&E characterization studies would be required under the rule making after an initial I&E study is carried out by a power plant operator. EPA should clarify its estimate for administrative costs. This cost is a significant burden to the industry even as a one time cost and we are concerned that the subsequent repermit cost estimates for I&E studies is far too low (Table B1-3 at p.B1-12).

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.057

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.0

Costs

Compliance Cost Estimate - Section B1, Page B1-17. EPA identifies uncertainties and limitations to their compliance cost estimate. However, EPA does not identify uncertainty in their cost estimating procedure. For instance, what is the level of uncertainty in the capital cost estimate? This is the largest cost element provided in Table B1-7, yet there is no mention of the level of accuracy for such an estimate. The reader is unclear whether this is based on conceptual, preliminary, or detailed engineering studies for all potentially affected facilities. The level of accuracy expected from EPA's cost estimation methodology should be discussed. Moreover, EPA's cost analysis for wet cooling tower retrofits neglects to make any allowance for site-specific requirements which may be mandated by State and local ordinances for plume cooling tower installation.

Through a web search on plume abated cooling towers, DOE was able to identify the following URL's describing either new facilities that will employ wet cooling tower technology, or existing facilities that are retrofitting with wet cooling towers. DOE offers the following websites for EPA's consideration:

AES Granite Ridge, Londonderry, NH: http://www.aesc.com/londonderry/aesl_qna.html

NIST nuclear plant: http://www.ncnr.nist.gov/AnnualReport/FY2000/operations.pdf and http://www.frm2.tu-muenchen.de/igorr/igorr-nl13/ig-nl13-11.html

FPL Sacramento Power LLC: http://www.energy.ca.gov/sitingcases/riolinda/documents/applicants_files/2001-08-22_PROP_REVISION.PDF

Blythe Energy LLC: http://www.energy.ca.gov/sitingcases/blythe/documents/2001-03-06_APPLICANTCOMMENT.PDF

Orion Power: http://www.orion.ene.com/files/executive_summary/S11.pdf

Agnews Plant (Calpine) – San Jose, CA: http://www.santateresacitizen.org/plume.html

Calgary Energy Centre (Calpine): http://calgaryenergy.calpine.com/docs/Jan01_newsletter.pdf

Empire State Newsprint, Albany, NY: http://www.besicorp.com/empire/info.html

Metcalf Energy Center (Calpine), Santa Clara County, CA: http://www.metcalfenergycenter.com/execsummary.asp

New York Power Authority, Astoria Plant, Queens, NY, new 500 MW CC: http://www.nypa.gov/ccf/NYPA%20Article%20X/text/Section%202.0%20Public%20Involvement%20(final).pdf

Badger Generating Co. LLC, Kenosha County, WI , new 1050 MW CC:
http://www.psc.state.wi.us/cases/badger/exec_sum.htm

Customer list – Plume Abatement Cooling Towers – Emcotek:
http://www.emcotek.com/references.htm

Duke Energy Morrow Bay Power Plant, conversion of 1058 MW gas-fired steam plant from once-through saline water cooling to cooling towers (saline water): http://www.morro-bay.ca.us/rwqcbsup.pdf

FPL Energy Elverta Power Project, Rio Linda, CA: http://obri.net/stop/fplcpac.html

Athens Generating Company, Athens, Greene County, NY, 1080 MW CC:
http://www.stoptheplant.org/parks_and_recreation_brief.htm

From this list, it appears as though plume abatement features are commonly employed in new and retrofit wet cooling towers thereby further supporting DOE's position.

As can be seen by visiting the URL's identified on the list, plume abatement is not required by EPA rules, but by local permitting regulations. These regulations generally require that "visual impacts" of any proposed new installation be minimized. This usually means eliminating any visible vapor plume from a cooling tower. If there is an airport anywhere in the vicinity, the FAA will also have to evaluate any potential visibility or icing impacts from a cooling tower vapor plume.

After reviewing this information, it seems obvious that by neglecting plume abatement entirely in their cost analysis, EPA is considerably underestimating the cost of compliance with the proposed Phase II regulations for options 1 and 4, given that plume abatement approximately doubles the cost of the cooling tower (by EPA's own cost estimate).

Additional costs should also be included for materials that would appropriately handle brackish or saline water. As EPA has indicated in a fax sent to NETL (D. Nagle to E. Parsons, January 18, 2002), these additional costs should be valued at 25 percent of tower costs. DOE agrees that this is a reasonable factor for corrosion resistant materials and drift elimination technology.

EPA Response

No Response Necessary to DOE comment.

Comment ID 316bEFR.010.058

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 9.01
Facility & firm-level costs/Econ. Practicability

Plant Closure and Other Economic Impacts - Section B2, Page B2-1. EPA concludes that compliance with this proposed rule (page B2-1) is economically feasible. However, EPA notes that this did not factor in plant closures or other types of economic impacts on facilities subject to the proposed Phase II rule (footnote 1 on page B2-1). EPA further states on page B2-3 that they estimate eleven facilities would be baseline closures (closures that would occur with or without the Phase II rule). Next, on page B8-13, additional closures above the baseline closures are estimated for the water body/capacity-based option (option 1) and the all cooling tower option (option 4). If such estimation can be made for the baseline and for these two options, why was an estimation of closures resulting from the Phase II rule not included? While EPA provides clarification on other aspects of their cost impact analysis, they are relatively silent on this issue.

Further information about possible closures under the proposed rule is available from a simple analysis of Appendix A to the technical document which suggests that most compliance costs are borne by relatively few facilities. Perhaps relatively few facilities need be “in-scope”(EPA’s definition).

	Total Sample	Positive Costs
Number of facilities	539	344
Total est. retrofit capital cost	$963,438,222	$963,438,222
Average	$1,787,455	$2,800,693
Median	$490,252	$1,427,204
Standard deviation	$3,585,858	$4,162,029
Costs over $10MM (number)	16	16
Costs over $10MM	$278,194,992	$278,194,992
% of total cost	28.9%	
% of facilities	3.0%	4.7%
Costs over $5MM (number)	51	51
Costs over $5MM	$517,286,308	$517,286,308
% of total cost	53.7%	
% of facilities	9.5%	14.8%

The table above shows that approximately 3 percent of in-scope facilities bear over a quarter of the costs of compliance; 10 percent bear over half of the costs. That the average compliance cost exceeds the median cost by a factor of 2 to 3 reflects the following skewed distribution:

Compliance Cost Range (million $)	$0 < $1	$1-$2	$2-$3	$3-$5	$5-$10	>$10
Number of Facilities	195	134 71	44	44	35	16

Focusing on the facilities which might bear over $10 million in (retrofit) capital costs constructs the following table of 16 facilities.

Plant Code	Water Body Type	Steam Plant Fuel Type	Compliance CWIS Technology Modification	Total Capital
170	Fresh Stream/Riv	Coal	Fine Mesh Trav w/ Fish Handling	$45,223,779
44	Estuary/Tidal Riv	Oil	Fine Mesh Trav w/ Fish Handling	$21,731,505
32	Ocean	Nuclear	Fine Mesh Trav w/ Fish Handling	$19,139,311
241	Estuary/Tidal Riv	Oil	Fine Mesh Traveling Screen	$18,748,809
28	Estuary/Tidal Riv	Nuclear	Fine Mesh Traveling Screen	$18,247,203
70	Ocean	Nuclear	Fine Mesh Traveling Screen	$18,025,893
510	Estuary/Tidal Riv	Nuclear	Fine Mesh Traveling Screen	$16,875,397
280	Estuary/Tidal Riv	Nuclear	Fine Mesh Traveling Screen	$16,834,637
268	Estuary/Tidal Riv	Coal	Fine Mesh Trav w/ Fish Handling	$15,282,924
395	Estuary/Tidal Riv	Other	Fine Mesh Traveling Screen	$14,707,137
415	Ocean	Oil	Fine Mesh Trav w/ Fish Handling	$14,339,794
413	Fresh Stream/Riv	Coal	Fine Mesh Trav w/ Fish Handling	$13,190,121
358	Estuary/Tidal Riv	Coal	Fine Mesh Trav w/ Fish Handling	$12,330,972
191	Fresh Stream/Riv	Coal	Fine Mesh Trav w/ Fish Handling	$12,311,066
442	Estuary/Tidal Riv	Nuclear	Fine Mesh Traveling Screen	$10,835,998
149	Great Lake	Coal	Fine Mesh Trav w/ Fish Handling	$10,370,446

Note that one coal-fired plant will incur a $45 million capital cost, nearly 5 percent of the national total. It would appear that further analysis may show that this plant would shut-down if it had to put these technologies in place and pay this cost. Since the cost seem to be on a very small number of plants a site-specific solution would better focus on those creating the AEI and the best technologies for minimizing AEI.

With regard to economic impact, one can not determine from available documentation which are the 11 facilities the EPA believes will shut down, irrespective of the proposed rule. One therefore is ignorant of whether any of those 11 form part of the 16 above. Of these 16 facilities, 6 are coal-fired, and 6 are nuclear. Most of these facilities supply baseload power to their regions. If the utilities are regulated, some of the compliance costs presumably could flow through to ratepayers; otherwise, some plants may shut down. For the coal-fired plants, large capital costs incurred to comply with 316(b), combined with regulatory uncertainty and the potential for additional costs to comply with air emissions regulations, may result in forced shut downs. DOE believes that an IPM analysis of these issues with the proposed rule must be performed.

EPA Response

No response necessary.

Comment ID 316bEFR.010.059

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Market Model Analysis - Section B3, Page B3-12. EPA's use of the Integrated Planning Model (IPM) to estimate national compliance impacts for only four of the ten NERC power pool regions is of some concern to DOE. EPA was not able to perform a market model analysis that completely matches the proposed rule's specifications (Option 3). EPA cites that market model analysis for the proposed rule was not performed because of limited time available after final definition of the proposed rule. DOE believes that such an analysis is essential to understand the economic and energy impacts associated with the proposed rule. EPA obtained a complete IPM analysis for two options: (1) the water body/capacity-based option (Option 1) and (2) the all cooling tower option (Option 4). Both options are more stringent than the proposed rule's specification. EPA determined that the water body/capacity-based option, as analyzed in the IPM, matches the technology specifications of the proposed rule for four of the ten regions. EPA compared the four regions as analyzed by the IPM with the other six regions in terms of characteristics relative to the rule's impact. EPA concluded that the results for the four regions would be representative of the other six regions. However, the IPM analysis was not a fully "integrated" analysis for the proposed rule since electricity exchanged between the regions did not properly reflect specifications for the proposed rule. This could limit the findings because the four analyzed regions may have benefitted from the higher compliance costs of the other six regions analyzed with the IPM in the more stringent option 1. DOE feels that the model input assumptions do not reflect the final proposed rule and that the results are subject to interpretation of what "might" occur if the IPM model had used inputs that reflect the final proposed rule. DOE believes that an IPM run should be made that exactly matches the proposed rules specifications. The credibility of the economic and possible energy impacts of the proposed rule is suspect in the absence of a complete market model analysis.

EPA Response

No response necessary.

Comment ID 316bEFR.010.060

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

IPM Model Assumptions - Appendix to Chapter B8, Page B8-26. EPA ran two different electricity demand assumptions. One uses EPA's electricity demand assumption and the other uses the Annual Energy Outlook (AEO) electricity demand assumption. Under the EPA assumption, electricity demand is based on AEO 2001 forecasts with an adjustment to account for demand reductions resulting from implementation of the 1993 Climate Change Action Plan (CCAP).

It is unclear if targets for GHG have been modified in the IPM electricity demand model from the original intent of CCAP. However, the EPA assumption clearly reduces fossil fuel power generation capacity over the model time frame compared to the AEO projections and consequently influences the results of the market analysis. For example, in Table B8-A-13 on page B8-33, the compliance forced increase in capacity of non-dispatched units projected by IPM with the AEO assumptions is nearly four times higher than that obtained with the EPA assumptions for electricity demand. This result suggests that compliance facilities become less competitive and are dispatched less frequently when using a more realistic electricity demand scenario such as provided in the AEO assumptions.

EPA has performed additional market analysis with IPM using the unadjusted AEO projections as suggested by DOE. This same type of IPM analysis was not performed for the proposed rule. DOE believes that the market analysis is warranted to completely understand the economic impact of the proposed rule and should be conducted through a vehicle such as a Notice of Data Availability (NODA).

EPA Response

No response necessary.

Comment ID 316bEFR.010.061

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.01

EBA related comments

Compliance Costs - Section B7, Page B7-2. EPA considered a number of alternative regulatory options. A summary of estimated alternative compliance costs is listed in the following table.

Alternative Regulatory Options	Post-Tax Annual Compliance Cost, Million $
Option 1 - Retrofit wet cooling tower (estuaries, tidal rivers, and oceans)	595
Option 2 - Same as 1 except at a select number of facilities (33 vs. 54)	379
Option 3a - I&E control technology everywhere	195
Option 4 - All Phase II plants reduce intake velocity	2,316
Option 5 - Same as 1 except retrofit dry cooling tower	1,252
Option 3 - Proposed Rule	182

The difference in the proposed rule's compliance cost of $182 million/year and alternative compliance cost estimates for option 3a of $195 million/year may be based on the allowance for a habitat restoration option. This would appear to suggest that the habitat restoration candidates will have a significant cost reduction potential. However, as the estimated cost reduction potential is not clearly identified, we are only guessing. It is recommended that the cost estimate for habitat restoration and primary compliance options be separately identified for the proposed and alternative compliance option cost estimates.

EPA Response

No response necessary.

Comment ID 316bEFR.010.062

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Modeling of Regulatory Options - Section B8. IPM was used to model two of the six regulatory options: Option 1- wet cooling towers on units located on estuaries, tidal rivers, and oceans and Option 4 – all Phase II units reduce intake velocity (i.e.; install cooling towers). The IPM estimated a "pre-run" capacity that is defined as the current operating and planned/committed generating units. As such, the base case does not provide a useful measure of the magnitude of capacity affected by the alternative options. The marginal impacts of each alternative option should be clearly stated in light of this modeling approach.

EPA Response

No response necessary.

Comment ID 316bEFR.010.063

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Significant Energy Actions - Section B8, Page B8-4. For both alternatives considered by IPM, each option would be considered a significant energy action under Executive Order 13211. However, for other options considered such a statement is not made. A clear statement for each option considered, including the proposed option, should be made that indicates if a significant energy action is anticipated.

EPA Response

No response necessary.

Comment ID 316bEFR.010.064

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

Amount of Cooling Water Needed - Page 2.19. The first sentence of the fourth paragraph of Section 2.2.1, Capital Costs of Wet Towers, reads:

"Recirculating the cooling water in a system vastly reduces the amount of cooling water needed."

DOE points out, and EPA acknowledges in later passages, that this is not true in that the condenser cooling flow is the same as in once-through system. What is reduced is the amount of water that must be withdrawn from the cooling-water source. DOE therefore suggests the following rewrite:

"Switching from once through cooling to recirculating the condenser cooling water greatly reduces the amount of water that must be withdrawn from the cooling-water source."

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.065

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

Power Plant Heat Losses - Page 2.21. Footnote 4 reads:

“4 With a 33 percent efficiency, one-third of the heat is converted to electric energy and two-thirds goes to waste heat in the cooling water.”

This is not accurate – for fossil fuel-fired power plants, heat rejected to the cooling water does not account for all power plant losses. DOE suggests footnote 4 be rewritten as follows:

“4 In a steam electric plant with 33 percent efficiency, one-third of the heat input is converted to net electric energy sent to the grid and two-thirds is rejected to the environment. The condenser cooling water typically represents 80 percent or more of this loss, with the remainder going to stack gases, frictional, thermal and auxiliary losses.”

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.066

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

Retrofit Factor - Pages 2.29 - 2.30. The text states that the “retrofit factor” is not considered a “contingency.” DOE believes that EPA is using the retrofit factor exactly the same way that a normal contingency allowance is used for estimation of construction projects. It is strongly recommended that the Agency use cost engineering terminology associated with recognized industry standards, such as the Association for the Advancement of Cost Engineering (AACE).

Moreover, DOE asserts through independent analysis that EPA’s contingency factor of 1.20 is too low and that a more appropriate contingency factor for a project such as a cooling tower retrofit would be 1.45, based on recognized industry standards compiled by AACE. DOE suggests that EPA refer to http://www.netl.doe.gov/publications/others/techrpts/parsons.pdf for a thorough discussion of these industry standards and their application to cost analysis.

For this case, where cost analysis is being done at a conceptual design phase of the project, the largest uncertainty is simply the incomplete state of the engineering design, which is 5 percent or less complete. To cover this uncertainty, AACE recommends a contingency allowance of 40 percent. The other major uncertainty is simply the technical risk inherent in the process technology being used. For this case, where standard commercial process technology is being applied in a retrofit situation, AACE recommends a minimum additional allowance of 5 percent, bringing the total allowance to 45 percent or a cost factor of 1.45.

EPA Response

No response necessary to DOE comment.

Comment ID 316bEFR.010.067

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

References for Cost Formulae - Pages 2.30 - 2.36. In the calculations presented, no specific references are provided for any of the many cost formulae used. A long unnumbered list of references is provided at the end of the chapter, but there is no way to determine which reference goes with which equation, so it is impossible to validate or replicate any of the cost calculations.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.068

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

Site Specific Nature of Cooling System Conversions - Chapter 4. DOE recognizes the value of the information presented in the chapter titled, “Cooling Systems Conversions at Existing Facilities.” Above all else, this chapter demonstrates the importance of all the site-specific analyses that must be conducted before consideration of a wet cooling tower retrofit. DOE will make the draft report, “An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants” available for review and consideration in the Fall 2002. The report, drafted by the Parsons Infrastructure and Technology Group, Inc., under DOE Contract Number DE-AM26-99FT40465, Task 50802, examines some of the issues (effect on turbine performance, increased plant parasitic power losses, land space consideration, tower size and type, permitting restrictions, tower plume and noise abatement, tower drift loss control) involved with a wet-cooling tower retrofit at four representative facilities. EPA may find the document useful for crafting a final 316(b) Phase II final rule.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.069

Author Name Carl Michael Smith

Organization Dept of Energy

Subject Matter Code 23.02

TDD related comments

Non-Viable Options - Chapter 5. DOE is pleased that the Agency has provided, with DOE input, an explanation into the differences between DOE's estimation of wet-cooling tower retrofit energy penalties and EPA's. (See Chapter 5: Energy Penalties of Cooling towers, 5.6.2). Both EPA's (1.1 percent) and DOE's (1.15percent, average excluding Yuma) estimate (for plants operating at 100 percent capacity) for the annual average energy penalties are similar (1.1 .vs. 1.15), but EPA estimates of peak summer energy penalties are considerably lower. EPA estimate ranges from 1.4 to 2.0 percent while the DOE estimate ranges from 2.4 to 4.0 percent. The reasons for this discrepancy (after discussions between EPA and DOE) probably include the following factors:

-EPA does not include all the pumping costs associated with a wet tower retrofit. The additional pumping costs could add approximately 0.2 to 0.7 percent to EPA's energy penalty estimates.

-EPA uses a range assumption at or near 20 degrees, which is higher than that used in most of the DOE model runs which were based on actual temperature data provide by EPA for each of the model locations (see descriptions in Chapter 7). If a 15-degree range were used, the energy penalty would increase by about 0.5 percent.

-EPA's analysis assumes that the condenser duty is the same when converting from once-through cooling to wet cooling towers. DOE estimates that this could result in a maximum additional penalty of 0.5 percent.

Adding these contributions from these three items yield a possible increase in the EPA peak energy penalty of 1.2 to 1.7 percent and a revised EPA peak energy penalty of about 2.9 to 3.5 percent for conversion to wet towers. These revisions to the EPA analysis to adjust to similar basis with the DOE study shows approximate agreement to the DOE results.

DOE also accepts EPA's position that a direct-dry cooling tower retrofit to existing steam condensing power generation facilities is a non-viable option. Neither should, as documented in Energy Penalty Analysis of Possible Cooling Water Intake Structure Requirements on Existing Coal-Fired Power Plants, an indirect-dry cooling tower retrofit be considered as a viable option for the Agency's proposed 316(b) Phase II rule.

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Comment ID 316bEFR.010.101

Author Name Carl Michael Smith
Organization Dept of Energy

Subject Matter Code 9.0
Costs

Energy Penalty Analysis of Possible Cooling Water Intake Structure Requirements on Existing Coal-Fired Power Plants

US Department of Energy

Working Draft -- May 23, 2002

1.0 Executive Summary

Section 316(b) of the Clean Water Act requires that cooling water intake structures must reflect the best technology available for minimizing adverse environmental impact. Many existing power plants in the United States utilize once-through cooling systems to condense steam. Once-through systems withdraw large volumes (often hundreds of millions of gallons per day) of water from surface water bodies. As the water is withdrawn, fish and other aquatic organisms can be trapped against the screens or other parts of the intake structure (impingement) or if small enough, can pass through the intake structure and be transported through the cooling system to the condenser (entrainment). Both of these processes can injure or kill the organisms. EPA adopted 316(b) regulations for new facilities (Phase I) on December 18, 2001. Under the final rule, most new facilities could be expected to install recirculating cooling systems, primarily wet cooling towers. The EPA Administrator signed proposed 316(b) regulations for existing facilities (Phase II) on February 28, 2002. The lead option in this proposal would allow most existing facilities to achieve compliance without requiring them to convert once-through cooling systems to recirculating systems. However, one of the alternate options being proposed would require recirculating cooling in selected plants.

EPA is considering various options to determine best technology available. Among the options under consideration are wet-cooling towers and dry-cooling towers. Both types of towers are considered to be part of recirculating cooling systems, in which the cooling water is continuously recycled from the condenser, where it absorbs heat by cooling and condensing steam, to the tower, where it rejects heat to the atmosphere before returning to the condenser. Some water is lost to evaporation (wet tower only) and other water is removed from the recirculating system as a blow down stream to control the building up of suspended and dissolved solids. Makeup water is withdrawn, usually from surface water bodies, to replace the lost water. The volume of makeup water is many times smaller than the volume needed to operate a once-through system.

Although neither the final new facility rule nor the proposed existing facility rule require dry cooling towers as the national best technology available, the environmental community and several States have supported the use of dry-cooling technology as the appropriate technology for addressing adverse environmental impacts. It is possible that the requirements included in the new facility rule and the ongoing push for dry cooling systems by some stakeholders may have a role in shaping the rule for existing facilities. The temperature of the cooling water entering the condenser affects the performance of the turbine -- the cooler the temperature, the better the performance. This is because the cooling water temperature affects the level of vacuum at the discharge of the steam turbine. As cooling water temperatures decrease, a higher vacuum can be produced and additional energy can be extracted. On an annual average, oncethrough cooling water has a lower temperature than recirculated water from a cooling tower. By switching a once-through cooling system to a cooling tower, less energy can be generated by the power plant from the same amount of fuel. This reduction in energy output is known as the energy penalty. If a switch away from once-through cooling is broadly implemented through a final 316(b) rule or other regulatory initiatives, the energy penalty could result in adverse effects on energy supplies.

Therefore, in accordance with the recommendations of the Report of the National Energy Policy Development Group (better known as the May 2001 National Energy Policy), the U.S. Department of Energy (DOE), through its Office of Fossil Energy, National Energy Technology Laboratory (NETL), and Argonne National Laboratory (ANL), has studied the energy penalty resulting from converting plants with once-through cooling to wet towers or indirect-dry towers. Five locations – Delaware River Basin (Philadelphia), Michigan/Great Lakes (Detroit), Ohio River Valley (Indianapolis), South (Atlanta), and Southwest (Yuma) – were modeled using an ASPEN simulator model. The model evaluated the performance and energy penalty for hypothetical 400-MW coal-fired plants that were retrofitted from using once-through cooling systems to wet- and dry-recirculating systems. The modeling was initially done to simulate the hottest time of the year using temperature input values that are exceeded only 1 percent of the time between June through September at each modeled location. These are the same temperature inputs commonly used by cooling tower designers to ensure that towers perform properly under most climatic conditions. The high temperature inputs correspond to the time of year when the highest power demands are observed and the needs for generating capacity are most critical due to the very high cost of buying replacement power on the spot market. Later, modeling was completed to estimate the monthly energy penalties, which were arithmetically averaged to generate an estimate of annual average energy penalty.

The results of the one-percent-high temperature modeling show that conversion to a wet tower could cause energy penalties ranging from 2.4 percent to 4.0 percent. This means that the plant will produce 2.4 percent to 4.0 percent less electricity with a wet tower than it did with a oncethrough system while burning the same amount of coal. That lost electricity could be made up at this plant or at some other existing or new plant by burning additional fuel. These peak-summer penalties are somewhat higher than those estimated by EPA in the technical documentation published with its April 9, 2002 proposal for existing facilities. DOE believes that EPA did not include all the relevant costs and made some inappropriate assumptions; these are described at the end of Chapter 4. When more appropriate costs and assumptions are considered, EPA estimates compare favorably with those in this report.

Conversion to an indirect-dry tower, where possible, could cause energy penalties ranging from about 8.9 percent to 12.14 percent using 20 degrees F for the approach (the difference between the inlet air dry-bulb temperature and the desired cold water temperature), and 12.7 percent to almost 16 percent using an approach of 40 degrees F. The industry norm for indirect dry towers – a 40-degree approach -- was evaluated initially, but the resulting pressures for the steam turbines were found to result in unacceptable operating conditions during the one-percent highest temperature times of the year. The mostly likely way that a company could operate a retrofitted indirect-dry tower at a 40-degree approach would be to reduce the power output from the plant (load shedding) during the hottest times of the year – just when the power demand is the greatest.

This power output reduction imparts an immediate energy penalty. On completion of the analysis it was determined that even if load shedding was attempted on all the 40-degree approach cases it would still be technically infeasible to operate the turbines safely during the summer months. To provide more information on dry tower energy penalties, a more conservative approach of 20 degrees was subsequently modeled.

The results of the annual energy penalty modeling show that conversion to a wet tower could cause energy penalties ranging from 0.8 percent to 1.5 percent. Conversion to an indirect-dry tower could cause energy penalties ranging from about 4.2 percent to 5.2 percent using 20 degrees F for the approach, and 7.9 percent to almost 8.8 percent using an approach of 40 degrees F.

A review of the "Environmental Directory of US Powerplants" (EEI 1996) indicated that in 1996, there were 258,906 MW of electric generating capacity in the United States that consisted of steam electric power plants employing once-through cooling. The one-percent highest temperature analysis modeled plants in just five locations and under very warm temperature conditions, but the modeled facilities are believed to be representative of the climatic conditions found throughout those portions of the country where once-through cooling is prevalent. It is quite possible that much of the Nation could experience very high temperatures at the same time (e.g., week of August 6, 2001), leading to results even more extreme than those calculated here. Tables ES-1 and ES-2 demonstrate the effects on electric generating capacity during the onepercent highest temperature conditions if 10, 25, 50, or 100 percent of the existing once-through cooled power plants in the United States were required to convert to either wet or indirect-dry cooling towers. The example of a requirement for 100 percent of the plants to retrofit to either wet or dry towers is hypothetical since it would be technically infeasible to do either. The energy, time, and expense required to make up for these losses is significant and would not necessarily require building new plants. But for example in the "average" case, 19 additional 400-MW plants might have to be built to replace the generating capacity lost by replacing oncethrough cooling with wet cooling towers in 100 percent of existing steam plants. If some of those affected plants were required to retrofit an indirect-dry tower, the energy penalty impacts would be over three times higher. For example, the "average" case might require 66 new 400-MW plants to be built to replace the generating capacity lost by replacing once-through cooling with indirect dry cooling towers with a 20-degree air-side approach in 100 percent of existing steam plants. This example of new plants needed if 100 percent of existing plants were required to retrofit to dry towers is far too low since after thoroughly completing this analysis it has been determined that it would be impossible for most existing plants to be retrofitted to dry towers at many locations and therefore there would be a need for closures and far more new power plants than provided in the simple example above.

These new power plants may be needed to replace the energy lost as a result of the conversion from once-through to recirculating cooling, and do not reflect the need to build additional new generating capacity to meet the nation's growing demands for electricity. The U.S. Department of Energy's Annual Energy Outlook states that anticipated growth in electricity sales between 2000 and 2020 is about 1.8 percent per year (EIA 2001a). Alternatively, some of the existing plants that might have to retrofit to either wet or indirect-dry cooling systems may be able to just burn more fuel to replace the electricity lost due to the cooling system conversion. Either way, additional fuel will be burned and other adverse environmental impacts will be created such as increased emissions, land use, and noise pollution.

To more closely evaluate the impact of increased air emissions from burning additional fuel, several additional analyses were performed. Estimates of incremental air emissions were made using the average annual energy penalty results at the Delaware River Basin site and the South site. The results show that when once-through cooled plants are converted to wet cooling towers, the incremental air emissions are not large on a percentage basis (generally less than one percent), but the absolute increases in pounds or tons of key air pollutants (SO2, NOx, PM, mercury, and CO2) are large nonetheless. If once-through cooled plants are converted to indirect-dry towers, however, the incremental air emissions can be significant. For dry towers with a 20-degree approach, the percentage increase in air emissions can exceed 4 percent depending on how the power company makes up the lost energy. For dry towers with a 40- degree approach, the percentage increase in air emissions can approach 8 percent and the number of additional pounds or tons is quite large.

Incremental air emissions are of greatest concern in nonattainment areas. Nonattainment areas are identified for "criteria pollutants" established under the 1970 Amendments to the Clean Air Act that do not meet standards set by EPA. The term "criteria pollutants" derives from the requirement that EPA must describe the characteristics and potential health and welfare effects of these pollutants. It is on the basis of these criteria that standards are set or revised. Although a national impact analysis is not performed in the present study, a general conclusion is that incremental air emissions are counterproductive to achieving standards set by EPA for air quality. There are a number of nonattainment locations throughout the United States where incremental air emissions could occur from an energy penalty associated with a requirement to add a cooling tower to existing power plants.

One important finding of this report is that neither indirect-dry nor direct-dry towers are viable as a retrofit technology at most U.S. locations under the one-percent-highest temperature conditions. As previously noted, many of the model runs evaluating conversion to indirect-dry towers resulted in calculated turbine pressures that exceeded the upper limit for safe turbine operation. This was true of all of the model runs made using the 40-degree approach assumption and for one quarter of the runs made at 20 degrees. The point should be made that the practice of load shedding, a method of reducing the steam load through the turbine, thereby reducing the condenser heat duty by a proportional amount, would not effectively lower the turbine backpressure enough for safe operation under the runs modeled with a 40-degree approach assumption. Even for those 20-degree approach cases in which the turbine pressures were below the upper safe limit, an indirect-dry tower would occupy huge amounts of space, which may not be available in an existing plant originally built with once through cooling. The results of sizing calculations to determine the required footprint area for a representative case of retrofitting to indirect dry towers at a 20-degree approach are discussed in section 10.2. Direct-dry towers are not practical either. In an existing plant, there simply is no room for the large-diameter ductwork required to conduct -atmospheric steam from the turbine exhaust hood to a direct-dry cooling tower.

Dry towers have been used as part of newly constructed cooling systems. If the entire power generating system (boiler, turbine, condenser, and cooling) is designed with dry cooling in mind, dry cooling does have applications. For retrofitted dry towers, the issues of large footprint and high energy penalty are important.

Table ES-1 - Wet Cooling Tower Energy Penalties and Impact at One Percent Highest Temperature Conditions
[see hard copy for table]

Table ES-2 - Indirect-Dry Cooling Tower Energy Penalties and Impact at One Percent Highest Temperature Conditions
[see hard copy for table]

2.0 Glossary

[see hard copy]

3.0 Introduction

3.1 Legal Background for Cooling Water Intake Structure Requirements

Section 316(b) of the Clean Water Act, enacted by Congress in 1972, addresses withdrawal of cooling water from surface water bodies, as follows:

Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

In 1976, the U.S. Environmental Protection Agency (EPA) promulgated final §316(b) regulations (April 26, 1976; 41 FR 17387). However, those regulations were successfully challenged by a group of 58 utilities [Appalachian Power Co. v. Train, 10 ERC 1965 (4 th Cir. 1977)]. In 1979, EPA formally withdrew its §316(b) regulations (June 1979; 44 FR 32956). As a consequence of the vacuum created by the absence of Federal regulations, many States adopted their own cooling water intake regulations to implement the §316(b) requirements. The broad statutory language facilitated widely differing interpretations by the States. Some adopted comprehensive programs, others imposed less rigorous requirements, and still others never developed formal regulations.

In the mid-1990s, a coalition of environmental groups, headed by the Hudson Riverkeeper, filed suit against EPA over failure to repromulgate §316(b) regulations [Cronin, et al. v. Reilly, 93 Civ. 0314 (AGS)]. On October 10, 1995, the U.S. District Court, Southern District of New York, entered a Consent Decree between the parties, directing EPA to regulate cooling water intake structures within 7 years. Under the Consent Decree, EPA agreed to propose regulations by June 1999 and promulgate a final rule by 2001. The Consent Decree was modified on November 21, 2000 to: a) finalize new facility regulations by November 9, 2001; b) propose existing source large utility and non-utility power producer regulations by February 28, 2002 and issue final regulations by August 28, 2003; and c) propose regulations by June 15, 2003 and issue final regulations by December 15, 2004 for other existing facilities not covered in b) above.

3.2 Purpose of This Report

EPA adopted 316(b) regulations for new facilities on December 18, 2001 (66 FR 65256). Under the final rule, most new facilities could be expected to install recirculating cooling systems, primarily wet cooling towers. The EPA Adminstrator signed proposed 316(b) regulations for existing facilities on February 28, 2002. The lead option in this proposal would allow most existing facilities to achieve compliance without needing to convert once-through cooling systems to recirculating systems. However, one of the alternative options proposed requires recirculating cooling in selected plants.

Until this rule is finalized, retrofitting to recirculating cooling remains a regulatory option.

Although neither the final new facility rule nor the proposed existing facility rule require dry cooling towers as the national best technology available, the environmental community and several States have supported the use of dry-cooling technology as the appropriate technology for addressing adverse environmental impacts. It is possible that the requirements included in the new facility rule and the ongoing push for dry cooling systems by some stakeholders may have a role in shaping the rule for existing facilities. Recognizing that over 50 percent of the existing coal-fired power plants employ once-through cooling systems, a decision to require many or all of these plants to install dry- or wet-cooling tower systems could have impacts on electricity costs and availability as well as secondary environmental impacts.

The purpose of this report is to quantify the loss of net electric output from an existing coal-fired power plant that would result from the replacement of its once-through cooling system to either a wet- or a dry-cooling tower. The reduction in net electric output is known as the energy penalty and is discussed below. Modeling was done for five locations to simulate the hottest time of the year using temperature values that are exceeded only 1 percent of the time between June through September at each modeled location. This corresponds to the time of year when the highest power demands are observed. To give an idea of the energy penalty at times other than the hottest period of the year, additional modeling was conducted on a monthly basis. This technique allowed for the calculation of an annual average energy penalty value at each site.

In order to compensate for the electricity lost as a result of the energy penalty, utilities would need to produce more electricity through burning additional fuel, thereby generating additional air emissions. A second purpose of this report is to quantify the additional amount of air emissions that would result at existing coal-fired plants using wet or dry cooling systems. Estimates of incremental air emissions were made at the Delaware River Basin and the South sites.

4.0 Overview of Cooling Systems at Steam Electric Power Plants

4.1 Cooling Water Use

Water is used in many industrial applications to cool machinery or to condense steam. The largest industrial user of cooling water is the steam electric power industry. Data from a recent U.S. Geological Survey (USGS) report indicate that steam electric power generation uses approximately 190 billion gallons of water per day (USGS 1998). In 1999, more than 60 percent of the utility power generating capacity in the United States (382,270 MW) utilized the steam-electric process (EIA 2000). At nuclear and fossil-fuel power plants, electricity is produced by heating purified water to create high-pressure steam. The steam is expanded in turbines, which drive the generators that produce electricity. After leaving the turbines, the steam passes through a condenser that has multiple tubes and a large surface area. A large volume of cool water circulates through the tubes, absorbing heat from the steam. As the steam cools and condenses, the temperature of the cooling water rises.

4.2 Types of Cooling Systems at Steam Electric Power Plants

Most power plants use either once-through cooling or recirculating cooling. Once-through cooling systems withdraw large volumes of water -- typically in the range of tens of millions to billions of

gallons per day from a river, lake, estuary, or ocean. The water is pumped through the condenser and finally returned to the same or a nearby water body. Recirculating cooling systems receive their cooling water from and return it to a cooling tower and basin, cooling pond, or cooling lake. Because evaporation and planned cooling tower blowdown (periodic discharges of portions of the recirculating water to remove build up of solids and other undesirable constituents) removes cooling water from the evaporative system, regular additions of "makeup" cooling water are needed. Makeup volumes are much lower than daily once-through volumes,
and may range from hundreds of thousands to millions of gallons per day. The USGS estimates that about 2 percent of the water withdrawn for steam electric power generation was consumed as a result of once-through cooling, cooling towers, or pond cooling (USGS 1998).

This report considers two types of recirculating cooling systems – wet towers and indirect-dry towers. These are defined in Section 2 and described in Section 5.3.

4.3 How Cooling Water Affects Steam Power Plant Performance

High-pressure steam is generated in a boiler whose heat source is a high temperature atmospheric pressure furnace fired by some type of fossil fuel or a nuclear reactor. The high-pressure steam is expanded through a multistage turbine that turns a generator to produce electricity. Spent exhaust steam exiting the turbine is condensed and recycled to the boiler for steam production. During the condensation process, a large quantity of low-grade heat is absorbed by the condenser coolant, which is typically water.

The steam side of the condenser operates under vacuum conditions (i.e., a pressure below normal atmospheric pressure). The magnitude of the condenser vacuum depends chiefly upon the condenser design and the incoming temperature of the condenser coolant. Lower coolant temperatures will produce a larger vacuum in the condenser that, to a certain extent, has a favorable effect on performance. Likewise, higher condenser coolant temperatures are associated with a smaller vacuum, resulting in reduced energy output. These relationships are based on the laws of thermodynamics and hold true regardless of the type of cooling system used (once-through or recirculating).

4.4 The Energy Penalty

Steam condensers are designed to produce a vacuum at the outlet end of the turbine, thereby increasing the efficiency of the system. The temperature of the cooling water exiting the condenser affects the performance of the turbine -- the cooler the temperature, the better the performance. As cooling water temperatures decrease, a higher level of vacuum can be produced and additional energy can be extracted. On an annual average, once-through cooling water has a lower temperature than recirculated water from a cooling tower. Because most of the heat rejection in a wet cooling tower is due to evaporation, the temperature of the recirculated cooling water is limited by the ambient air wet-bulb temperature. It can never be lower than the wet-bulb temperature and generally is about 5 to 10 F higher. As a result of switching from a once-through cooling system to a cooling tower, less energy can be generated by the power plant from the same amount of fuel.

In a related manner, the performance of a dry cooling system is limited by the ambient air dry-bulb temperature because all of the heat rejection in a dry cooling system is attributable to sensible heating of the surrounding air. Since dry-bulb temperatures are higher than corresponding wet-bulb temperatures, the performance of dry cooling systems will be less than wet systems (either once-through or recirculating). In fact, a recent analysis of cooling system options for combined-cycle power plants found that at nearly all locations and under nearly all climatic conditions in the United States, the performance of a properly designed and operated recirculating cooling system would be superior to a comparable direct-dry cooling system (Burns and Micheletti 2000).2001). Therefore, switching a once-through cooling system to a dry cooling system would mean that the decline in power generation for a given amount of fuel would be even greater than for a once-through to a recirculating wet cooling system retrofit.

Veil et al. (1992) summarized literature values for the energy penalty associated with retrofitting once-through cooled plants with wet-cooling towers. The majority of the data points for the energy penalty for fossil-fueled plants were clustered in a band between 1.5 percent to 2.5 percent. Results for nuclear power plants show greater variability, ranging between 1 percent and 5.8 percent. The data points were not as clearly clustered in a narrow range as were the data points for the fossil plants. Veil et al. (1992) selected a range of 2 percent to 3 percent for the decrease in net electrical power that could be experienced if existing nuclear power plants retrofit from once-through to wet cooling.

In a more recent study, Burns and Micheletti (2000) estimate the maximum energy penalty values for a new generic 750-MW combined-cycle power plant using either a wet recirculating cooling system or a direct dry cooling system at sites in five different parts of the country. In this study, the energy penalty is defined as the loss of electricity generating capacity incurred when a cooling system is unable to perform at design efficiency. Then for both types of cooling systems, the maximum energy penalty occurs during the hottest times of the year when ambient wet-bulb and dry-bulb temperatures are greatest. This period normally is represented by 1 percent of the time during the four warmest months, which also happen to coincide with the times of national peak electricity demand. For recirculated wet cooling, the estimated maximum energy penalty was less than 1 percent for any of the five sites. For direct dry cooling, the estimated maximum penalty ranged from 11.6 percent to 18.1 percent, depending on site climatic conditions. Although the estimates prepared by Burns and Micheletti indicate a dramatic difference in the maximum energy penalties expected from using wet and dry cooling systems, the results are not directly comparable to this study for two reasons. First, the Burns and Micheletti estimates were based exclusively on new cooling systems for new plants and did not consider any of the retrofit complexities associated with an existing once-through cooling system at an existing plant. Second, the Burns and Micheletti estimates were based on a direct-dry cooling system, while an indirect dry cooling system would be a more suitable retrofit option for an existing once-through cooling system (see subsequent discussion in Section 5.3).

For its 316(b) regulation development, EPA researched and derived energy penalty estimates based on empirical data and proven theoretical concepts for a variety of conditions (EPA 2002). To estimate nationally representative energy penalties, EPA sought data to estimate representative regions. These four regions include Northeast (Boston, MA), Southeast (Jacksonville, FL), Midwest (Chicago, IL) and Northwest (Seattle, WA). The Agency calculated the turbine component of the energy penalty by examining the empirical effect on net plant heat rates resulting from changing turbine exhaust pressures for fossil-fueled, combined-cycle, and nuclear plants. The Agency related the turbine exhaust pressure to ambient conditions for the selected locations. Because the source water temperature for once-through cooling systems and the ambient wet bulb and dry bulb temperatures for cooling towers varies with location and time of year the Agency used empirical coastal water temperatures at the four selected locations.

For calculation of monthly average wet and dry bulb temperatures, EPA calculated time-weighted averages during the daytime period between 8 AM and 4 PM. Since the energy penalty will vary over time as ambient climatic and source water temperatures vary, the calculation of the total annual energy penalty for a chosen location integrated the results of individual calculations performed on a periodic, monthly basis. EPA used design temperatures to calculate peak-summer penalties for the selected locations based on the temperature that ambient conditions equaled or exceeded one percent of the time.

EPA derived the turbine exhaust pressure values for alternative cooling system scenarios in conjunction with the empirical temperature values. EPA used these turbine exhaust pressure values to estimate the associated change in turbine efficiency. EPA then calculated either the peak-summer (design) or the monthly energy penalty. Annual values were calculated by averaging the 12 monthly values. The annual average energy penalty values for fossil-fueled plants at the four regional sites ranged from 1.5 to 1.8 percent and the peak-summer energy penalties ranged from 1.4 to 2.0 percent.

It should be noted that EPA's annual average energy penalties were based on assuming that plants operate at just 67 percent of maximum load. The DOE does not agree with this assumption for base load plants and has brought this to EPA's attention. Subsequently, EPA estimated a 1.1% annual energy penalty based on assuming that plants operated at 100 percent of the maximum load.

The annual average penalties presented in Chapter 8 of this report are similar to those calculated by EPA, but the EPA estimates of peak summer energy penalties are considerably lower than those presented in Chapter 7 of this report. The reasons for this discrepancy are:

- EPA does not include all the pumping costs associated with a wet tower retrofit. The additional pumping costs could add approximately 0.2 to 0.7 percent to EPA's energy penalty estimates.
- EPA uses a range assumption at or near 20 degrees, which is higher than that used in most of the DOE model runs. Those runs were based on actual temperature data provided by EPA for each of the model locations (see descriptions in Chapter 7). If a 15-degree range were used, the energy penalty would increase by about 0.5 percent.
- EPA's analysis assumes that the condenser duty is the same when converting from once-through cooling to wet cooling towers. DOE estimates that this could result in a maximum additional penalty of 0.5 percent.

Adding the contributions from these three items yield a possible increase in the EPA peak energy penalty of 1.0 to 1.5 percent and a revised EPA peak energy penalty of 2.7 to 3.2 percent for conversion to wet towers. These revisions to the EPA analysis to adjust to similar basis with this study shows approximate agreement to the DOE results.

[comment continued in 316bEFR.010.102]

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

[comment continued from 316bEFR.010.101]

5.0 Description of Models and Modeling Efforts

5.1 - Background on ASPEN Model

ASPEN (Advanced Simulator for Process Engineering) PLUS is a simulator software package commercially available from Aspen Technology (the original development was co-sponsored by the DOE) that is used worldwide by companies and universities to examine both commercially available and conceptual processes. Examples of technologies for which ASPEN has been used as part of the development process include integrated gasification combined cycle (IGCC) power plants, pulverized-coal power plants, fuel cells, advanced gas turbine systems and Vision 21 systems (see the NETL web site at http://www.netl.doe.gov). The simulator includes a suite of built in physical property packages and engineering process models and an additional flexibility for adding user-generated models. The ASPEN model provides a steady state representation of the overall process units (or process sections) that includes sufficient detail to accurately predict the energy and mass balances.

5.2 Specific Model for Pulverized Coal Power Plant

An ASPEN PLUS 10.2 model developed for a pulverized coal power plant in an earlier study by NETL (Shah et al. 2001) was used as a starting point for this analysis. For this study, cooling-tower systems (i.e. “Wet” and “Indirect Dry”) were added as options to the original model’s “Once-Through” steam condenser cooling.

The ASPEN model used for this study was based on a detailed design by Buchanan et al. (1998) for a power plant feeding pulverized coal to a conventional steam boiler and steam turbine. The process design uses a single reheat steam power cycle to generate nominally 400 MW of power. The steam boiler can be viewed as containing two major heat-transfer sections, a radiant section and a convective section. The radiant section consists of a natural circulation, wall-fired, subcritical unit arranged with a water-cooled dry-bottom furnace. The convective section consists of a superheater, reheater, and economizer heat exchangers. An additional air heater is external to the steam boiler. The furnace burners were a low-NOx type. The flue gas was desulfurized by treating it with lime slurry.

In the design, air is preheated in the air heater by exchanging heat with the flue gas. Coal and hot air are fed to the boiler from the bottom. High-pressure steam is generated in the radiant section. Flue gas from the radiant section enters the convective section at 2,200 F. In the convective section, thermal energy from the flue gas is transferred to high-pressure steam (in the superheater heat exchanger), intermediate-pressure steam (in the reheat heat exchanger), and feed water (in the economizer heat exchanger). Flue gas leaves the convective section at 600 F and passes through the air heater to preheat combustion air. An ESP is used to remove particulates and the flue gas is then sent to a sulfur dioxide (SO2) scrubber with the aid of an induced draft fan. Lime slurry is employed to scrub SO2 from the flue gas. The treated flue gas leaves through stacks.

High-pressure steam is superheated in the convective section. Superheated steam at 2,415 psi and 1,000 F is expanded in the high-pressure turbine to an intermediate pressure of 604 psi. The intermediate-pressure steam is reheated in the convective section to 1,000 F and is then expanded in the intermediate-pressure steam turbine. Finally, the exhaust from the intermediate-pressure steam turbine is expanded in the low-pressure turbine to approximately 1 psia and is then sent to a condenser. The condensate water is sent to a series of low-pressure feed heaters. The heated water is sent to the deaerator to remove dissolved gases. De-aerated water is passed through high-pressure water heaters and is then fed to the economizer portion of the convective section. Water is further heated to close to its saturation temperature in the economizer and then sent to radiant section for boiling.

5.3 - Model Adaptation for Cooling Systems

The ASPEN model described above provides the heat duty (heat of condensation for the exhaust steam) for the steam-cycle condenser. For the purposes of this study the following options were added to the model described above:

−Once-Through Cooling - this modification considers that cooling water is used in a single open-loop pass in a shell-and-tube heat exchanger. The simulator estimates the cooling water requirements and associated circulating water-pump power.

−Wet Cooling Tower - a detailed model for a wet cooling tower (Enick et al. 1994) was added to the simulator. The cooling tower operates in a closed-loop with the steam condenser. The tower cools the hot cooling water from the steam condenser by both evaporation of some of the entering water and sensible heating of the ambient air entering the tower. Estimates for blowdown and drift losses were assumed. Makeup water is provided for these losses and for evaporative losses. The cooling tower air fans' power requirements were predicted based on induced-draft fan design.

−Indirect Dry Cooling Tower - a cooling tower in which a hot liquid such as condenser coolant rejects heat to the atmosphere without the evaporation of water. Heat from the water is transferred to the surrounding atmosphere in finned-tubes, which are cooled by large diameter fans blowing air over the finned surfaces. The cooling tower air fans' power requirements were predicted based on induced-draft fan design.

The hot cooling water from the steam condenser enters countercurrent to the entering ambient air. Since the dry tower uses only sensible heat transfer to cool the water, the required air-flow rate and fan power is considerably higher than for the wet-cooling tower.

For each of the above options, the steam turbine exhaust pressure to the steam condenser is dependent on the assumptions (such as cooling water range and approach temperatures) for a particular case.

A direct-dry cooling system was not considered for use with the ASPEN model because the focus is to provide a cooling system that can be retrofitted to existing plants. In an existing plant, there simply is no room for the large-diameter ductwork required to conduct sub-atmospheric steam from the turbine exhaust hood to a direct-dry cooling tower. Additionally, existing plants have steam turbine designs that result in only allowable maximum backpressures of approximately 5.5 inches of mercury.

This limit would probably be exceeded with the choice of a direct-dry cooling system when ambient temperatures are above 90 F.

5.4 Air Emissions Calculations

The process for estimating increased air emissions as a result of an energy penalty associated with conversion of a once-through cooling system to a cooling tower is focused on existing coal power plants. Calculation of air emission increases will depend on the extent and type (e.g., wet or dry cooling tower) of cooling system conversions. For illustrative purposes, this analysis assumes that all once-through cooling systems at existing coal power plants are converted to a recirculating cooling tower. The procedure to conduct this analysis is described in the following discussion.

The ASPEN Model was used to determine the peak and annual energy penalty estimates associated with replacing once-through cooling with cooling towers. The incremental air emissions resulting from combustion of additional fuel to make up for these energy penalties are estimated using the following process. First, the regional power system that is associated with the location of the model plant is defined (see Figure 1). The Delaware River Basin model plant is located in the Mid-Atlantic Area Council (MAAC) regional power pool. The MAAC Region, geographically the same as the PJM Interconnection (a company responsible for the operation and control of the bulk electric power system) control area, encompasses nearly 50,000 square miles. MAAC encompasses approximately 58,000 MW of installed generating capacity of which 20,000 MW is coal-fired capacity.

The South (Atlanta) model plant is located in the Southeastern Electric Reliability Council (SERC) regional power pool. The SERC Region covers an area of about 464,000 square miles and includes parts or all of 13 southeastern and south central States. The Region is divided geographically into four diverse Sub regions - Entergy (the geographical area of the Entergy Operating Companies and Associated Electric Cooperative, Inc.), Southern (the geographical area of the Southern electric system), TVA (the Tennessee Valley Authority area), and VACAR (the Virginia-Carolinas area).

The MAAC and SERC Regions have 332 coal-fired boiler generator sets connected to various cooling systems. The MAAC Region has 73 coal-fired boiler generator sets with about 46 percent of its capacity using cooling towers. The dominant type of cooling tower is natural draft (36 percent), followed by forced mechanical draft (8 percent). The natural draft towers will cost more but emit less pollutants. The least common type of cooling tower installed in the MAAC Region is the induced draft (2 percent) design. Similarly, the SERC Region has about 36 percent of its coal-fired capacity cooling system operating with cooling towers. The SERC Region has 259 coal-fired boiler generator sets and its coal-fired capacity is approximately four times larger than the MAAC Region capacity. The cooling tower type is dominated by the natural draft design (20 percent) followed by forced mechanical draft (10 percent) and then induced draft (5 percent).

Next, the total of all atmospheric emissions of concern associated with coal-fired power plants in this region are estimated for a baseline time period (1998). The basis for these estimates was taken from the NETL database for coal-fired power plant operations in 1998. The database contains power plant equipment details as well as an accounting of existing air emissions from these plants. The database was linked to results of ASPEN model simulations of energy penalties for model plants located in the power pool regions. The air emission model was comprised of the NETL database and logical code for translating energy penalty into increased air emissions. Also, the regional plant capacity and electricity generation are defined for the baseline time period in order to determine the amount of lost generation and lost plant capacity.

In the third step, the annual energy penalty estimates from the ASPEN simulations are used to develop estimates of plant-level emissions increase of sulfur dioxide (SO2), nitrogen oxides (NOx), particulate matter (PM), mercury (Hg), and carbon dioxide (CO2), under the assumption that all coal-fired plants currently employing once-through cooling systems will need to retrofit to either wet or dry cooling towers. The model considers three different scenarios for making up the energy lost to the energy penalty. Scenario 1 assumes that new coal-fired power plants will be built to replace lost power generation capacity. Scenario 2 assumes that the replacement capacity is provided by a new gas-fired combined-cycle unit. Scenario 3 assumes that no new plant construction is needed to replace the loss of generating capacity, but that existing units are able to supply the needed power through increased dispatching of these units. This scenario implies the availability of power outside each regional power pool or sufficient marginal capacity to achieve reliable operations while reducing reserve margins within that power pool. Power generation availability is a function of supply and demand. Forecasts for power generation availability in these regions indicate that supply will be able to meet demand over the next decade. However, these forecasts do not account for energy penalties associated with installations of cooling towers. As the energy penalty increases, the availability of power generation will likely diminish. For low energy penalties (e.g., wet cooling towers), there is less risk to realizing insufficient availability than for high energy penalties (e.g., dry cooling towers). An independent availability analysis was not performed for the present study.

The replacement options in scenarios 1 and 2 consider either an advanced design coal-fired power plant or an advanced design gas-fired combined cycle power plant that meets or exceeds the Clean Air Act's New Source Performance Standards (NSPS). These scenarios will result in less emissions since the newer plants have greater efficiency and, on average, have better pollution controls. Reference plant designs for each of these options are taken from DOE's Market-Based Advanced Coal Power Systems report (DOE 1999).

Pollution control equipment at existing coal-fired power plants is accounted for in the NETL database for coal-fired power generation. Pollution control equipment is comprised of particulate control devices, SO2 control equipment and NOx control devices.

For the MAAC region, particulate controls are predominantly cold-side electrostatic precipitators (ESPs) and represents about 94 percent of the capacity for power generation. Baghouses are used at about 5 percent of the power generation capacity with the remaining capacity equipped with mechanical devices. Most of the capacity (86 percent) in the MAAC region does not have flue gas desulfurization controls installed to reduce SO2 emissions. The balance of coal-fired power plant capacity (14 percent) has wet scrubbers to control SO2 emissions. NOx control equipment includes combustion controls (low NOx burners and/or overfire air) and post combustion controls (selective catalytic reduction [SCR] and selective noncatalytic combustion controls). Only 13 percent of the coal power plant capacity in the MAAC region do not have some form of combustion controls –this means that NOx emissions are higher. On the other hand, only 18 percent of the capacity are equipped with post combustion NOx controls (SCR). Therefore 82 percent, or a majority of systems in the MAAC region, are emitting high levels of NOx. This amounts to 2 to 4 times the emissions rate of the Advanced Coal-Fired replacement plants.

For the SERC region, particulate controls are predominantly cold-side ESPs (78 percent of capacity) with a lesser amount of hot-side ESPs (17 percent) and baghouses (4 percent). Mechanical devices to control particulates are installed at less than 1 percent of the capacity of coal power plants. Approximately 85 percent of the capacity in the SERC region does not have controls to reduce SO2 emissions. SO2 control is predominantly wet scrubbers (14 percent) with only 1 percent using spray dryer absorbers. Combustion controls to reduce NOx emissions are installed in nearly all coal-fired power plants located in the SERC region (94 percent of capacity). Less than 1 percent of the coal power plant capacity in the SERC region has post combustion NOx controls.

5.4.1 Advanced Coal-Fired Replacement Plant

The design of the replacement coal-fired power plant is based on a 400 MW supercritical steam cycle (3500 psig/1050 F/1050 F), which is a power generating facility configured to run under a Rankine cycle where the pressure and temperature of the steam inside the boiler exceed 3,200 psi and 1,100 o F respectively. The overall net plant efficiency is 39.9 percent, which exceeds the efficiency of the existing coal-fired plants (typically 34 to 38 percent). The maximum coal burn rate is 147 tons per hour with a design margin of 5 percent to get to a burn rate of 154 tons per hour.

The flue gas desulfurization (FGD) system for removing sulfur emissions is comprised of a limestone forced oxidation reactor designed to remove up to 96 percent of the sulfur dioxide in the flue gas. A single module reactor is configured with countercurrent flow of the flue gas and limestone slurry. Formic acid is used as a buffer to enhance the SO2 removal characteristics.

NOx control consists of a dual system, low NOx combustion and selective catalytic reduction (SCR). The low NOx combustion system is comprised of low NOx burners (LNB) and overfire air (OFA). The SCR system is designed to remove 63 percent of the incoming NOx. Particulate control is achieved with a pulse jet fabric filter capable of removing 99.9 percent of the particulates.

Design conditions for emission control equipment of major pollutants are given in Table 1. The design conditions include controls for SO2, NOx and particulate emissions. Emission control equipment for mercury and CO2 are not included for the advanced coal-fired replacement plant.

Table 1 - Design Emission Rate for Airborne Emissions (lb/MWh)
[see hard copy for table]

Mercury emissions are estimated from the mercury content in the coal and emission modification factors associated with the pollution control equipment for SO2, NOx, and particulates. An approximate control rate is taken as 90 percent removal of the oxidized mercury from coal combustion, based on preliminary field data taken from EPA's Mercury Information Collection Request (ICR) data (EPA 2000). Using these preliminary data, the oxidized fraction of mercury for bituminous and sub-bituminous coal is 70 percent and 35 percent. The estimated overall mercury removal is 31.5 percent and 63 percent for sub-bituminous and bituminous coal, respectively.

Average emission rates from existing coal-fired power generation is higher than for the advanced coal-fired replacement plant. The average SO2 emission rate for the MAAC and SERC Regions is 19.8 lb/MWh and 14.7 lb/MWh, respectively. This is more than ten times greater than the SO2 emission rate for the advanced coal power replacement plant. The average NOx emission rate for the MAAC and SERC Regions is 4.27 lb/MWh and 5.5 lb/MWh, respectively. The average NOx emission rate for existing coal-fired power plants is more than three times greater than that for the advanced coal-fired power replacement plant. PM emission rate for the existing coal-fired power plants is more than three times greater than for the advanced coal-fired power plant. CO2 emission rate is about 25 percent larger for the existing power plants than for the advanced coal-fired replacement plant. The difference in CO2 emission rate is predominately caused by the higher efficiency of the advanced power plant.

The cooling water system for the coal-fired replacement power plant consists of two 50-percent capacity vertical circulating pumps, a multi-cell mechanical draft evaporative cooling tower, and carbon steel cement-lined interconnect piping.

5.4.2 Advanced Natural Gas Combined Cycle (NGCC) Replacement Plant

The design of the replacement NGCC plant is based on a natural gas combustion turbine (CT) coupled with a heat recovery steam generator (HRSG). The reference plant design for the CT/HRSG technology is based on gas turbine characteristics that are similar to the Westinghouse 501G machine. The combined cycle net efficiency of the plant is 50.6-percent and is capable of producing a net output of 326 MWe. The configuration of the NGCC involves one gas turbine in conjunction with one 1650 psig/1000 F/1000 F steam turbine. The steam turbine is a single multi-stage machine exhausting steam to a single pressure condenser operating at 2 inches of mercury (absolute) when operating at 100 percent design load conditions.

The advanced NGCC system is expected to produce low levels of SO2 and particulate emissions. For the purposes of this study, the plant is considered to produce negligible SO2 and particulate emissions as well as no mercury emissions. Low levels of NOx production from the combustion turbine are achieved by zoning and staging of fuel combustion using dry Low-NOx can-annular combustion systems. Design conditions for emission control equipment of major pollutants are given in Table 1.

The cooling water system for the NGCC replacement power plant consists of two 50 percent capacity vertical circulating pumps, a multi-cell mechanical draft evaporative cooling tower, and carbon steel cement-lined interconnect piping.

6.0 Model Assumptions

This section of the report outlines the data that were used as inputs to the ASPEN model, where the data came from and why they were selected, any analyses that were made to convert sets of data into single model inputs, and the assumptions that were made. The same model was used for estimating both the peak and the annual energy penalties but some of the inputs varied as appropriate.

6.1 Size and Type of Plant

The objective of this study was not to simulate every possible size and type of steam power plant, but to be representative of a large class of existing plants. Approximately 52 percent of existing net generation in the United States during 2000 was coal-fired (EIA 2001b). Out of 829 existing coal-fired generating units in the United States with capacities greater than or equal to 100 MW, 43 percent fall in the size range of 200 to 600 MW. A 400 MW plant was selected as representative of this range. Because DOE had previous experience using the ASPEN model to simulate various aspects of a hypothetical 400 MW pulverized coal plant, the same model plant was used in this analysis.

6.2 Plant Location

DOE attempted to strike a balance between the number of modeled locations and the number of runs using alternate inputs at each location. Five locations were selected to represent a geographic cross-section of the existing fleet of coal-fired power plants using once-through cooling. Figure 2 plots data from the Edison Electric Institute's (EEI's) Power Statistics Data Base to show that nearly all of the coal-fired power plants with once-through cooling are located in the eastern United States, and particularly in the mid-Atlantic, Appalachian, and Great Lakes regions. Therefore, the first four sites are located in Philadelphia, Pennsylvania, Detroit, Michigan, Indianapolis, Indiana, and Atlanta, Georgia. The fifth site, Yuma, Arizona, is somewhat of an artifact because no once-through cooling plants exist in the southwestern United States except for several coastal California facilities. None of those California plants is coal-fired. Although the southwest Arizona leg of the Colorado River could theoretically support a once-through cooled power plant, this model case was run primarily to get a sense of the potential impact of a hot, dry climate on steam power plant efficiency. In addition, the southwestern site was included to give a projection of the energy penalty for converting from a wet tower to an indirect dry tower.

Site selection was also based on the availability of climatic information (e.g., wet-bulb and dry bulb temperatures, humidity, surface water temperatures) and State and Federal thermal discharge permit data used as input to the Aspen model. Table 2 shows the five site locations and a variety of information about each location for the 1 percent peak summer conditions. Table 3 includes the average monthly wet-bulb, dry-bulb, and surface water temperature for the four sites. The source of these data was the NOAA's 30-year normal temperature records.

The analysis to calculate the incremental air emissions was highly labor intensive and therefore was run for the Delaware River Basin and South sites only.

Table 2 - Locations for Model Runs
[see hard copy for table]

Table 3 – Monthly Average Temperatures
[see hard copy for table]

6.3 Discharge Temperatures and Range

EPA provided DOE with information on actual and permitted discharge temperatures from commercial coal- and oil-fired power plants in each of the locations selected for analysis (the actual power plants are not identified in the report). The information was compiled from the National Pollutant Discharge Elimination System (NPDES) permit records as found in EPA's Permit Compliance System (PCS) database (http://www.epa.gov/enviro/html/pcs/pcs_userguide.html).

Table 2 indicates that the ambient air and water temperatures are similar for several of the regions. Thus modeling would lead to a corresponding similar energy penalty if the same ranges (difference in temperature between the hot water entering and the cold water leaving the condenser; often referred to as “delta-T”) were used. To provide an indication of the energy penalty sensitivity, two or three different ranges were modeled at each location for the peak summer conditions. Additionally, the various condenser ranges were employed to reconcile the differences between permitted and actual discharge temperatures at some of the sites. The primary range case for peak summer conditions at each location is based on the lower of permitted or actual discharge temperatures provided by the EPA. Due to the amount of computer resources required (runs/time) only a single range (15-degrees) was considered for all sites in estimating the annual energy penalty (this was simply chosen as the middle of most of the range assumptions used for the sensitivities at the peak –summer modeling analysis). For some of the locations, surface water conditions in the winter would result in an unacceptably low turbine back pressure below 1 inch of mercury if the range of 15 degrees were used for the once-through cooling option. If this occurs, the range is allowed to increase until the turbine back pressure is approximately 1 inch of mercury. Note that all temperatures referenced in this report are expressed in Fahrenheit degrees. A brief description of the range assumptions derived for each location is provided below.

6.3.1 - Delaware River Basin

Actual summer average discharge water temperature for the modeled plant with once-through cooling is 96 degrees. As shown on Table 2, the water temperature is 76 degrees, so a 20-degree range was used as the base case. The Delaware River Basin Commission regulations require a five-degree maximum temperature increase at the limit of a mixing zone. This could require a smaller range depending on the design of the mixing zone. Consequently, cases were also analyzed for 10- and 15-degree ranges.

6.3.2 - Michigan/Great Lakes

The modeled plant uses once-through cooling. It operates with a typical 25-degree range that represents the base case for this location. Michigan’s regulations for Lake Erie require thermal discharges to the lake not to exceed an average of 80 degrees during summer months. This would require a seven-degree range during the summer season based on Table 2 water temperatures; therefore, that case was developed. An intermediate range of 15 degrees was also analyzed to define the sensitivity of temperature rise and energy loss.

6.3.3 - Ohio River Valley

Information from two plants was used to model this location. Both plants have permits restricting discharges to 90 degrees, thus making a 14-degree range the base case. Both of the plants appear to exceed the permitted temperatures regularly (perhaps due to variances) and therefore a case utilizing a 20-degree temperature increase was also developed. The annual energy penalty modeling was run for a 15-degree range case with the results compared to those that were obtained from a peak energy penalty that also employed a 15-degree range.

6.3.4 - South

The modeled plant discharges to the Chattahoochee River and its permit and operating data show a five-degree increase over receiving water temperature. A five-degree range is too small for a practical cooling system design. Therefore 10-degree and 15-degree range cases were analyzed.

6.3.5 - Southwest

As discussed previously, there are no once-through cooled coal-fired power plants in the southwestern United States. Using EPA's NPDES data, the model run was based on an allowable discharge temperature to the Colorado River in the Yuma area of 92 degrees. Therefore, a 10-degree range would be appropriate for a once-through plant. A 15-degree range case was also developed.

6.4 Approach

In a new installation using dry cooling, steam condensation would occur in a direct, air-cooled exchanger. The plant would be laid out to minimize distance from the steam turbine to the air cooler so that there would not be significant pressure drop between the turbine exhaust and the cooling tower. Direct, air-cooled heat exchangers occupy significant land space. The footprint for a direct, air-cooled condenser integrated with a 400-MW power plant of the type modeled herein would require additional land space on the order of several acres. Since the distance from the steam turbine to the dry tower could not be minimized, the diameter of the piping connecting the two units would be prohibitively large to accommodate minimal pressure losses. Therefore, in a retrofit situation, it is unlikely that a direct air-cooled condenser could be installed. For the purpose of this retrofit study, we have assumed that the existing water-cooled condenser will be retained and the water will be cooled by air in the dry-cooling tower; this is known as an indirect-dry tower.

Most dry-cooling towers existing at or being designed for utility steam power plants today are the direct, air-cooled condenser type and are designed for air-side approach temperatures of 40 degrees or greater. We therefore selected 40 degrees as our first case for dry cooling. This 40 degree air-side approach proved problematic for an indirect-dry system modeled under the one percent highest ambient air conditions because the resultant steam turbine back pressure, determined thermodynamically from the cooling tower approach, condenser range, and terminal temperature difference, was elevated to a level far in excess of the steam turbine's originally designed safe operating conditions based on once-through condenser cooling. Operation of a turbine so far above the design-point back pressure would not be viable without significant levels of modification. The energy penalties resulting from the assumption of a 40-degree air-side approach should be considered optimistic – the penalties actually realized for such a configuration would be higher than predicted here. To get a second, less extreme, set of model outputs, which would be more realistic for the case of an indirect-dry tower, we also evaluated a conservative air-side approach of 20 degrees. The rationale for this is discussed in more detail in Section 10.

For wet cooling towers, the typical commercial design is based on using an approach between the cooling water exiting and the wet-bulb temperature of the entering air of 8 degrees plus 1 to 3 degrees to account for possible plume recirculation. An approach of 10 degrees was used for the model runs used for estimating both the peak and annual energy penalties. For all cooling options (once-through, wet and dry), an 8-degrees approach was specified between the cooling water exiting and the steam entering the condenser. This approach is sometimes referred to as the terminal temperature difference.

6.5 Ambient Air Temperatures

Ambient air dry-bulb and wet-bulb temperatures for all five selected sites modeled under the one percent highest ambient air conditions are from the Marley Company's handbook (Marley 1970). Our estimate of the summer peak performance impact in going from wet to indirect-dry cooling towers was accomplished by evaluating the cooling scenarios at the maximum design point conditions. The industry accepted definition for maximum design point condition in the context of cooling towers is the dry-bulb (indirect-dry cooling towers) and wet-bulb (wet cooling towers) temperatures (o F) that are equaled or exceeded 1 percent of the time, on the average, during the warmest consecutive four months. This is also the period when the demand for electricity is at its peak. In the United States, these are the months of June through September, inclusive. By definition, the maximum design point wet-bulb temperature that would be used to design a wet cooling tower for a steam condensing power plant located in Philadelphia, Pennsylvania is 79 E because the ambient air wet-bulb temperature between the months of June through September (inclusive) for that city exceeds 79 E less than one percent of the time during that period (see Table 2).

The analysis of annual energy penalty is based on separate estimates made at monthly intervals. The monthly dry-bulb and wet-bulb temperatures are shown in Table 3.

6.6 Ambient Water Temperature

With the exception of the Michigan/Great Lakes site, the ambient water-surface temperatures required to evaluate once-through cooling were provided by the United States Geological Survey (USGS). However, because the USGS does not record water-surface temperatures for the southwest corner of Lake Erie, calendar year 1999 data supplied by the Fermi II nuclear power plant located on the lake's shore in the town of Newport, Michigan was used for peak summer conditions. For the Michigan/Great Lakes site, daily average surface-water temperature data for the years 1997- 2001 from the National Oceanographic and Atmospheric Administration (NOAA) was used in the annual energy penalty analysis. To remain consistent with the accepted definition of ambient-air maximum design point conditions, a mean water-surface temperature was developed by taking the arithmetic average of the 12:00 pm daily temperature recording at the specified sites over the months of June through September for the peak summer conditions. Water temperature decreases with depth in a water body. The ambient data are assumed to be values taken at the water surface. If a plant withdraws water from a deeper level, that incoming water may have lower temperature than the surface temperature used in the modeling. Monthly ambient water temperature data for each site are shown in Table 3. The site-specific data sources are described in greater detail below:

6.6.1 Delaware River Basin (Philadelphia, Pennsylvania):

USGS Water Resources Data – Pennsylvania, Water Year 2000, Volume 1, Delaware River Basin, Station Number 01474703, Delaware River at Fort Mifflin at Philadelphia, Pennsylvania.

6.6.2 Michigan/Great Lakes (Monroe, Michigan)

Fermi II Nuclear Power Plant
6400 N. Dixie Highway
Newport, Michigan 48166
Also see: http://coastwatch.glerl.noaa.gov/statistics

6.6.3 Ohio River Valley (Indianapolis, Indiana)

USGS Water Resources Data – Indiana, Water Year 2000 (Provisional), Station Number 03353611, White River at Stout Generating Station in Indianapolis, Indiana.

6.6.4 South (Atlanta, Georgia)

USGS Water Resources Data – Georgia, Water Year 2000, Station Number 02336490, Chattahoochee River at State Route 280N, Atlanta, Georgia.

6.6.5 Southwest (Yuma, Arizona)

USGS Water Resources Data – Arizona, Water Year 2000, Station Number 09429490, Above Imperial Dam on the Colorado River, Yuma, Arizona.

[comment continued at 316bEFR.010.103]

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

[comment continued from 316bEFR.010.102]

7.0 Results of Peak Season Energy Penalty Analysis

7.1 Energy Penalties

The ASPEN model was run for five locations and either two or three ranges at each site for a total of twelve model runs. Each run calculated the energy penalty relative to once-through cooling for a wet tower, and indirect-dry towers at approaches of 20 degrees and 40 degrees. There may be cases in which plants already using wet towers may be asked to convert to indirect dry towers (e.g., plants in the Southwest, none of which use once-through cooling). Further calculations estimated the energy penalty that would be realized in going from a wet tower to an indirect-dry tower. These results are displayed in Table 4. The detailed model output charts are included in Appendix A.

For the purpose of this report, the peak and annual average energy penalties associated with a recirculating cooling system retrofit have been presented as the percent decrease in plant net power output, holding fuel consumption constant, compared to the same facility operating under a once-through cooling scenario. The reduction in plant net power output was determined by the summation of turbine performance loss due to increased steam backpressure and the increase in plant parasitic loads caused by the cooling tower's induced draft fans and head pressure losses. Energy penalties at the 1-percent highest temperature condition relative to once-through cooling systems ranged from 2.41 percent to 3.95 percent for wet towers, from 8.85 percent to 12.14 percent for indirect-dry towers at a 20-degree approach, and 12.67 percent to 15.9 percent for indirect-dry towers at a 40-degree approach. The larger energy penalties that were obtained from
the 40-degree approach model results versus the 20-degree approach model results would indicate that the reduction in plant net power was driven to a greater extent by the steam turbine's performance loss than could be overcome by the net gain in parasitic power loss (i.e., the 40-degree approach tower's fans would not consume as much power as those would on the 20-degree approach tower). A sensitivity analysis on condenser ranges, in the case of an indirect-wet cooling tower, shows that increasing the range by 5 degrees tends to decrease the energy penalty, on average, by 0.3 percent. For indirect-dry cooling towers with a 20-degree approach, increasing the condenser range by 5 degrees decreases the energy penalty, on average, by 0.9 percent. Five-degree increases for the condenser range of power plants modeled with 40- degree approach indirect-dry cooling towers decreased the energy penalties, on average, by 1 percent. This trend would seem to indicate that the parasitic power savings that can be had by reducing the cooling water flow rate through the condenser, effectively increasing the condenser range, more than makes up for the minor decrease in turbine performance due to the resultant higher backpressure. Note that the calculated energy penalties for the Southwest location have been omitted from these ranges because there is not likely to be a once-through system located in Yuma. Energy penalties associated with a retrofit from wet towers to indirect dry towers ranged from 6.1 percent to 10.9 percent at a 20-degree approach, and 10.0 percent to 15.2 percent for indirect dry towers at a 40-degree approach.

7.2 Turbine-Back Pressure

Because turbine-back pressure is an important consideration in plant performance, calculated back pressure values are presented in Table 5. The model runs using an approach of 20 degrees calculated a back pressure of the condensing steam between 4.18 and 8.35 inches of mercury and for 40 degrees calculated a back pressure between 7.03 and 13.37 inches of mercury. Steam turbines manufactured in the United States are designed to operate at back-pressures as high as 5.5 inches of mercury. Operation of a steam turbine at backpressures in excess of that recommended by the manufacturer will void the warranty and may cause significant damage to the machine because of adverse aerodynamic effects on the blades. Dry-cooling towers modeled with a 40-degree approach to ambient dry-bulb temperature yielded turbine back pressures that would require prohibitive levels of modification and re-tooling, resulting in even higher energy penalties than shown in this report by virtue of load shedding. For comparison, 6 out of 12 of the dry cooling tower model runs incorporating a 20-degree approach to ambient dry-bulb temperature produced steam-turbine-back pressures in an acceptable, albeit borderline, range.

Table 4 - Energy Penalty Results from ASPEN Model at One Percent Highest Temperature Conditions
[see hard copy for table]

Table 5 - Turbine-Back Pressure Results from ASPEN Model at One Percent Highest Temperature Conditions
[see hard copy for table]

8.0 Results of Annual Energy Penalty Modeling

8.1 Energy Penalties

The energy penalties were calculated on a monthly basis for each site. Monthly penalty values were arithmetically averaged to estimate the annual energy penalty. Note that this is not exact because the use of averaging conditions may underestimate penalties occurring during the very hot and very cold times of the year when electricity demand is greater than the periods with more moderate temperatures. Table 6 shows the estimated annual energy penalties for each site. The penalty associated with retrofitting wet towers ranges between 0.8 and 1.5 percent while retrofits to dry towers are considerably higher. For the sake of comparison, the one percent highest temperature energy penalties, assuming a 15-degree range, are shown in parentheses.

Table 6 – Estimated Annual Energy Penalty
[see hard copy for table]

8.2 Turbine Back Pressure

None of the monthly pressure values at any of the sites exceeds the critical threshold of 5.5 inches of mercury design point for the turbine’s safe operation for the once-through, wet cooling, or 20-degree approach dry cooling options. Some exceptions are present primarily for the 40-degree approach dry cooling option for the Southwest (Yuma) site. It should be noted that using temperature averaging misses the peak summer conditions when this threshold of 5.5 inches of mercury is often exceeded for the dry cooling options at both approach assumptions (see section 7.2).

9.0 Results of Air Emissions Modeling

Increased air emissions of SO2, NOx, PM, Hg, and CO2 have been estimated under three scenarios for two power pool regions. Air emissions increase as the energy penalty increases Increased air emissions are a function of baseline operating conditions and increased fuel consumption. Increased fuel consumption is a result of the energy penalty associated with conversion of an existing cooling system to a closed cycle cooling system employing a cooling tower. Baseline air emissions are contained in the NETL database for coal power plant operations.

For the three scenarios developed in this study, increasing fuel consumption at existing coal power plants yields the largest increase in air emissions because existing systems are both less efficient at producing power and therefore burn more coal and , on average, have less emissions control equipment. The higher the energy penalty, the larger the fuel consumption and increase in air emissions. In this study, the largest energy penalty is associated with conversion of a once-through cooling system to a dry tower.

The capacity of coal power plants in the MAAC region is about one quarter of that in the SERC region. Since the SERC region has a larger power generation capacity, the baseline air emissions are consistently higher than that for the MAAC region.

The emission rate, expressed in mass per unit of power generation, varies with the installed control equipment and coal properties (e.g., sulfur content). For the SERC region, the average SO2 emission rate (14.7 lb/MWh) is slightly lower than for the MAAC region (19.8 lb/MWh). Even though there are a similar percentage of SO2 controls in both regions, the SO2 emission rate is lower in the SERC region because a lower sulfur coal is used in that region. The average sulfur content of coal in the SERC region is 0.95 lb/MMBtu as compared to an average sulfur content of 1.22 lb/MMBtu for the MAAC region.

The NOx emission rate for the MAAC region (4.27 lb/MWh) is lower than for the SERC region (5.50 lb/MWh). One of the principal reasons for the lower emission rate in the MAAC region is the more frequent installation of post-combustion NOx controls.

The particulate emission rate for the MAAC and SERC region is similar, 0.29lb/MWh and 0.27 lb/MWh, respectively. The dominant particulate control device is cold-side ESPs for both regions.

The mercury emission rate for the MAAC region is 7.2 x 10 -5 lb/MWh and is more than 70 percent greater than in the SERC region 4.1 x 10 -5 lb/MWh. The dominant reason for the higher mercury emission rate in the MAAC region is the higher mercury content in the coal.

CO2 emissions are not controlled at existing coal power plants. Emission rates are primarily a function of the efficiency of power generation while fuel properties play a minor role. The CO2 emission rates are similar for the MAAC and SERC region, 2,190 lb/MWh and 2,200 lb/MWh, respectively. Increased CO2 emissions that yield no significant economic benefit to the gross domestic product will negatively affect this Administration's carbon intensity reduction goal to mitigate the threat of climate change associated with increased emissions of greenhouse gases. For a given amount of power generation, fuel consumption will increase proportionally with an increase in energy penalty. For the three scenarios developed in this study, the energy penalty and increased fuel consumption as a result of conversion of a power plant to a closed-cycle cooling system is lowest for a wet cooling tower and highest for conversion to a dry cooling tower with a high range.

Annual coal consumption for existing power plants in the MAAC and SERC region is 45 million tons and 201 million tons, respectively. For the scenario where existing coal power plants will makeup lost power generation by increasing coal feed rate, the increase in coal consumption is equal to the energy penalty multiplied by the baseline coal consumption for each affected facility.

If a replacement plant is used to make up lost power generation from an energy penalty, the replacement plant will use less fuel to produce an equivalent amount of power. This is because the replacement plants are designed to be more efficient than the existing plants. The NETL database contains fuel consumption and associated power generation for each coal power plant. It also contains power generation losses associated with each energy penalty scenario developed in the present study. Replacement plant fuel consumption is calculated from lost power generation from the existing plant and the efficiency of the replacement plant.

The baseline air emissions for the two regions modeled in this study are provided in Section 9.1 and 9.2.

9.1 – MAAC Region (Region for Delaware River Basin Site)

The baseline generating and emission conditions for the MAAC in 1998 are outlined in Table 7. The additional emissions associated with making up electricity lost to the energy penalty under three different generating scenarios are shown in Table 8.

Table 7 – Baseline Conditions for MAAC – 1998
[see hard copy for table]

Table 8 – Increased Annual Emissions for MAAC
[see hard copy for table]

9.2 – SERC Region (Region for Southern Site)

The baseline generating and emission conditions for the SERC in 1998 are outlined in Table 9. The additional emissions associated with making up electricity lost to the energy penalty are shown in Table 10.

Table 9 – Baseline Conditions for SERC – 1998
[see hard copy for table]

Table 10 – Increased Annual Emissions for SERC
[see hard copy for table]

As seen in Tables 8 and 10, the largest increase in annual emissions is for CO2. There are no controls for carbon dioxide at power plants so emissions increase proportionally with increased fuel consumption. If increased coal consumption is used to compensate for lost power production associated with an energy penalty, SO_2 and NOx emission will increase. Both of these pollutants have adverse health and welfare impacts. These pollutants contribute to acid rain formation that causes acidification of lakes and streams and can damage trees at high elevations. Based on health concerns, SO_2 and NOx have historically been regulated under the Clean Air Act. These pollutants interact with the atmosphere to form fine sulfate and nitrate particles. Scientific studies have identified a relationship between elevated levels of fine particles and increased illness and premature death from heart and lung disorders, such as asthma and bronchitis.

The range of results for increased air emissions from the three scenarios indicates that widespread installation of wet cooling towers on coal power plants would likely stress the power industry's ability to meet demand and regulatory requirements but would likely not impact the ability for the electric generation sector to meet more stringent air emission caps, such as limits for NOx emissions under the NOx State Implementation Plan (SIP) Call or for limits of SO_2 and NOx emissions under the Acid Rain Program (Title IV of the Clean Air Act Amendments of 1990). A likely scenario for mitigation of increased emissions (with the exception of CO_2 emissions) would be installation of environmental control equipment at existing plants. The extent to which controls would be added to offset increased emissions has not been investigated in this report.

10.0 Discussion

10.1 Energy Penalties

10.1.1 One Percent Highest Temperature Conditions

The one-percent highest temperature energy penalties estimated in this study are significant in light of the large number of coal-fired and other-fueled plants that currently operate under once-through cooling systems. If new regulations for existing facilities cause more than a few such plants to retrofit wet- or dry-cooling towers, the loss of available energy to the nation as a whole or to certain regions of the country where once-through cooling is widely used could be very important to utilities' ability to supply abundant and affordable electricity.

For the sake of discussion, consider that in 1996, 258,906 MW of electric generating capacity consisted of plants employing once-through cooling systems (EEI 1996). Assume that 10 percent, 25 percent, 50 percent, or 100 percent of the once-through plants producing that power may be required to retrofit to wet cooling towers. Using the low (2.4 percent), arithmetic average (3.0 percent) and the high (4.0 percent) energy penalties generated by the ASPEN model, the resulting loss in power generating capacity would be significant and is illustrated below (Table 11). Keep in mind that these energy penalties were generated in five different locations during the peak energy demand period of the summer months. Many of the locations are in the Eastern half of the country (see Figure 2) and heat waves could affect the entire area where the once-through cooled plants are concentrated. Note that in developing these tables, we have extrapolated these energy penalties to the whole United States at the same time of peak demand.

The energy, time, and expense required to make up for these losses is significant. The energy lost to the energy penalty could range from 621 MW to more than 10,000 MW. This represents from 0.24 to 4 percent of the quantity of power currently generated by once-through cooled plants. For example in the "average" case, 19 additional 400-MW plants would have to be built to replace the generating capacity lost by replacing once-through cooling with wet cooling towers in 100 percent of existing steam plants. The amount of additional fuel that would be required to generate the lost power is huge.

The second reason involves whether the existing turbines in place at most U.S. once-through cooled power plants could operate at such high levels of back pressure. The results of the modeling suggest that, under the climatic inputs assumed, dry cooling will not be a feasible option as a retrofit during peak summer conditions for many plants originally designed to operate with once-through cooling.

Table 11 - Wet Cooling Tower Energy Penalties and Impact at One Percent Highest
[see hard copy for table]

A similar analysis was performed for those plants that might be required to retrofit their once-through cooling systems to indirect-dry towers using the conservative 20-degee approach; the resulting energy penalty impacts would be over three times higher (see Table 12), ranging from more than 2,000 MW to over 33,000 MW. This represents from 0.9 to more than 13 percent of the quantity of power currently generated by once-through cooled plants. There are two contributors to the increased impacts. First of all, the magnitude of the energy penalties for indirect-dry towers is several times higher than the penalty for wet towers due to much higher turbine back pressures associated with dry towers. To accommodate the energy lost to the energy penalty, the “average” case would require 66 new 400-MW plants to be built to replace the generating capacity lost by replacing once-through cooling with indirect dry cooling towers with a 20-degree air-side approach in 100 percent of existing steam plants. If the 40-degree approach had been analyzed here, the results would have been significantly higher.

Table 12 - Indirect-Dry Cooling Tower Energy Penalties and Impact at One Percent Highest Temperature Conditions
[see hard copy for table]

As noted earlier, 6 of the 12 model runs using a 20-degree approach resulted in pressures that exceeded the 5.5 inches of mercury threshold. For situations in which the turbine backpressure falls within 1 to 1.5 inches of mercury of that threshold, it would be theoretically possible to reduce the back pressure to safe levels through load shedding. This possibility may be applicable for 3 of the 6 model runs that exceeded the pressure threshold. The load shedding would be accomplished through a reduction in the temperature range of the condenser cooling water, which is directly proportional to plant output. For example, if the condenser cooling water temperature range were 20 degrees at full load, reducing the plant output by 50 percent would reduce the condensing temperature by 10 degrees. This would provide about 1.2 inches of mercury reduction in turbine back pressure. However, the severity of the energy penalty (in terms of reduced power output) associated with this small amount of back pressure relief makes it an unattractive option that would only be selected in an emergency situation for a short time. Peer review comments received on this report indicated that a 20-degree approach was too conservative and cooling systems designed on that basis would not function properly. Even if a retrofitted dry tower with a 20-degree approach is hypothetically assumed, it cannot operate safely under the peak temperature conditions at most U.S. locations.

Many plants would face costly modifications to enable existing steam turbines to operate safely at back pressures so far removed from their original design point. The standard steam turbine in most water-cooled plants is designed for optimal operation at 1.5 inches of mercury back pressure. These units are designed to normally operate between 1.0 and 6.5 inches of mercury without significant loss of turbine performance. At extreme off-design operation, pressures significantly above 6.5 inches of mercury, standard turbines will experience degraded turbine performance, and physical damage to the turbines is possible.

All of the model runs using an approach of 40 degrees calculated a back pressure of the condensing steam of between 7.03 and 13.37 inches of mercury. This range of turbine back pressures would not allow for safe operation of the system. In order to operate above 5.5 inches of mercury, existing standard steam turbines would either have to be replaced by new turbines with different designs, or at the very least, would need to be significantly modified by removal of stages (this means that the last few stages of the turbine would actually be removed, causing even greater losses in efficiency). Therefore, the turbines would not be fully operational at the assumed approach of 40 degrees and the estimated energy penalties would likely be greater than forecasted in this study. We concluded that the cost of such modification would be unacceptable. Retrofit of once-through cooled plants to dry cooling using a 40-degree approach (the current industry norm) is not a practical or acceptable option for peak season conditions.

It is interesting to note that attempts to retrofit a dry tower at the Southwest location, using either a 20-degree or a 40-degree approach, would exceed the 5.5 inches of mercury threshold. According to the model results, dry towers could not be retrofit onto once-through plants in the Southwest. Two points can be made on this issue. First, since few if any plants in the Southwest are likely to use once-through cooling, the case is purely hypothetical. On the other hand, the calculations point out that dry cooling combined with traditional boilers and turbines will not be an effective cooling remedy in very warm climates. If dry cooling is to be used in hot climates, the entire power generating system – boiler, turbine, condenser, and cooling – must be built to a different set of specifications in a coordinated fashion.

The cost to convert/retrofit an existing plant to operate using a dry tower would be very high and could cause utilities to evaluate various options. The requirement and design details would be site specific and we have not analyzed this option. In one example reported in the literature (http://www.glencanyon.net/navajo.htm), the Navajo power plant would have to reduce its output by 30 percent to utilize dry cooling.

10.1.2 Annual Average Temperature Conditions

The annual average energy penalties are lower than those calculated for the one-percent highest temperature conditions and the impacts to national and regional energy supply are consequently less extreme. Nevertheless, in parts of the country with many once-through cooled plants, even the annual energy penalty can have a significant impact. Using an average of the annual average energy penalties from the four sites excluding the Southwest site (1.15 percent) and following the same types of calculations outlined in Tables 11 and 12, requirements to retrofit wet cooling towers at 100 percent of once-through cooled plants would result in 2,984 MW of lost energy. Requirements to retrofit indirect-dry towers with a 20-degree approach at 100 percent of once-through cooled plants would result in 12,375 MW of lost energy. These composite losses are not huge, but they could have an undesirable affect on some regions of the country.

Apparently, the issue of excessive turbine backpressure for dry tower retrofits does not apply during most temperature conditions. Nevertheless, the periods of highest electricity demand typically occur during those one-percent highest temperature conditions, such that dry cooling is most likely not a retrofit option.

10.2 Dry Cooling Tower Footprint Area

Another significant issue limiting the viability of a potential retrofit of an indirect dry tower to an existing plant is the amount of land area required by the cooling tower. A commonly used measure of plant equipment land use is called the battery limit footprint area, which is defined as the amount of land area “inside the fence” occupied by the actual equipment, plus any additional space needed for maintenance access. For power plants, the footprint area is usually expressed in square feet of land needed per megawatt of generating capacity.

To determine what the footprint area would be for indirect dry cooling towers, a representative site was selected (Delaware River Basin) and the indirect dry towers that would be needed for those design conditions were sized. This involved: performing design calculations for the actual heat exchanger modules that would be needed at that site to accomplish the degree of cooling required; calculating the amount of space these units would occupy; and then adding an allowance for the additional space that would be needed for maintenance access determined the footprint area.

An indirect dry cooling tower is simply a heat exchanger in which hot water rejects heat to the atmosphere by conduction and convection. The hot water flows inside a series of tubes that are cooled by ambient air. To enhance the heat transfer efficiency of the tubes, helical fins are attached to the outside of the tubes to provide additional surface area on the air side. As is typical of other large heat exchangers, these finned tubes are arranged in large factory-assembled modules that can be trucked to the plant site and connected together to complete the cooling tower assembly.

The most critical parameter in sizing an indirect dry cooling tower is the total surface area required for the heat exchanger, which may be readily determined from simple engineering relationships, depending upon the hot water flow rate and temperature, the ambient dry-bulb temperature and the desired approach temperature. The most important of these is the desired approach temperature. As the approach temperature is reduced, the cooling tower is forced to operate closer to the thermodynamic limits on how much heat can be theoretically transferred from the water to the air and the surface area increases significantly.

Once the total surface area is determined, it is a straightforward matter for the designer to select a tube configuration, module layout and then calculate the number of tubes and modules required to complete the cooling tower heat transfer array.

The heat exchanger sizing calculations for this example were based on the following design parameters:

- 1-inch diameter finned tubes made of hot-dipped galvanized steel,
- 50 feet long tubes,
- 0.375-inch high helical fins,
- 10 fins per inch,
- spaced at 2.2-inch pitch laterally and longitudinally, and

- an optimized tube array configured in an A-frame overall arrangement.

The calculated battery limit footprint for the indirect dry tower for the 40-degree approach Delaware Valley case was 186 square feet per megawatt of generating capacity. This is nearly equal to the footprint typical of an entire coal-fired power plant with once-through cooling (200 square feet per megawatt). Retrofitting such a cooling tower to an existing plant would mean nearly doubling the battery limit footprint area.

The indirect dry tower footprint for the 20-degree case approach was 57 percent larger than the 40-degree approach case, 292 square feet per megawatt. Retrofitting that tower to an existing plant would entail about a 150 percent increase in the plant footprint area.

To observe a visual example of the large battery footprint of a dry cooling system for a new facility, readers are directed to a website describing a direct-dry tower system at a 40-MW geothermal power plant operated by Steamboat Geothermal near Reno, Nevada. The plant employs 240 fans covering a significant area of land relative to the overall size of the plant. Photographs of that facility are available at http://home.nvbell.net/sbgeo/steamboat.html. Note that these towers are direct-dry towers that were built as part of the original construction. Also note the large surface area of fans for just 40-MW of generating capacity.

10.3 Incremental Air Emissions

The incremental air emissions associated with the annual average energy penalty are proportional to the energy penalty. For each increase in energy penalty, the air emissions will increase at a constant rate. When once-through cooled plants are converted to wet cooling towers, the incremental air emissions are not large on a percentage basis (generally less than one percent), but the absolute increase in pounds or tons of air pollutants is large nonetheless. If once-through cooled plants are converted to dry towers, however, the incremental air emissions can be significant. For dry towers with a 20-degree approach, the percentage increase in air emissions can exceed 4 percent depending on how the power company makes up the lost energy. For dry towers with a 40-degree approach, the percentage increase in air emissions can approach 8 percent and the number of additional pounds or tons is quite large.

It is logical to assume that numerous power plants are located in highly populated areas. By virtue of their high populations, many of those same areas are likely to experience less than ideal air quality. If some or many of the power plants in areas with diminished air quality must modify their cooling systems, thereby imposing an energy penalty, they will need to generate additional power. Assuming that plants in the same highly populated areas generate the additional power, air quality will be further diminished by virtue of the additional air emissions resulting from burning additional fuel. Of the five air pollutants evaluated in this report, three (SO2, NOx, and PM) are of national concern to human health and welfare. EPA’s National Ambient Air Quality Standards (NAAQS) set concentration limits for those pollutants to maintain suitable air quality. NOx also contributes to the formation of ozone, which is yet another criteria pollutant having standards set under NAAQS. Mercury is an air toxic and can bioaccumulate into the food chain. Carbon dioxide (CO2) is a greenhouse gas and is the largest contributor to global warming potential.

EPA refers to those parts of the country where air pollution levels consistently exceed the NAAQS as nonattainment areas. As of January 2002, the EPA website for listing nonattainment areas, http://www.epa.gov/air/oaqps/greenbk/index.html, has identified a significant number of nonattainment areas in the MAAC and SERC power pools. The MAAC region is in nonattainment for ozone in 18 counties located in New Jersey, 36 counties in Pennsylvania, and 14 counties in Maryland. A smaller area is in nonattainment for SO2 and PM. The SERC region is in nonattainment for ozone in 13 counties located in Georgia, and 2 counties in Alabama.

Increased emissions of NOx, SO2, and PM will stress areas that are currently in nonattainment. Although the impact of increased emissions on air quality is not part of this study, it should be a consideration for at least nonattainment areas. Increased air emissions associated with increased fuel usage required to offset the energy penalty from a cooling tower is of special concern in Class I areas. The Clean Air Act defines mandatory Class I federal areas as certain national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence as of August 1977. These sensitive areas have undergone significant change in air quality. For example, without the effects of pollution, a natural visual range is approximately 140 miles in the West and 90 miles in the East. When considering our current air quality, in the West, the range is 33-90 miles, and in the East, the range is only 14-24 miles.

Through the 1977 amendments to the Clean Air Act, Congress set a national goal for visibility as "the prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution." The amendments required EPA to issue regulations to assure "reasonable progress " toward meeting the national goal. Furthermore, the Clean Air Act requires all states to develop and implement an operating permit program that meets minimum Federal requirements. The operating permit program covers a variety of significant operations, including sources required to have pre-construction or new source permits under New Source Review or Prevention of Significant Deterioration (PSD) requirements. Although the calculated increase in emissions is relatively small, for plants located near a national park, even a small increase in emissions would not be allowed under the Clean Air Act's PSD requirements. Increased air emissions associated with the installation of cooling towers may not be permitted under PSD requirements if these emissions were shown to affect the quality of air in Class I areas.

There is one Class I area in the MAAC power pool and fifteen Class I areas in the SERC power pool. This represents about 10 percent of the 163 federally mandated Class I areas designated in the United States. Special analyses are required when a proposed new emissions source may impact any of the Class I areas. The Class I areas in the SERC regional power pool include the Shenandoah and Great Smokey Mountain National Parks, both of which have seen a statistically significant upward trend in ozone concentration from 1990 to 1999.

All increased emissions presented in this study are estimated on an annual basis. However, air quality can be sensitive to climatic conditions that are seasonal in nature. For instance, Nox emissions (a precursor to ozone formation) can be especially damaging to air quality during hot summer days. This period of time encompasses the period in which electricity frequently peaks to its greatest demand. Peak energy penalties for the MAAC and SERC regions can be 2.6 to 2.9 times greater than for annual energy penalties based on model plant estimates for conversion of a once-through cooling system to a wet cooling tower (see Table 6). The increase in air emissions during peak temperatures (1 percent highest temperature condition) would be 2.6 to 2.9 times greater than the annual average increase in air emissions.

Figure 1 – Power Pools
[see hard copy for figure/appendix]

Figure 2 - Generating Capacity of Coal-Fired Units Using Once-Through Cooling by State Source for Data: Power Statistics Data Base, Edison Electric Institute
[see hard copy for figure/appendix]

EPA Response

No response is required for this comment as DOE is a Federal partner in the rulemaking.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Christine Martin

On Behalf Of:

PA Dept of Environmental Protection

Author ID Number:

316bEFR.011

Comment ID 316bEFR.011.001

Author Name Christine Martin
Organization PA Dept of Environmental Protection

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

As your agency formulates a final rule for Phase II facilities under Section 316(b) of the Clean Water Act (CWA), we urge you to design a rule that allows the states maximum flexibility to implement programs that have been developed by us over the past 25 years. During those 25 years we have applied Section 316(b) on a site-by-site basis, examining the impacts of existing cooling water intakes in relation to the specific biological community. Further, the Phase II rule should not overturn existing state 316(b) decisions at existing facilities.

EPA Response

EPA believes today's final rule allows ample flexibility with section 316(b) determinations. In addition to five means with which to comply with the applicable performance standards, the rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. Additionally, § 125.90(d) states that nothing in today's rule precludes a State or Interstate Agency from adopting or enforcing any requirement that is not less stringent than those required by Federal law. As with any new rule, existing State section 316(b) determinations must be revisited to determine compliance with today's final rule and may need to be changed.

Comment ID 316bEFR.011.002

Author Name Christine Martin

Organization PA Dept of Environmental Protection

Subject Matter Code SUP

General statement of support

Generally, we believe the new regulations will provide consistency and an improved understanding of the requirements for all parties involved since the proposal establishes national technology-based performance standards on the location, design, construction, and capacity of cooling water intake structures. This will assist the regulated community and the permitting and enforcement authorities in minimizing adverse environmental impacts associated with the cooling water structures at these facilities.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.011.003

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

Author Name Christine Martin

Organization PA Dept of Environmental Protection

We would, however, emphasize that the resulting regulations and program guidance must not be overly prescriptive, but allow for continued sufficient flexibility to address case-specific concerns when necessary. For instance, we generally support technologies such as closed cycle cooling that conserve water, and view these technologies as a way to better manage our limited water resources while protecting aquatic life. However, we feel it is unnecessary for the EPA to prescribe any single technology (i.e., closed cycle recirculating system) by imposing specific, strict performance criteria. The Department encourages EPA to develop cooperative, common sense approaches that promote program flexibility while maintaining water quality protection to meet the unique needs and conditions being faced by the States/Tribes and the regulated community. Using a technology-neutral approach to decisions will allow Pennsylvania and other states to achieve the most environmentally effective and cost-effective reduction in adverse environmental impact.

EPA Response

EPA believes today's final rule allows ample flexibility with section 316(b) determinations. The rule contains five means with which to comply with the applicable performance standards. These performance standards do not prescribe any single technology but rather allow the best technology available to achieve the performance standard to be chosen for each facility. Also, the rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. Additionally, § 125.90(d) states that nothing in today's rule precludes a State or Interstate Agency from adopting or enforcing any requirement that is not less stringent than those required by Federal law.

Comment ID 316bEFR.011.004

Author Name Christine Martin

Organization PA Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

[A] definition of "adverse environmental impact" (AEI) focused on overall environmental protection is necessary to provide the flexibility needed to achieve the best environmental outcome in individual cases. PA DEP generally supports using biological assessment approaches to determining the ecological and/or community or populational impacts that may be related to adverse environmental impacts which are associated with the impingement and/or entrainment by a cooling water intake structure. This follows the approach PA DEP uses in assessing environmental impacts of thermal discharges under Section 316(a) of the CWA. The Section 316(a) provisions are intended to "assure the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on that body of water;" and would be workable and consistent with federal and state goals of ensuring adequate protection to aquatic resources. PA DEP, however, fully recognizes that determining the potential AEI that may be attributed to the cooling water intake structure is difficult, especially in complex situations where multiple stressors may compound the observed impacts. Therefore, PA DEP would request that we remain party to EPA's on-going considerations of the definition and related methods that will identify what is considered as AEI under this rule.

EPA Response

In today's final rule, EPA has elected not to define adverse environmental impact. Consistent with the Phase I New Facility Rule, EPA believes that it is reasonable to interpret the minimization of adverse environmental impact as minimizing the loss of aquatic organisms due to impingement and entrainment. The Agency has long maintained that adverse environmental impact from cooling water intake structures must be minimized to the fullest extent practicable. The objective of section 316(b) includes population effects but is not limited to those effects. EPA has considered the consequences associated with the loss of large numbers of aquatic organisms, including impacts on the stocks of various species, loss of compensatory reserve due to the deaths of these organisms and the overall health of ecosystems. Given all of these considerations, EPA determined that there are multiple types of undesirable and unacceptable adverse environmental impacts which result from impingement and entrainment and which must be minimized. EPA has rejected all proposed alternative definitions of adverse environmental impact because they are too broad and dependent on proven damage on the community and population levels before controls on cooling water intake structures could be put in place as the best technology available. EPA does not view adverse environmental impact as limited to demonstrated community or population level effects. Damage on the community or population level is extremely difficult to quantify and attribute to a particular cooling water intake structure given the vast number of environmental factors and anthropogenic factors which work concurrently on fisheries at that organizational level. It is difficult to isolate the effect of a single factor. Many cooling water intake structures have been in operation for decades. During these years, fish populations have been affected by other factors such as overfishing, habitat alteration and water quality changes. Because of these simultaneously-occurring factors, the determination of a change in a population that is directly attributable to the operation of a cooling water intake structure may prove to be very difficult.

Thus as in the Phase I rule, EPA continues to interpret adverse environmental impact to include impingement and entrainment; reductions of threatened, endangered, or other protected species; diminishment of a population's potential compensatory reserve; damage to ecologically critical aquatic organisms, including important elements of the food chain; losses to populations, including reductions of indigenous species populations, commercial fishery stocks, and recreational fisheries; and stresses to overall communities or ecosystems as evidenced by reductions in diversity or other changes in system structure or function. EPA also continues to assert that for section 316(b), measuring environmental performance in terms of reduction of impingement and entrainment is appropriate because it has a higher degree of certainty than conducting population or ecosystem studies.

Comment ID 316bEFR.011.005

Author Name Christine Martin

Organization PA Dept of Environmental Protection

Subject Matter Code 18.01.04

RFC: Alternative definition of "AEI"

Moreover, while our primary objective is to assure that intake structures minimize possible adverse impacts from the entrainment and impingement of fish, the state should be able to consider local concerns and guard against undesirable environmental effects, such as water use, water quality, or transference of problems to other media such as air emissions or solid waste generation, that might occur from using certain technologies. A rule that adopts a holistic approach to evaluating adverse environmental impact is better. We strongly encourage EPA to define AEI in a way that is understandable, defensible and considers all types of adverse environmental impacts, including those involving possible transfer to other media (e.g., air emissions, noise, water usage).

EPA Response

EPA has elected not to define adverse environmental impact as part of this rulemaking. Please see response to comment 316bEFR.011.004. Today's final rule contains much flexibility which will allow States to consider local concerns. These include but are not limited to the provisions in § 125.90 which allow States to demonstrate alternative regulatory requirements which would result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94 and which allow States to adopt or enforce any requirement with respect to control or abatement of pollution that is more stringent than those required by Federal law. Since the final rule is not based on and does not require installation of cooling towers, non-aquatic impacts such as air emissions, water consumption and noise should not be a concern with regard to adverse environmental impacts.

Comment ID 316bEFR.011.006

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Christine Martin

Organization PA Dept of Environmental Protection

The Phase II Section 316(b) rule should include, at a minimum, site specificity to maximize the ability to achieve the most environmentally effective and cost-effective reduction in adverse environmental impact and retain the ability to do mitigation or other “trading” which can further maximize environmental benefits and cost-effectiveness.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on trading and restoration measures, please refer to section VII of the preamble to the final rule. The preamble also contains a discussion of trading.

Comment ID 316bEFR.011.007

Author Name Christine Martin

Organization PA Dept of Environmental Protection

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

[T]he Section 316(b) rule for existing sources, while protecting our fisheries, should not unduly affect national or regional energy supply. A rule requiring an unnecessary or overly burdensome retrofit of cooling towers to generation plants will increase energy production costs, reduce output as a result of efficiency losses, and necessitate taking base load capacity out of production for significant periods of time. All of this has the potential for significant adverse impacts on energy supply that will vary regionally. If premature closure occurs, fuel diversity would be compromised.

EPA Response

The final Phase II rule does not contain requirements to retrofit cooling towers. In addition, EPA's analysis of the potential effects of the final rule on the electricity market showed no adverse energy supply effects (see results in EBA chapters B3 and B6, DCN 6-0002).

Comment ID 316bEFR.011.008

Subject Matter Code 1.01
Comment period

Author Name Christine Martin
Organization PA Dept of Environmental Protection

We appreciate this opportunity to comment on EPA's proposals for guiding the implementation of Section 316(b) of the Clean Water Act. We would like to continue to work with you to formulate a sound program that builds on a history of partnership with the states, is effective in protecting our environment, and does not adversely affect national energy policy. It is important to balance the need for federal authority with a tailored regulatory program that will fit the unique aspects of our state waters. We must take into account the numerous biological, hydrological, and ecological factors that affect our waters. Because there is such an array of scientific, biological, engineering, economic, social and environmental concerns associated with this proposal, which will affect the management of state run NPDES programs and the welfare of our residents and the resources on which they derive benefit and recreation, we respectfully request that any additional comments we may choose to file after the current comment deadline be given due consideration.

EPA Response

EPA accepted and considered all comments. EPA considered those that were submitted after the official close of the comment period to the extent it was able. Those comments were included in the public rulemaking record.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Robert N. Stavins

On Behalf Of:

John F. Kennedy School of Government, Harvard University

Author ID Number:

316bEFR.012

Comment ID 316bEFR.012.001

Subject Matter Code MISC

Miscellaneous comment

Author Name Robert N. Stavins

Organization John F. Kennedy School of Government, Harvard University

This comment consisted solely of submitted references. Please see 316bEFR.005 for the author's comments.

EPA Response

Please see EPA's response to the comment referenced in the comment text.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Toni Ristau

On Behalf Of:

PNM Bulk Power Services

Author ID Number:

316bEFR.013

Notes

EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.013.001

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

New Mexico is an arid to semi-arid state, and semi-arid/arid conditions were not utilized by EPA in formulating the proposed Rule. None of the facilities modeled by EPA are located in this physiographic region of the US, so many of the environmental and water resource factors unique to or especially important to our facilities are simply not addressed at all in the rulemaking.

The major facility owned/operated by PNM likely to be affected by either the Phase II regulations (current rulemaking proposal) or the Phase III regulations (to be the subject of a future rulemaking) is the coal-fired San Juan Generating Station, located near Waterflow, New Mexico, in the Four Corners region of the US. This facility is currently the only facility operated by PNM that depends upon the use of surface water for cooling and other process water. (In New Mexico, much of the potable, municipal, agricultural, and industrial use water is from groundwater sources not directly regulated under the Clean Water Act, rather than from surface watercourses).

EPA Response

EPA disagrees. EPA notes that the comment does not indicate specifically the environmental and water resource factors unique to New Mexico that are not addressed in the final rule. Regardless, numerous aspects of this rule have considered the southwest region of the U.S., including New Mexico. Such aspects include EPA's profile of the electric power industry (New Mexico is part of the WSCC NERC region), assessment of rule costs and impacts by NERC region, assessment of the rule's power market impacts (New Mexico and Arizona are one of 26 regions modeled in the IPM), and regional approach to assessing benefits (e.g., see NODA, 68 FR 13543). In fact, the benefits assessment was specifically expanded to address regional differences throughout the country.

Comment ID 316bEFR.013.002

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

Stormwater National Pollutant Discharge Elimination System (NPDES) Issues:

San Juan Generating Station (SJGS) currently holds two NPDES permits – one (NM 0028606) is a "zero discharge" permit for process/cooling wastewater, and the other (NM R05A433) is a stormwater NPDES permit for sporadic stormwater runoff discharges to intermittent/ephemeral watercourses; there is no direct discharge or outfall to the river (the San Juan River, a tributary to the Colorado River) of either process/cooling wastewater or stormwater runoff. The existing cooling/process water intake is situated on the San Juan River.

To the extent that stormwater NPDES alone would cause SJGS to be subject to the Phase II or Phase III regulations under 316(b), our preference would be that we would be provided the option of formulating a site-specific permit for the intake structure. Currently, EPA has compiled essentially no data on the appropriate requirements for a general permit for the arid/semi-arid regions of the west and southwest, and the "case studies" have identified requirements that may not be particularly appropriate for this environment and that, if imposed, may actually be counterproductive in terms of environmental protection or enhancement.

EPA Response

Either NPDES permit indicates the facility is a point source, potentially subject to this rule if other applicability requirements are satisfied. The specific approach to permitting is to be determined by the Director (in this case the EPA Regional Administrator) based on applicable regulations and facts. EPA notes that the case study data referenced in the comment was expanded to encompass a regional approach to assessing benefits, as described in the NODA (see, 68 FR 13543). Also see response to 316bEFR.013.001.

Comment ID 316bEFR.013.003

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 6.05

Impacts to T&E species

Endangered Species Act (ESA) Coordination Issues:

SJGS's intake structure is located within a reach of the San Juan River that is designated critical habitat for an endangered fish species (the Colorado Pike Minnow), and several state and Federal entities (including the U.S. Fish and Wildlife Service, which is charged with assuring ESA compliance and recovery efforts for endangered species) have had ongoing studies and species recovery efforts for several years.

PNM is concerned that the prescriptive technology requirements (see Section VI, Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities) may be in conflict with mandates under the ESA, including endangered species recovery plans, and directives of other agencies.

For example, the San Juan River Basin Recovery Implementation Program (effective November 1, 1992) provides guidelines for structures and intakes in the river (as well as for other management efforts) with which SJGS has been cooperating and complying for almost 10 years. Nine years of research have been conducted to determine what is needed for the endangered fish recovery, including the total eradication of non-native fish and elimination of any sport fishing. Despite several years of studies, the USFWS has yet to identify specific technologies for water intake structures which would enhance the recovery efforts. The USFWS has made a preliminary determination that employing fish screens, as is suggested in EPA's Best Available Technology requirements, would only work for sub-adults (greater than 300 mm total length) and adult fish of this endangered fish species; they are not effective for larval/juvenile stages, which are the developmental stages which are in need of the greatest protection to ensure recovery of the endangered fish.

Also, research has indicated that the San Juan River is "biomass limited" (i.e., there is only so much food available, and it must support the entire food chain, from insects to top predators). Thus, changes in the distribution and numbers of various populations may change, but the total biomass within the river cannot change. If screens at the current intake structure were upgraded to keep out the fry of the endangered fish species, this could cause a shift in population densities for other species but have no positive effect on the endangered species, due to the total biomass limitation.

In addition, EPA's own guidance indicates that fine-mesh screens, traveling screens, etc. may not be feasible in streams/rivers with a high silt burden (as is the case in the San Juan River). Any techniques employed that would impede the downstream flow of silt or diminish the amount of silt in the river could adversely affect endangered fish viability, as these species are adapted to and dependent upon the naturally occurring silt loads in these streams.

Thus, for these reasons, PNM would prefer that, if SJGS is subject to the Phase II or Phase III regulations under 316(b), we would be provided the option of formulating a site-specific permit for the intake structure, rather than being subject to the prescriptive technology requirements currently proposed by EPA, so that we could take into consideration the research and directives under the mandates of the ESA.

EPA Response

Today's final rule allows for site specific determinations of best technology available. In addition, the provisions in this rule should not be construed to preclude or deny the right of any State or Interstate agency to set or enforce any requirement to protect species under the Endangered Species Act.

Comment ID 316bEFR.013.004

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 2.04.01

Require closed cycle cooling

Water Rights Issues:

SJGS currently has a right to 16,200 acre-feet/year of the flow of the San Juan River based on a prior contract with the U.S. Bureau of Reclamation. In the western US, in states that are appropriation states, water rights are property rights, and the possession and maintenance of water rights is an important economic, as well as physical, asset for any facility that uses water in its processes.

Water rights simply have not been analyzed as an issue at all in EPA's economic analyses. Any rulemaking proposal that either proposes measures that would increase the amount of water that must be taken by the facility to maintain operations or that would prevent that facility from applying its existing water rights to beneficial use would have an impact not only on that facility but on the region in which the facility is located. Forcing changes to an operating facility that would limit flows and thus limit the amount of water that could be applied to beneficial use could cause an impairment of existing water rights, potentially constituting a taking.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.013.005

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Ponds/Lakes Issues:

In addition, clarification is needed regarding whether cooling ponds [or lakes] are considered "waters of the U.S." if they meet the criteria of the 40 C.F.R. § 122.2 definition. SJGS is a facility that "stores" water withdrawn from the river in a raw water reservoir temporarily, then withdraws water from the reservoir to use for steam, cooling, and other processes at the plant. The raw water reservoir does not receive any discharges from plant operations, and is not open to the public for recreational or other uses. Thus, PNM is concerned that any intake structures, etc. associated with the raw water reservoir would not also be subject to the prescriptive technology requirements contained in the proposed rule. PNM would urge the EPA to instead clarify the definition of such facilities as parts of a process/treatment facility rather than as "waters of the United States", so that such facilities are not subject to the 316(b) intake requirements.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.013.006

Author Name Toni Ristau

Organization PNM Bulk Power Services

Subject Matter Code 17.06

Option: Site-specific determination of BTA

SUMMARY:

In summary, PNM supports the comments by EEI and UWAG on general issues, and strongly supports the application of site specific permitting processes (or other mechanisms allowing for permitting flexibility) in view of the lack of analysis by EPA in identifying appropriate BTA for the environment in which we operate.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA does not intend to specify technologies for individual facilities. The final rule offers facilities flexible alternatives for compliance.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Frank Ackerman

On Behalf Of:

Global Development and
Environmental Institute

Author ID Number:

316bEFR.014

Comment ID 316bEFR.014.001

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

Briefly stated, EPA's analysis of the benefits of reduced cooling water intake is seriously incomplete, and should be considered as no more than an extreme lower bound on the complete benefits. A simple quantitative adjustment, filling in just two of the many gaps in EPA's estimate of benefits and drawing on more recent economic literature than EPA has used, results in substantially greater benefits for every option EPA is considering, and show that EPA's proposed option does not maximize net social benefits. To be sure, my adjustments remain incomplete; they do not come close to capturing all of the benefits of regulating cooling water intake structures. Nevertheless, my estimates are sufficient to demonstrate that policy options involving greater reduction in water intake create greater net benefits than the proposed option.

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. As stated in the NODA, EPA attempted to include non-use benefits categories for the final Section 316(b) Phase II rule analysis. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN #6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

Comment ID 316bEFR.014.002

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

These comments also examine the methodological problems of valuation of the environmental benefits involved in this case. Natural ecosystems, such as the aquatic ecosystems affected by cooling water intake, provide numerous interrelated services, some of which are clearly valuable but difficult to quantify. Assigning a zero value to these benefits would misstate society's preferences and values. Yet rigid insistence on applying a single, narrowly defined valuation methodology to every benefit would, in effect, dismiss (that is, value at zero) all hard-to-quantify environmental values. For this reason, EPA's analysts should be commended for exploring valuation methodologies such as habitat-based replacement cost (HRC) and societal revealed preferences, which have the potential to address the full range of ecosystem services. The problems with these alternative methodologies are that they do not go far enough, and cannot be consistently applied across the board.

EPA Response

EPA agrees that ecosystems provide many difficult-to-value services and that assigning zero values to this services would misstate society's values. As stated in the proposed rule analysis and in the NODA the Agency explored various alternatives to quantifying and monetizing non-use benefits. However, given the unavoidable uncertainties in estimating non-use benefits, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. For the final regulation, EPA considered all benefits -- monetized, quantified but unmonetized, and qualitatively in the decision making process.

For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment #316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see response to comment #316bEFR.005.006.

Comment ID 316bEFR.014.003

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

In addressing the methodological problems, I also respond to aspects of the comments on this rule by Dr. Robert Stavins. Commenting on behalf of PG&E National Energy Group, one of the major corporations that has a direct financial interest in the outcome of this rulemaking procedure, Dr. Stavins reaches conclusions opposite to mine, arguing that all methodological innovations in benefits valuation in this case are illegitimate and that many EPA benefit estimates are drastic overestimates. Throughout his comments, he inaccurately suggests that he speaks for all economists. However, he neglects to document the supposed unanimity of economists on these issues, repeatedly offering only his own personal authority as evidence for the views of the entire profession. In my comments I describe the ongoing differences among economists, including recent Nobel Prize winners, on the issues at stake in this case.

Here I will focus on three of the numerous points on which I disagree with Dr. Stavins: the treatment of non-use values, the basis for habitat replacement cost estimates, and the validity of societal revealed preferences. My conclusions on these issues, in short, are that

-Dr. Stavins ignores the extensive evidence that EPA's non-use values are conservative underestimates;

-Habitat replacement cost valuation is similar to standard approaches to asset valuation used through the economics literature, and provides a reasonable approach to valuation of large but uncertain ecosystem benefits; and

-Societal revealed preference is a reasonable approach to the problems of social choice, which are intrinsically different from the individual choice paradigm that is assumed in Dr. Stavins' preferred approach.

Finally, despite our differences, Dr. Stavins and I agree that there are enormous methodological difficulties in complete valuation of the benefits of reducing cooling water intake requirements, but we disagree about the implications of these challenges. Dr. Stavins urges EPA to wait to regulate until the valuation methodologies of economists catch up to the environmental aspirations of the Clean Water Act. I, in contrast, conclude that the difficulties in valuing environmental benefits illustrate the limits to the usefulness of cost-benefit analysis in the environmental setting. In contrast to the cost-benefit analysis EPA now appears to endorse, identification of the best available technology is a process in which costs are only one of many factors to be considered, and benefits need not be precisely quantified and monetized in order to be taken seriously. A recommendation based on the best available technology could be made, as has been done for numerous regulations in the past, without entangling the agency in the massive web of methodological, technical, and even philosophical challenges to cost-benefit calculations.

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. As stated in the NODA, EPA attempted to include non-use benefits categories for the final Section 316(b) Phase II rule analysis. However, given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment #316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see response to comment #316bEFR.005.006.

Comment ID 316bEFR.014.004

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

The incompleteness of EPA's benefit estimates

Cost-benefit analysis is designed to weigh the relevant costs of a proposal against the corresponding benefits. This process cannot yield a meaningful result unless the calculations of costs and benefits are equally complete. In the private sector, a balance sheet that weighs all of a company's income against some of its expenditures does not provide a useful picture of the company's true financial condition, as recent corporate scandals have reminded us. Likewise, in the public sector, a comparison of complete costs and incomplete benefits does not provide an accurate picture of net benefits to society.

Yet a comparison of complete costs and incomplete benefits is exactly what EPA has produced in this case. The costs of reducing the impacts of cooling water intake are monetary costs for marketed goods and services, such as production and installation of screens, cooling towers, and other equipment. Such costs are backed up by detailed engineering analyses, and often by recent experience in buying and installing similar equipment. There are no categories of costs which are intrinsically difficult to express in monetary terms.

Contrast this with the calculation of the benefits of reducing cooling water intake. In general terms, the benefits consist of reduced damage to aquatic ecosystems. But how should those benefits be measured and monetized? EPA's analysis focuses on a more restricted question, namely valuing the benefits of killing fewer fish; this is already a complex problem with no simple answers. Market prices are available only for a few commercially valuable fish species; even when available, commercial prices do not necessarily capture all the value of avoided fish mortality. And avoided fish kills are far from the only significant benefits of reduced ecosystem damages, since many other organisms and environmental services are also affected.

EPA's economic benefit analysis (EBA) explicitly describes the categories of benefits that have been omitted. EBA Chapter C1, particularly section C1-5, lists the following reasons why the environmental impacts of cooling water intake structures, and consequently the benefits of regulating them, are underestimated:

-Facility-provided monitoring data, the basis for EPA's analysis, typically focus on only a subset of the species impacted by impingement and entrainment (I&E), thus underestimating total losses.

-Monitoring data often pertain to conditions existing many years ago, before the Clean Water Act had improved aquatic conditions; if the numbers and diversity of fish were depressed by degraded water quality, estimates of I&E losses would be similarly low.

-Cumulative impacts of multiple facilities on the same fish population are often important, but have been considered only to a limited extent.

-Estimated recreational and commercial values include only the proportion of I&E losses that would have been caught, typically less than 20 percent of I&E mortality of recreationally and commercially valuable species.

-Secondary economic impacts such as effects on marinas, bait sales, and property values have not been included.

-Losses of invertebrate species such as lobsters, mussels, crabs, and shrimp were not included, even though these include commercially valuable species.

-Effects on fish-eating (piscivorous) birds were not included.

-Current fishing mortality rates often reflect already-depleted fisheries, as for example in the case of winter flounder near the Brayton Point facility, one of the EBA case studies.

-Forage species, accounting for the predominant share of I&E losses, are poorly documented, and their full ecological value to the food web is not considered.

-Non-use benefits are estimated only for recreational users, not for the population as a whole.

-Thermal impact reductions are not accounted for in some options, such as replacement of once-through cooling with cooling towers.

Another portion of the EBA, Case Study Chapter A11, re-examines the areas of incompleteness from a different perspective, focusing on the ecological services that are disrupted by I&E, but are not addressed by conventional valuation methods. Quoting directly from the EBA, those omitted or undervalued services include:

-decreased numbers of ecological keystone, rare, or sensitive species;
-decreased numbers of popular species that are not fished, perhaps because the fishery is closed;
-decreased numbers of special status (e.g., threatened or endangered) species;
-increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
-disruption of ecological niches and ecological strategies used by aquatic species;
-disruption of organic carbon and nutrient transfer through the food web;
-disruption of energy transfer through the food web;
-decreased local biodiversity;
-disruption of predator-prey relationships…
-disruption of age class structures of species;
-disruption of natural selection processes;
-disruption of public uses other than fishing, such as diving, boating, and birding; and
-disruption of public satisfaction with a healthy ecosystem.
(EBA Case Studies, p. A11-2.)

This second list is presented as part of the rationale for HRC valuation, a method that can encompass the full diversity of ecosystem values. My comments on HRC appear in section 5 below.

It would be impossible in practice to estimate all of these omitted values. However, benefit analyses for other proposed rules have estimated a broader set of values. For example, the economic and environmental benefits analysis for the metal products and machinery (MP&M) rule estimated separate recreational benefits for fishing, other boating, and wildlife viewing and near-water activities. Recreational fishing accounted for only one-fourth of all recreational benefits from reduced MP&M discharges. <FN 2> EPA has now issued a Notice of Data Availability for the MP&M rule; it suggests that the estimates of recreational benefits were increased in response to peer reviewers' comments. <FN 3> If similar relationships hold for the recreational benefits of reductions in cooling water intake, then EPA's estimates of recreational benefits in the 316(b) analysis should be multiplied by 4 or more. However, the data needed to determine the magnitude of other recreational benefits are not presented in the EBA. I recommend that EPA should explore the impacts of cooling water intake structures on the other recreational benefits considered in the MP&M analysis, and increase its estimates of recreational benefits of cooling water intake reduction whenever appropriate

The two lists of omissions and underestimates presented here – both taken directly from the EBA – are more than sufficient to demonstrate the incompleteness of the benefits analysis in this case. Complete costs are being compared to a restricted subset of benefits; the bottom line of such a lopsided comparison slants heavily in a predictable direction, toward "justifying" less regulation and weaker environmental protection than a complete analysis would support. All that can be concluded from this misleading, incomplete comparison is that true, complete benefits must be larger, and net social benefits larger as well, for each of the various options under consideration.

Footnotes

2 Economic, Environmental and Benefits Analysis for the Proposed Metal Products and Machinery Rule (EPA 821-B-00-0008, December 2000, available at www.epa.gov/waterscience/guide/mpm/rule.html), Chapter 15; the results in Table 15-13, p.15-17, show that recreational fishing accounts for 24% of the midpoint values for recreation benefits as a whole.

3 Federal Register, June 5, 2002, p. 38774.

EPA Response

The comment focuses on understatement of benefits. EPA agrees that comparison of complete costs to incomplete benefits is not appropriate. EPA agrees that ecosystems provide many difficult-to-value services and that assigning zero values to these services would misstate society's values. As stated in the proposed rule analysis and in the NODA the Agency explored various alternatives to quantifying and monetizing non-use benefits. However, given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

For the final 316(b) rule analysis, the Agency explored non-use benefit valuation estimates, including the value of threatened and endangered species lost to impingement and entrainment where relevant, for all study regions, but did not maintain these estimates due to the uncertainty of the estimates. See the Regional Analysis Document for the Final Section 316(b) Phase II Existing Facilities Rule for details (DCN #6-0003).

Comment ID 316bEFR.014.005

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

Summary account of adjustment of EPA benefit estimates

I have prepared an adjusted set of figures incorporating estimates of corrections to just two of EPA's omissions and underestimates. This section presents my calculations; the rationale for the first correction appears in section 4 below.

My first adjustment is for the underestimate of non-use benefits. As I discuss in section 4, a recent literature review finds that non-use benefits are on average 1.9 – 2.5 times all use values, rather than 0.5 times recreational benefits alone as EPA assumed. My reading of the recent literature suggests that 1.9 – 2.5 times use value is still a conservative estimate for existence values of many natural ecosystems. To correct for EPA's underestimate in this area, I have recalculated their estimates assuming that non-use values are 2 times estimated recreational, commercial, and forage values.

My second adjustment is for the unvalued fraction of the mortality of recreationally and commercially valuable species. EPA's methodology values only the fraction of those species that would have been caught in the absence of I&E mortality. That is, I&E mortality rates are adjusted downward in proportion to historical catch rates before any valuation occurs in the EBA. Only the fraction of the fish that would have been caught are assigned any value; the rest are ignored. The catch rate, or "landed fraction," is below 20% in every case, and below 10% in some cases. <FN 4> Thus the great majority of I&E mortality of the most valuable species is never valued.

The nonlanded fraction of these species – the ones that survive uncaught – have an obvious ecological value. If nothing else, their reproduction is the source of the catch in future years; that is, they are essential to the creation of future recreational and commercial values. A catch rate of 100%, if it occurs, can only occur once. The available data do not allow calculation of the present value of future reproduction of nonlanded fish; the calculation would be complex and would likely vary by species. It seems reasonable to assume that nonlanded fish have a value that is significantly greater than zero, but not more than the value of the landed (caught) fish of the same species. I have conservatively assumed that nonlanded fish have a value equal to 0.25 times the value of landed fish of the same species. That is, I have created a new category of inferred recreational and commercial value in the case studies, as follows:

Value of nonlanded recreational = and commercial fish	(Value of landed recreational and commercial fish) x (nonlanded fraction / landed fraction) x 0.25

To calculate the effects of these adjustments, it was first necessary to construct a spreadsheet system that reproduces EPA's estimates. This spreadsheet reproduces in detail the benefit categories for each of the EBA case studies, extrapolates to best estimates of national baseline losses using the relationships described in the EBA, and then adjusts for the percentage reduction in losses achieved by each EBA policy option. <FN 5> My spreadsheet calculates national baseline losses, and benefits of each policy option, replicating EPA's values when using EPA's assumptions.

I then recalculated the spreadsheet three times: in Scenario A, keeping all EPA assumptions and input data, except assuming that non-use value is 2 times recreational, commercial and forage value; in Scenario B, restoring EPA's non-use assumption but assuming that nonlanded recreational and commercial fish are valued according to the above equation; and in Scenario C, combining my two assumptions. The results, as shown in Table 1 (next page), are:

-Estimated benefits of each policy option are more than doubled in Scenario A, relative to the estimates in the EBA;
-Estimated benefits of each policy option are roughly doubled in Scenario B; and
-In Scenario C, combining my two adjustments, benefits of policy options are roughly 4-6 times the estimates in the EBA.

When compared to the costs of the policy options, as reported in the EBA, my three scenarios of course have much greater net social benefits. The order of policy options, ranked according to net social benefits, is changed: Option 5 – the dry cooling option – has the greatest net benefit in all three scenarios, as shown in Table 2. In Scenario C, combining the two adjustments, EPA's proposed option, i.e. EBA Option 3, is the one that fares worst. Options 1, 2, 3a, and 4 all have net benefits of $4.1 – $4.5 billion in Scenario C.

Because my rough estimates of these two changes have such a large effect on the outcome of the analysis, I recommend that EPA explore both issues in greater detail. Specifically,

1. EPA should develop approaches to non-use value more consistent with the recent economic literature, to replace the outmoded "50% rule" used in the EBA; and

2. EPA should develop plausible values for the nonlanded fraction of I&E fish mortality. The one thing we know for certain is that the current estimate of zero is not the correct value.

An enormous amount is at stake here: my two adjustments show that all options have large net benefits, and that EPA's incomplete valuation of benefits misleadingly favors the option that has the lowest net benefits on a corrected basis. Thus it is important that EPA explore these corrections in detail.

[see hard copy for tables]

Footnotes

4 Data on the landed fraction of commercially and recreationally valuable species can be found in the EBA for every case study except Ohio. EPA's answers to Riverkeeper questions, received very late in the process of my analysis, imply a landed fraction of about 1-2% for Ohio; this appeared remarkably out of line with other case studies. My calculations conservatively assume a landed fraction of 10% for the Ohio case study. Use of EPA's Ohio data would lead to higher estimates of benefits in my Scenarios B and C in Table 1, below.

5 An additional stage of adjustments would have been necessary to convert to the policy options as presented in the Federal Register. EPA's explanation of these adjustments, in response to my questions, was received late in the process of my analysis. Therefore I did not develop calculations to match the Federal Register categories. In several of the key cases, EPA's estimates of Federal Register options benefits are about 95% of corresponding EBA benefits, suggesting that my conclusions apply almost equally to Federal Register options. The difference between Federal Register and EBA benefits includes both the distinction between estimates for 539 vs. 550 plants, and differences in the treatment of taxes.

EPA Response

EPA agrees that ecosystems provide many difficult-to-value services and that assigning zero values to this services would misstate society's values. As stated in the NODA (Federal Register: 68 FR 13522-13587), the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Instead, the Agency explored various alternatives to quantifying and monetizing non-use benefit (e.g., meta-analysis), including benefits from non-landed fish. However, given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented only a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

For EPA's response to comments on non-landed fraction of commercial and recreational fish see comment # 316bEFR.336.009.

Comment ID 316bEFR.014.006

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

General comments on Dr. Stavins' arguments

Dr. Stavins argues repeatedly that EPA's benefits analysis violates the canons of approved economic theory. As he says on page 1, "some of the methodologies employed are neither recommended nor endorsed by EPA's own Guidelines for Preparing Economic Analysis…" This is the first of at least 16 mentions of the Guidelines in his 43 pages of comments; it is by far his most frequent source, repeatedly cited as the final, definitive source on allowable methods.

However, when the Guidelines were first approved, Dr. Stavins had a more flexible view of the document. The Guidelines were reviewed by EPA's Science Advisory Board – Environmental Economics Advisory Committee (EEAC), chaired by Dr. Stavins. The EEAC review of the Guidelines said, in its Executive Summary,

Economics, like any scholarly discipline, is constantly changing. Environmental economics, a relatively young branch of the discipline, has experienced particularly rapid growth. New areas of the literature continue to emerge, and existing areas change and expand. Hence, despite the Committee's generally positive assessment of the revised Guidelines, we urge EPA to carry out new reviews every two to three years. <FN 6>

The cover letter signed by Dr. Stavins, transmitting the EEAC review of the Guidelines to Carol Browner, the EPA Administrator at the time, likewise said,

The best analytical tools of environmental economics are constantly changing, as experience with applications of existing tools and as new theoretical and empirical techniques appear in the scholarly literature. As a result, it is important that EPA carry out new reviews of the Guidelines every two to three years to reflect these developments in environmental economics. <FN 7>

Although the Guidelines were officially published in September 2000, the EEAC review occurred in 1998-99; the cover letter to Carol Browner is dated September 30, 1999. Thus it is now three years later, the time at which, according to the EEAC – and the Dr. Stavins of 1999 – a new review of the Guidelines would be called for. Dr. Stavins got it right the first time, in 1999: environmental economics is a fast-changing field, and it is important to take a fresh look at it, rather than being bound by scriptural references to a report from some years ago.

Looking more generally at the world of environmental economics and policy analysis, the choice of techniques for valuation of benefits, and the application of cost-benefit analysis to legal and regulatory issues, remain the subjects of active debate. Recent special issues of the Journal of Legal Studies and the University of Pennsylvania Law Review have highlighted the ongoing differences of perspective on these issues among legal scholars and economists. <FN 8>

The economics profession as a whole is exhibiting an increasing interest in alternative perspectives that question the conventional textbook wisdom. Two of the last four Nobel Prizes in economics have gone to scholars who are famous for their unorthodox views. Amartya Sen, the 1998 Nobel laureate, has raised fundamental questions about the nature of social choice, ethics, and equity in economics, including recent comments on cost-benefit analysis that I will discuss in section 6 below. The 2001 prize went to Joseph Stiglitz, George Akerlof, and Michael Spence, economists who have analyzed the problems of imperfect and asymmetric information – problems that require fundamental rethinking of the optimality of markets, and create a strong case for the benefits of regulation.

Several "heterodox" schools of economics have emerged in recent years, raising questions and developing methodologies that go beyond the conventional limits of economic theory. Ecological economics is one of the fastest-growing new perspectives, represented by the International Society for Ecological Economics and the journal Ecological Economics. Alternative approaches to ecosystem valuation, and studies of the role of "natural capital," are frequent topics that have received insightful analysis by ecological economists, with direct relevance to the issues raised in the current rulemaking procedure.

In short, it is increasingly inaccurate to say that there is a single, narrowly defined approach to economic theory, environmental economics, or the evaluation of ecological benefits. If EPA's past guidelines for economic analysis were as rigidly defined as Dr. Stavins now suggests, perhaps EPA should begin the next review of those guidelines with a broader representation of the full range of contemporary views on environmental economics. As Dr. Stavins anticipated in 1999, it is now time for a fresh look at the progress of the field.

Footnotes

6 Science Advisory Board Report on the EPA Guidelines for Preparing Economic Analysis, published as Appendix A to the Guidelines, p.1.

7 Letter to Carol Browner from Joan Daisey and Robert Stavins, September 30, 1999, included in Appendix A of the Guidelines.

8 Journal of Legal Studies 29 no. 2, part 2, June 2000, and University of Pennsylvania Law Review 150 no. 5, May 2002, are both devoted to discussion of cost-benefit analysis. For my own views on the discussion see Frank Ackerman and Lisa Heinzerling, "Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection," University of Pennsylvania Law Review 150 no. 5, 1553-1584.

EPA Response

Dr. Ackerman's main point is that EPA's Guidelines for Preparing Economic Analyses (DCN #6-1931) are in need of review, which is an issue that cannot be directly addressed in the 316(b) benefits analysis. The Agency, in preparing the 316(b) benefits analysis, interpreted the guidelines to be a general approach that "do not provide a rigid blueprint or a 'cook-book' for all policy assessments ... [and that t]he most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment to apply." Id. at p. 2. The Guidelines also recognize that the choices made on how to approach the economic analysis issues in a given situation will necessarily be influenced by factors such as the nature of the issues present, the relevant statutory requirements, the availability of data, the cost and time needed to obtain data, and the need for expedition in taking regulatory actions. Id. at pp. 3, 5 (n. 2), 59, 64.

Therefore, EPA's Guidelines for Preparing Economic Analysis are not legally binding and, in fact, allow EPA to use the most up to date, state-of-the-art approaches to benefit estimation, if applicable.

Comment ID 316bEFR.014.007

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Survey of non-use values and updated estimates of their magnitudes

EPA's approach to non-use values is one of the least defensible aspects of the EBA. Environmental economics increasingly recognizes the importance of non-use values: people place a substantial value on the mere existence of animals, ecosystems, wildernesses, and unique natural locations, quite apart from any past, present, or planned future use of those aspects of nature. It is frequently the case that existence values dwarf use values: in the Exxon Valdez oil spill, a court awarded compensatory damages – compensating for lost use values – of less than $300 million to those who lived and worked near Prince William Sound; economists using contingent valuation techniques estimated the existence value of the pristine environment of Prince William Sound at $9 billion, or 30 times use value.

The ratio of non-use value to use value is important here, because EPA uses an unfounded hypothesis about this ratio to estimate non-use value. Based on just a few, very dated citations, EPA suggests that non-use value can be estimated as 50% of the recreational component of use value. EPA notes that this is intended only as an estimate of non-use value to recreational users; there is no reason, however, to restrict the calculation of non-use value to this subset of the population. Here I am happy to agree with Dr. Stavins when he contends that the 50% rule is entirely inappropriate, since it fails to address any of the more recent literature on the subject. We differ, however, on the appropriate alternative.

A 1993 literature review by Thomas Brown – significantly newer and more comprehensive than the sources for the 50% rule – examines 31 contingent valuation studies published since 1980 that have estimated non-use values. <FN 9> Some of these studies contained multiple estimates, leading to 34 comparisons of non-use to use value for the same environmental benefit. The median ratio of non-use to use value was 1.92. After a thoughtful review of the varied methods used in the studies, Brown identifies 22 comparisons that appear to be more reliable than the others; these higher-quality comparisons have a median ratio of 2.56. It is on the basis of this study that I adopted the ratio of non-use to use value of 2 for the purpose of my recalculations presented in Tables 1 and 2 above. The Brown study contains a wealth of information about the effects of different methods of estimation on non-use value, and its relationship to use value, beyond the median ratio that I have used. I recommend that EPA explore additional uses of Brown's analysis, in devising more appropriate estimates of non-use value for the case studies.

Revised assumptions about non-use value have a large effect on net benefits. As shown in Table 1, moving from EBA estimates to my Scenario A, introducing the higher non-use value alone, adds $1 – 2 billion to the benefits of the various policy options. Billion-dollar existence values, and more, for nationwide benefits are relatively common in the environmental economics literature. <FN 10> Studies have repeatedly found very large non-use values; these values are best understood as a quantitative expression of widespread public concern about environmental resources – even in the absence of personal use.

One of the studies cited by Brown found a nationwide non-user willingness to pay of $111 per household for improving water quality in all U.S. rivers and lakes to a fishable level – implying a nationwide total value of more than $11 billion in 1981 dollars, or closer to $20 billion in today's dollars. <FN 11>   This remarkable figure emphasizes the great importance that people place on water quality, putting the benefit estimates for the current case in a broader perspective. Dr. Stavins' casual and undocumented suggestion that non-use values might be close to zero for this case appears to be quite at odds with the evidence of substantial non-user willingness to pay for improved water quality.

Other studies routinely find vast existence values for endangered species, for clean air in national parks, and other environmental resources and amenities. The surprising value, the figure that is out of line with the recent literature, is the very low estimate of non-use value found in the EBA. Revising this value up to a level more consistent with the literature, as shown in my Scenarios A and C, causes a fundamental change in the evaluation of the policy options considered by EPA.

Footnotes

9 Thomas C. Brown, "Measuring Nonuse Value: A Comparison of Recent Contingent Valuation Studies," in J.C. Bergstrom, editor, Benefits and Costs Transfer in Natural Resource Planning, Sixth Interim Report, University of Georgia, Department of Agricultural and Applied Economics, Athens GA, 1993.

10 See, among many others, John B. Loomis and Douglas S. White, "Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis", Ecological Economics 18 (1996), 197-206; and V. Kerry Smith and Laura L. Osborne, "Do Contingent Valuation Estimates Pass a 'Scope' Test? A Meta□analysis," Journal of Environmental Economics and Management 31 (1996), 287□301. The nationwide, per-household values in each of these articles, based on reviews of many other studies, imply multi-billion dollar national totals.

11 Robert C. Mitchell and Richard T. Carson, "An Experiment in Determining Willingness to Pay for National Water Quality Improvements," preliminary draft of a report to EPA, Resources for the Future, 1981, as cited in Brown, supra note 9. My calculations in the text reflect the facts that there are more than 100 million households in the U.S. today, and average prices, as measured by the Consumer Price Index, have almost doubled since 1981.

EPA Response

EPA agrees that non-use benefits can be substantial and that the use of Brown's analysis would substantially increase the benefits estimates based on the rule-of-thumb approach. However, in the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the rule-of-thumb approach to estimate non-use benefits.

For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.014.008

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Rationale for use of habitat replacement cost

In several of the case studies, the EBA uses calculations of habitat-based replacement cost (HRC) to value the damages due to impingement and entrainment. The rationale for this method is straightforward, although different from other approaches to valuation. Natural ecosystems produce numerous interrelated benefits, some of which are hard to quantify (see the lists of omitted benefit categories in section 2 above). Even if they all could be quantified, separate valuation of the entire list of ecosystem services is an impractical task. A simpler approach is to calculate the replacement cost of the ecosystem that provided the array of services.

Restoration cost is used as a measure of damages under CERCLA for Superfund sites, under the National Marine Sanctuaries Act, and under the oil spill provisions of the Clean Water Act. Use of restoration costs was explicitly upheld in the landmark Ohio vs. Interior court decision of 1989. I recommend that EPA revise and expand the EBA Case Studies Chapter A11, explaining and supporting HRC calculations, discussing the theoretical basis for HRC, and identifying categories of ecosystem value that are not measured by any other techniques.

Dr. Stavins finds HRC to be even more objectionable than other aspects of the EBA, describing it as “completely illegitimate” and “fatally flawed.” Yet again, we have only his word to go on, with little in the way of documentation. My reading of the literature is quite different; it appears to me that standard texts on environmental economics are not filled with warnings against the dire perils of the avoided cost method of benefits estimation.

Indeed, valuation of assets at replacement cost is a common practice in economics. In macroeconomics, depreciation is routinely valued at replacement cost; the difference between historical book value and market value (market value is current replacement cost, for a marketed asset) is essential in understanding investments. Any detailed analysis of capital costs focuses on “economic depreciation”, or the replacement cost of the capital that is consumed, and distinguishes it from accounting measures of depreciation based on book value or tax laws. <FN 12>

Insurance companies frequently value damages to property at estimated replacement cost. If any of us should experience a loss, our home insurance provider might pay us on the basis of “household replacement cost” – unless we have explained to them that the calculation is fatally flawed and insisted on using a much lower value, as Dr. Stavins proposes to do for ecosystems.

Another important disagreement lurks behind these comments. Are the natural resources that are affected by cooling water intake best thought of as long-lived capital goods – or are they more like consumer goods that people, or power plants, might choose to consume when they are hungry? If you eat the last cookie and then throw out the box, you may not have to pay the full “cookie replacement cost.” Perhaps you are getting tired of cookies and don’t plan to buy any more, so there is no need to worry about replacement cost. Something along these lines seems to be involved in the claim that

HRC overstates the value of environmental resources: if we are planning to consume the ecosystem without replacement, then HRC might overestimate the values at stake.

A cookie box is not an appropriate analogy for the environmental resources protected by the Clean Water Act. Rather, the aquatic ecosystems under discussion in this case are long-lived assets, comparable to capital goods, which provide a wide range of valuable services. Society values and plans to keep these assets for the long run, and expects to receive their services year after year. The view of nature as "natural capital" is one of the foundations of ecological economics; but more conventional environmental economists have also argued that natural resources should be analyzed as assets, i.e. comparable to capital rather than consumer goods. <FN 13>

HRC often looks more expensive than conventional approaches to valuation, as Dr. Stavins emphasizes. But this may simply reflect the incompleteness of conventional valuation, as discussed in section 2 above. Ecosystems provide numerous services simultaneously, using the same "capital equipment" to produce multiple benefits. Many of these benefits are not normally evaluated, but should be. As the list of separately evaluated benefits grows longer, the total benefit will of course increase. If we were able to achieve complete evaluation of ecosystem benefits, assuming that each benefit had to be produced and evaluated separately, we might well find that the totals exceeded HRC estimates. Nature has evolved efficient and parsimonious ways of producing many ecosystem services from limited resources; it would be surprising if artificial substitutes were routinely cheaper.

Although HRC is the only valuation method that even comes close to capturing the full range of ecosystem services, it, too, has shortcomings. In practical terms, it appears difficult and expensive to perform adequate HRC calculations; even more than with other valuation techniques, time and budget constraints may often limit the applications of HRC. Speaking more theoretically, HRC may at times be inappropriate because some ecosystems and natural services are not replaceable. If environmental damages involve risks of extinction of species, destruction of unique resources, or even disruption that allows unwanted invasive species to occupy vacated ecological niches, there may be no way to undo what has been done. Calculation of habitat replacement costs for regulatory purposes have often involved cost estimates for generic wetland restoration, an approach that captures only some of the ecosystem services that are at risk.

Despite these limitations, HRC remains a valuable contribution to the process of valuation whenever it can be used. I recommend that EPA explore HRC valuation of additional sites, to broaden the data and analysis used in the estimates of benefits in this case.

Footnotes

12 There are numerous examples, such as Frank C. Wykoff, "Economic Depreciation and the User Cost of Business-Leased Automobiles," and other essays in Dale W. Jorgenson and Ralph Landau, editors, Technology and Capital Formation (MIT Press, 1989).

13 "Examples abound in the scientific literature supporting the asset interpretation of environmental resources." V. Kerry Smith, Estimating Economic Values for Nature: Methods for Non-Market Valuation (Edward Elgar, 1996), p.7. See also Smith's subsequent discussion of the "asset interpretation."

EPA Response

Chapter A11 from the Case Study Analysis at proposal can be found in the docket (DCN #4-0003).

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see EPA's response to comment #316bEFR.005.035.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method.

Comment ID 316bEFR.014.009

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02.06.02

Revealed preference

Problems of social choice and the use of societal revealed preference

To value the effects of cooling water intake on threatened and endangered species, EPA employs an innovative method described as "societal revealed preference" in the case study of the San Francisco Bay estuary plants. Essentially, the method assigns values based on the amounts that society has been willing to pay for protection of similar threatened and endangered species in other contexts. Economists have frequently deduced individual "revealed preference" for environmental amenities from individual behavior in other markets; here EPA simply extends the same reasoning to social behavior and social choices. Dr. Stavins again displays his hostility to theoretical innovation, describing this procedure as having "no foundation whatsoever in economic theory"; it is in his view "totally invalid… a complete corruption of the notion of a revealed-preference method… a complete sham…"

The revealed preference procedure employed by EPA would be entirely orthodox and familiar, even qualifying for endorsement by Dr. Stavins and the Guidelines for Preparing Economic Analyses, if it referred to individual rather than social choice. Thus the question at issue can be restated: is it totally invalid and a complete sham to consider issues of social choice, separately from individual choice? Both economic theory and political reality show that there is an irreducible, independent role for social choice.

In economic theory, Kenneth Arrow's impossibility theorem proved long ago that there is no universal "social welfare function" – that is, no mathematical function of individual choices always produces meaningful social choices. <FN 14> Questions of public goods and public choice continue to challenge the standard model of individual choice; as textbooks often point out, there is no such thing as an individual demand curve for national defense. (Nor are there cost-benefit analyses to determine how much defense spending is "efficient" based on individual revealed preferences.) Any attempt to convert defense spending to a matter of individual purchases or private willingness to pay would be overwhelmed by the "free rider" problem: why pay for your individual share of defense, since your neighbors' contributions will defend you as much as them?

Exactly analogous questions arise in environmental economics. Nobel laureate Amartya Sen, in recent comments on cost-benefit analysis, points out that individual willingness to pay for major environmental initiatives is not always meaningful: if the amount you would contribute to cleaning up an Exxon Valdez-sized oil spill does not depend on whether anyone else contributes anything, then you have not understood the nature of the problem. On the other hand, if the question is how much would you contribute if everyone else contributes the same amount, we are no longer discussing individual willingness to pay. As Sen puts it:

The very idea that I treat the prevention of an environmental damage just like buying a private good is itself quite absurd. The amount I am ready to pay for my toothpaste is typically not affected by the amount you pay for yours. But it would be amazing if the payment I am ready to make to save nature is totally independent of what others are ready to pay for it, since it is specifically a social concern. <FN 15>

Dr. Stavins drifts out of economic theory and into political debate when he argues against societal revealed preference on the grounds that preferences must be "revealed by those individuals who are doing the paying, not by the judgment of others (in this case, legislatures, executive departments and agencies, and/or courts)." (Stavins comments, p. 27) Denouncing the supposed arbitrariness and unrepresentativeness of all government actions has become unfortunately fashionable; but in this case it is necessary to look beyond the rhetoric. Who exactly is paying for the actions of legislatures, executive agencies, and courts? Ultimately, the answer can only be the taxpayers, ratepayers (consumers), and shareholders – that is, society.

Do people feel that the decisions about environmental protection, made on their behalf by their elected representatives, are hopelessly inefficient and expensive? Is there a groundswell of popular demand to save money by eliminating the Clean Air Act, the Clean Water Act, protection for endangered species, and all the rest? Of course not. On the contrary, many successful politicians have figured out that people strongly prefer environmental protection, and are willing to have their money spent to back up that preference. That's how democracy is supposed to work, with or without the blessing of conventional economic doctrine. Social choice is alive and well in environmental policy, and cannot always be deduced from isolated individual behavior. Dr. Stavins is able to "prove" that individual preferences are necessarily more legitimate than social preferences only by assuming that answer to begin with.

There is one more piece to the case against inferring social values from past regulation, as seen in the "societal revealed preference" approach; this final argument is implicit rather than explicit in Dr. Stavins' comments. It is often said that past regulations, adopted without the benefit of careful economic analysis, have been disastrously expensive. Long lists of regulations, purporting to show wildly differing costs per life saved, are frequently cited as evidence of the need for cost-benefit analysis, rather than reliance on regulatory precedent. The lists, however, can almost always be traced back to just two original studies of the costs of regulation. Careful reading of those original studies reveals that they are routinely misquoted: they are studies of the costs of actual and proposed regulations, or in one case, actual, proposed, and other possible regulations that have never even been proposed by any agency. <FN 16> The ridiculously expensive regulations described in these studies are almost entirely the ones that were never adopted. In many cases, EPA and other agencies rejected the expensive proposed regulations, precisely because they were too expensive – evidence of the success, not failure, of past regulatory practice.

Since social choice cannot be reduced to individual choices, and past regulations are not nearly as expensive as is commonly believed, EPA's "societal revealed preference" method is a promising new innovation in the methods of valuation, one that deserves further development and discussion.

Footnotes

14 More precisely speaking, Arrow proved that there is in general no social welfare function that depends solely on individual preferences for relevant alternatives and avoids intransitivity, unless it is dictatorial (always agreeing with one individual no matter what others prefer).

15 Amartya Sen, "The Discipline of Cost-Benefit Analysis," Journal of Legal Studies 29 no. 2 part 2 (June 2000), pp. 931-952; quote from 949.

16 Lisa Heinzerling, "Regulatory Costs of Mythic Proportions," Yale Law Journal 107 no. 7 (May 1998), pp. 1981-2070; Lisa Heinzerling and Frank Ackerman, "The Humbugs of the Anti-Regulatory Movement," Cornell Law Review 87 no. 2 (January 2002), pp.648-670.

EPA Response

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

Comment ID 316bEFR.014.010

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Limitations of cost-benefit analysis and merits of the “best available technology” standard

To summarize briefly, I have demonstrated that EPA’s analysis of the benefits of reducing cooling water intake is incomplete, and underestimates true, complete benefits by an unknown but large amount. Just two corrections – accounting for the large “non-landed fraction” of I&E mortality of valuable species and increasing non-use values to levels more in line with the recent economics literature – add billions of dollars to the benefits of each regulatory option. These adjustments show that EPA’s proposed option does not maximize net social benefits. Dr. Stavins is not persuasive in his arguments for banning innovation in economics and lowering benefit estimates throughout the analysis. Two of the innovations adopted by EPA in this case, habitat-based replacement cost (HRC) and societal revealed preference, are useful contributions to the fast-changing field of environmental economics, and deserve to be analyzed in depth and applied more widely.

EPA Response

EPA agrees that focusing exclusively on direct use benefits from commercial and recreational fisheries will lead to an underestimate of total benefits from reduced I&E. The omission of nonuse values and other benefits associated with the relatively large unlanded fraction of I&E-impacted fish could also contribute to a significant underestimate of total benefits. Please see response to comment 316bEFR336.009 regarding a more in-depth discussion of the unlanded fraction and related valuation issues, and response to comment 316bEFR.005.029 for additional discussion of the limits and merits of the HRC approach.

Comment ID 316bEFR.014.011

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 2.04.04

Use cost-benefit tests

It is clear that there is no consensus on these issues. One of the few things that Dr. Stavins and I agree on is that EPA's published benefit estimates are an insufficient basis on which to make a decision in this case. The plain truth of the matter is that cost-benefit analysis has failed in its fundamental political ambition. Rather than providing an objective, transparent standard for cost-effective decision-making, cost-benefit analysis has become a partisan battleground where opposing parties fight over rival technical hypotheses about environmental valuation.

Fortunately, cost-benefit analysis is not required in this case. There is no reason to base the regulation of cooling water intake on an analysis that is neither required by law, nor close to complete representation of benefits, nor successful in achieving objectivity and transparency. My Scenario C (refer to Tables 1 and 2 above), combining my two revised estimates, makes it clear that every policy option under consideration has substantial net social benefits. Any choice of the "best available technology" from among these options will bring social benefits greater than its costs; options that achieve the greatest reduction in cooling water intake generally appear to have the greatest benefits.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.014.012

Author Name Frank Ackerman

Organization Global Development and Environmental Institute

Subject Matter Code 10.02.06.01

Stated preference (Contingent Valuation)

In the end, only one question of "willingness to pay" matters for the politics of regulatory policy. It is a much broader, less technical question than the ones raised in the EBA. Any regulation will impose some costs; power plant operators will undoubtedly pass those costs on to their customers. So the question that ultimately matters is, are ratepayers willing to pay the increased costs imposed by regulation? <FN 17> As Synapse Energy Economics has estimated in their comments on this rule, if all costs were passed on to the consumer, an all cooling tower rule would cost each ratepayer 28 cents per month on their electric bills. If the public was asked, "Are you willing to pay 28 cents more per month on your electric bill to avoid massive fish mortality and other underwater environmental damages caused by power plants?", I feel confident the answer would be "yes." And if people are willing to pay the costs of environmental protection, there is no way for experts to prove that they are wrong.

Footnotes

17 One could also examine the impact on the plant owners. EPA did in fact discuss comparison of the costs of the rule to the revenues of the affected companies. But Dr. Stavins, commenting on behalf of PG&E, says, "The comparison [of regulatory costs to company revenues] is utterly irrelevant!… Although such a socially efficient technology [one endorsed by Dr. Stavins' analysis] maximizes net benefits to society, it may yield higher costs than benefits to an affected company." (Stavins comments, pp. 11, 12)

EPA Response

EPA agrees that ultimately, the benefit-cost question is an empirical one of whether or not consumers are indeed willing to pay for the environmental improvement associated with the 316b rule. Unfortunately, without primary data collection through a stated preference survey, no one can effectively argue this point one way or the other; only the data would tell. Please see response to comment 316bEFR.306.105.

Please also refer to Chapter B2 of the EBA, section B2-2 on costs per household (DCN #6-0002).

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Scott Davis

On Behalf Of:

Pinnacle West Capital Corp

Author ID Number:

316bEFR.015

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), UWAG (316bEFR.041)

Comment ID 316bEFR.015.001

Author Name Scott Davis

Organization Pinnacle West Capital Corp

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Ponds and Reservoirs Designed and Constructed for Closed-Cycle Cooling Achieve the Requirements of Any Final Rule.

In identifying all cooling ponds as reasonably within the scope of § 316(b) EPA has neglected to consider unique circumstances associated with the design, operation, and ecosystems of cooling water ponds and reservoirs constructed for the purpose of providing closed-cycle cooling for electric generation. This is particularly important as those circumstances are related to ponds and reservoirs which were constructed in areas where, prior to the construction of the generation facility no "water of the United States" was present.

PNW facilities, which are located in the southwestern United States, have been designed to meet the challenges associated with the limited availability of surface waters that can be used for industrial purposes. All of PNW's facilities have been designed to implement closed-cycle, recirculating cooling systems; some of these designs include closed-cycle recirculating cooling water reservoirs. In all cases make-up water used to maintain these systems represents a very small fraction of the water required for plant operations.

The Four Corners Power Plant obtains make-up water for the cooling reservoir from the San Juan River in northwest New Mexico. The facility is a five unit, coal-fired facility with a generation capacity of approximately 2,000 megawatts. A small (less than 50 million gallon per day (mgd)) intake structure pumps make-up water uphill a distance of over three miles to the facility's cooling water reservoir. Intake structures for condenser cooling are located within the reservoir. Discharges from the reservoir represent a very small fraction of the intake water, and at times, discharges are not required. The cooling reservoir at this facility was not constructed in a water of the United States. EPA's rule should recognize that a facility of this size, which withdraws less than 50 mgd from a "water of the United States," has already been designed to minimize impacts on the aquatic environment, and that at such a facility the cooling reservoir is a recirculating closed-cycle cooling system, EPA's preferred alternative.

The Cholla Power Plant, a four unit, 950 megawatt coal-fire facility, operates a closed-cycle recirculating cooling water reservoir. The reservoir was constructed in an upland area previously used for dry land farming, and was not within a "water of the United States." The reservoir was filled and continues to receive make-up water exclusively from a large, deep groundwater well field owned and operated by the facility. Therefore, the reservoir is a groundwater surface impoundment and the present aquatic ecosystem entirely contrived, see Comment 3. The facility maintains a National Discharge Elimination System (NPDES) permit only as a result of recreational opportunities that have resulted from the development of the contrived ecosystem.

Further, management of both waterbodies by permitting recreational access provides a community benefit not otherwise available in the arid southwest. In the absence of sport fish stocking programs and recreational access, these reservoirs would likely not be required to maintain a NPDES permit, because under operating conditions more typical of the United States, these reservoirs would be defined as cooling “ponds” and be expressly “wastewater treatment systems” and not “waters of the United States.”

The proposed rule suggests that EPA has concluded that § 316(b) must be applied to all “waters of the United States” under EPA’s current definition. With this conclusion EPA has neglected to note that hydraulically isolated cooling water ponds and reservoirs do not need additional intake technology, because by design they already “minimize environmental impact” and meet EPA’s described preferred alternative for recirculating, closed-cycle cooling. Additionally, the proposed rule neglects the fact that some “waters of the United States” are impoundments of groundwater. EPA must recognize that § 316(b) was not intended to apply to groundwater impoundments.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.015.002

Author Name Scott Davis
Organization Pinnacle West Capital Corp

Subject Matter Code 3.03
Definition: Waters of the U.S.

Because A Cooling Pond Or Reservoir Is Part Of A Plant's Treatment System, The Make-Up Water Intake Point Should Be Considered The Jurisdictional Intake For Purposes Of § 316(B).

Many cooling water ponds and reservoirs, such as at the Four Corners Plant, utilize intake structures on "waters of the United States" as the source of make-up water for reservoir level and chemistry maintenance. Therefore, these facilities are required to operate and maintain "in-take" structures on two separate water bodies to operate the same facility.

Based on our review of the economic development documents presented in EPA's docket for this rule package, EPA has not considered the economic impacts on facilities that would be required to implement § 316(b) controls at two waterbodies.

Because cooling water ponds and reservoirs have been designed expressly to supply cooling water as closed-cycle recirculating cooling water systems and to minimize adverse environmental impact, only the make-up water intake point should be considered the jurisdictional intake for the purposes of § 316(b).

EPA Response

See response to 316bEFR.006.001. The comment is correct that in development of this rule EPA generally assessed the cost of implementing 316(b) requirements for one source waterbody per cooling water intake. However, the jurisdictional intake point for purposes of section 316(b) depends on where the facility uses a cooling water intake structure to withdraw water from waters of the U.S. As indicated in the referenced response, this determination will be made on a case-by-case basis.

Comment ID 316bEFR.015.003

Author Name Scott Davis
Organization Pinnacle West Capital Corp

Subject Matter Code 3.03
Definition: Waters of the U.S.

The Rule Should Recognize That Ecosystems In Constructed Cooling Water Ponds And Reservoirs Are Contrived.

Many cooling water ponds and reservoirs, such as the ones used by PNW, were constructed specifically to support the operation of power plants. Often these ponds and reservoirs are constructed in areas where aquatic ecosystems were not previously present. The designs recognize the important role that recirculating cooling systems serve in conserving water when compared to other types of plant cooling systems, including cooling towers.

With no natural "lake" flora or fauna, these reservoirs support a combination of introduced and adaptive species. The fisheries of the publicly accessible reservoirs are usually stocked and managed by parks and wildlife agencies, such as the Arizona Game and Fish Department in Arizona, to support sport fishing. The usual fish stocking regimes include predator species, strains and hybrids (largemouth bass, catfish, crappie, etc.) and prey species and hybrids (sunfish, minors, shad, etc.). Most of the stocked sport fish species must be restocked because of fishing pressure and low naturalization.

With little natural seed bank and no managed vegetation stocking programs, the aquatic flora develops slowly and can result in unbalanced and/or low diversity plant communities. Many of these reservoirs become increasingly impacted by nuisance plants and these nuisance plants often have a negative effect on the fisheries by altering the available nesting/spawning areas, influencing recruitment of certain species, and decreasing the depth of light penetration and the associated swings in dissolved oxygen concentrations.

In areas where PNW operates, climate also has a major impact on reservoir water quality and fisheries. Prolonged droughts and daily high ambient temperatures of over 100˚F for extended periods often result in dramatic increases in water temperature and drops in reservoir volume. This impacts fisheries by reducing or eliminating quality habitat, reducing recruitment, altering nesting locations and patterns, and eliminating available habitat.

From the above description, it is easy to see that such reservoirs represent a contrived ecosystem. The fisheries are created, modified, and managed for a variety of human needs, with little natural material or conditions to build from. These reservoirs are also subject to wide swings in fishery populations, distribution, and makeup because of their comparatively simple ecosystems. As important as recreation and sport fishing have become on these types of reservoirs, the parks and wildlife agencies where PNW operates have never identified impingement as an impact of concern on the fisheries of power plant cooling water pond and reservoirs. Further, EPA's concepts of "baseline studies" and "compliance monitoring" are difficult is not impossible to implement in reservoirs and ponds where the ecosystems are so unnatural and inherently unstable.

EPA Response

See response to 316bEFR.006.001. See also 316bEFR.025.018. In addition, the requirements and implementation provisions of the final rule, in combination with existing relevant NPDES program regulations, provide permit writers with sufficient flexibility to consider and accommodate the specific characteristics of cooling water source waterbodies as appropriate. With regard to "baseline studies," EPA notes that the Comprehensive Demonstration Study is not required under every compliance alternative, and its components are applied only as appropriate under each alternative. Moreover, the point of these efforts to characterize the waterbody and any impacts to the waterbody is to understand the specific waterbody and environmental impacts, including any unique or unusual factors. Under the NPDES program regulations, Directors have reasonable discretion to apply these requirements as appropriate to achieve regulatory requirements and program objectives. Thus, EPA does not agree that such studies would be difficult or impossible to conduct. Nor does EPA agree that compliance monitoring would be difficult or impossible. Compliance monitoring under the rule also is dependent on the compliance alternative selected, and also allows the applicant to propose and the Director to determine the specific aspects of such monitoring. Thus, this too can easily accommodate application to unique waterbodies. The rule also allows compliance in certain circumstances under a Technology Installation and Operation Plan, which focuses on installation and proper operation of appropriate technologies.

Comment ID 316bEFR.015.004

Author Name Scott Davis

Organization Pinnacle West Capital Corp

Subject Matter Code 7.02

Performance standards

Determination Of Impingement Mortality Cannot Be Applied To All Impingeable Species In The Waterbody.

In determining whether a technology will reduce impingement mortality by 80-95%, the analysis cannot be applied to all impingeable species in the waterbody. Any reduction standard or threshold should be applied to certain species that are impingeable and representative of species in the waterbody that need to be protected. In previous arguments presented by the Utility Water Act Group (UWAG) these species have been referred to as "Representative Indicator Species" (RIS). EPA must recognize that it is simply not feasible to design an intake technology that will ensure protection of every impingeable species.

Moreover, fisheries experts agree that not all species are of equal value, both from the perspective of ecosystem stability and from the perspective of fisheries management. The loss of some species will not harm the aquatic community. Impingement of forage species, for example, may be far less important than the impingement of commercial or recreational species.

EPA Response

EPA agrees with the commenter that, in most circumstances, it is not feasible to implement a deploy a design and construction technology that will be equally protective of all species present in the waterbody. EPA disagrees, however, that forage species may be far less important than commercial or recreational species. EPA does recognize that forage species are often present in larger numbers than commercial or recreational species, but also acknowledges that forage species are an integral part of any aquatic ecosystem and cannot be dismissed out of hand as unimportant.

Please see response to comment 063.005 for a discussion of the methods of determining compliance with today's rule, as well as the preamble.

Comment ID 316bEFR.015.005

Subject Matter Code 6.08

Non-aquatic impacts

Author Name Scott Davis

Organization Pinnacle West Capital Corp

Exotic species, especially nuisance species, may not be valuable to a waterbody at all. Based on experiences at various PNW facilities, some fisheries managers taught the benefits of CWIS in managing the populations of some nuisance species.

Exotic species that are regarded as a “nuisance” should be given special consideration in the § 316(b) decisions. Certain exotic species, such as common carp, shad, or Asiatic clam are viewed as nuisance species by natural resource managers for some waters. In such cases, entrainment should not be regarded as a problem. Further, given state fishery resource managers’ often extensive efforts to get ride of these species and EPA’s own expressed concerns about their effects, cropping by CWISs should not be considered an “Adverse Environmental Impact” (“AEI”), as discussed in the proposed rule.

EPA Response

Today's rule presents five compliance options. These are discussed in the preamble to the final rule. In addition, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see EPA’s response to comment 316bEFR.063.005. How to account for nuisance species can be considered in the context of these provisions, all of which are subject to decisions by the Director.

Comment ID 316bEFR.015.006

Author Name Scott Davis

Organization Pinnacle West Capital Corp

Subject Matter Code 3.07

Special definitions

The Seven-Day Retention Time In The Definition Of "Lake Or Reservoir" Is Not Appropriate for Application To Constructed Water Bodies.

In EPA's proposed definition of "lake or reservoir" the water body is required to have a hydraulic retention time of seven days to be considered a lake or reservoir. Water bodies with shorter hydraulic retention times are otherwise defaulted to be defined as rivers. This "more than seven days" cutoff may not be appropriate. EPA does not provide a technical basis for this argument in the proposed rule or in the technical support and development documents. Further, EPA is not clear how the retention time is to be calculated, and the definition does not distinguish between inflows from make-up water sources, return flows from recirculating cooling water systems, evaporation, and infiltration. Therefore, in the arid southwest, where overland outflows are very small or absent, and evaporation/infiltration rates are high, hydraulic retention times could be inappropriately described as shorter than the prerequisite seven days to be defined a reservoir.

Therefore, it could be interpreted that EPA intends inflows and outflows generated by a recirculating cooling water system to be considered when calculating hydraulic retention time. Under those circumstances, many hydraulically isolated waterbodies designed as closed-cycle cooling water ponds and reservoirs would incorrectly be defined as rivers under the proposed rule. EPA should clarify that only surface water inflows from and outflows to a "water of the United States" should be used in the calculation of hydraulic retention time.

EPA Response

For the purpose of today's rule, EPA has defined a freshwater river or stream as having an average hydraulic retention time of 7 days or less, and a lake or reservoir as having an average hydraulic retention time of greater than 7 days (see definitions at § 125.93). EPA's definitions of freshwater river or stream, and of lake and reservoir in the final rule are standard definitions that have been used historically to provide general guidelines for distinguishing between the waterbody types. Retention time is not a function of recycled cooling water system flows, but of natural water flows including precipitation. See EPA's response to comment 316bEFR.006.001 for more information on categorizing waterbodies in today's final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

William E. Driscoll

On Behalf Of:

TXU Generation Company

Author ID Number:

316bEFR.016

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), NEI (316bEFR.020), UWAG (316bEFR.041)

Comment ID 316bEFR.016.001

Subject Matter Code 3.03

Definition: Waters of the U.S.

Author Name William E. Driscoll

Organization TXU Generation Company

TXU has worked closely with the Texas Parks and Wildlife Department (TPWD) in cooperation with their activities to monitor and manage the fisheries. For this reason, TXU reservoirs have provided a continuous and successful source of recreational fishing to the public. At no time, however, has the TPWD ever expressed a concern or identified a problem related to a possible impact of our cooling water intake structures on the fisheries, or a reservoir's biological community as a whole.

TXU is very concerned with the "one size fits all" approach found in several key components of the proposed regulations. In particular, the grouping of reservoirs and lakes is inappropriate. Furthermore, reservoirs across the country vary widely and should not be subject to national criteria. For reasons described in the attached comments, TXU believes that cooling water reservoirs should be considered as closed-cycled cooling systems and not subject to these proposed regulations.

EPA Response

See response to 316bEFR.006.001. In addition, the final rule includes five compliance alternatives, including the ability for a facility to seek a site-specific determination of best technology available and, therefore, EPA does not agree that it constitutes a "one size fits all" approach. With regard to grouping waterbody categories, EPA recognizes that the categories used in the final rule are broad and that there will be a certain level of variation within each category (e.g., due to differences in waterbody size, hydrology, location, use, and numerous other factors). Nevertheless, for purposes of this rule EPA has grouped lakes and reservoirs together, as defined in § 125.93, because these waterbodies have sufficiently similar characteristics relevant to the environmental concerns posed by cooling water intake structures and can employ similar available technologies to minimize the environmental impacts associated with these concerns. Also see response to 316bEFR015.003.

Comment ID 316bEFR.016.002

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 3.03

Definition: Waters of the U.S.

TXU has several serious and legitimate concerns over the “one size fits all” approach found in several key components of the proposed regulations. In particular, the grouping of reservoirs and lakes is inappropriate and appears to be based more on hydrology than biology. Since the focus of this issue is on the flora and fauna of a waterbody, biology should be the primary determinating factor.

A second related concern is the agency’s belief that all reservoirs across the country should be subject to the same criteria. Again, from a biological standpoint this concept is ill conceived. In addition to biology, many other important factors such as climate, hydrology, water quality, fisheries, and reservoir/fisheries management techniques vary widely from region to region and sometimes from state to state. In many other water related programs, the agency has acknowledged and embraced the concept of regional differences. These proposed regulations, especially in light of the tremendous scope and cost, should also acknowledge and incorporate the difference between source water bodies in different regions of the nation.

The following discussion on inland water bodies in Texas is provided to give the agency an appreciation of the uniqueness of both its reservoirs and the region. It is also provided to help illustrate and quantify many of the general and specific comments on the proposed regulations that follow the discussion.

Inland Water Bodies of Texas in General.

Of the 212+ “lakes” in Texas, only one is natural, Caddo Lake. It is located in the far eastern portion of the State, is shared with Louisiana, and was created by seismic activity about 400 years ago. All of the other "lakes" are actually manmade reservoirs constructed for single or multiple purposes to provide potable water sources, flood control, recreation (i.e. boating, swimming, skiing, sports fisheries, etc.) and/or industrial use. Many of these reservoirs were constructed specifically to support the operation of power plants, recognizing the important role that recirculating cooling systems serve in conserving water when compared to cooling tower systems.

In general, the power plant reservoirs are relatively shallow (< 30 ft average depth), with gently sloping bottoms over a wide variety of substrates. The water volumes are controlled by either mechanical tainter gates or passive overflow structures, and subject to significant annual pool level variation due to seasonal climatic conditions. Occasionally there is also some form of continuous flow-through to maintain downstream conditions; however, retention times are very long (ranging from weeks to years).

With no natural lake flora and fauna present, Texas reservoirs support a combination of introduced lacustrine and adaptive riverine species. The fisheries of the publicly accessible reservoirs are usually stocked and managed by the Parks and Wildlife Department to support sports fishing, a major recreational industry in the State. The usual fish stocking regimes include predator species, strains and hybrids (e.g. largemouth bass, catfish, crappie, etc.) and prey species/hybrids such as sunfish, minnows and shads. Over time, and at various locations, the State has also introduced striped bass, redfish, carp, and other non-native species. Most of the stocked sports fish species, however, must be re-stocked periodically because of high fishing pressure, low naturalization, and to increase genetic diversity. For example, in 1998 the Texas Parks and Wildlife Department's Inland Fisheries Division stocked over 8 million Florida-strain largemouth bass, and over 9 million fingerlings of other species.

With little natural seed bank, and no managed vegetation stocking program, the aquatic flora develops slowly and can result in unbalanced and/or low diversity plant communities. In recent years, many Texas reservoirs have become increasingly impacted by exotic nuisance plants (e.g., water hyacinth, hydrilla, giant salvinia, eurasian water milfoil, etc.). These invasive plants often have a negative effect on the fisheries by altering the available nesting/spawning areas, influencing recruitment of certain species, decreasing the depth of light penetration and the associated dissolved oxygen levels. Heavy infestations can also alter species distribution and limit recreational access.

Texas waterbodies are also under continuous threat from exotic aquatic fauna. The list of exotic fauna is long and seems to be growing each year. Apart from the expanding number of fish species, the list of exotics also includes invertebrates such as clam, mussel and snail species. Recently, a species of estuarine mud crab has been found to be reproducing in at least four different reservoirs that are several hundred miles from the coast. Each of these uninvited exotics presents new problems and future challenges to each reservoir in which they occur.

As mentioned earlier, the climate also has a major impact on Texas reservoir water quality and fisheries. Prolonged droughts, and daily high ambient temperatures of ~100 F for extended periods, often result in dramatic drops in reservoir volume. This impacts the fisheries by reducing recruitment, altering nesting locations and patterns, and eliminating available habitat. It also subjects the fisheries to additional stresses, such as higher salts concentrations, which necessarily weakens the population. It can take years for the fisheries to return to pre-existing levels following a drought episode. Then there are the floods, as experienced in July of 2002, which alter the water quality, redistribute or introduce populations, decrease survivability, and impact historical nesting areas.

Natural conditions can also combine to negatively impact the fisheries. A prime example is the recent occurrence of golden algae blooms in several Texas inland reservoirs. Golden algae (Prymnesium parvum), is a naturally occurring saltwater tolerant species. When in a "bloom" or period of rampant growth, it causes water discoloration and can be toxic to fish. The toxin released from the algae, and concentrated during a bloom, affects the gills by reducing their oxygen intake and asphyxiating the fish. The toxin appears to affect scaled fish the most. In the golden algae blooms over the past few years, estimates range from 60% to 95% mortality of the scaled fish in each reservoir. The effects of golden algae blooms appear to be lingering in some reservoirs, and the length of time needed for the fish populations to recover to previous levels is not yet known.

An additional natural factor to consider is the gradual decline of a reservoir's fisheries. Reservoirs typically experience an initial "boom" in fisheries the first years following impoundment. Following the initial boom, the fisheries generally begin to slowly decline over the years. The National Reservoir Research Program (administered by the U.S. Fish and Wildlife Service) established that this cycle is related to nutrients. As the reservoir is developed, nutrient levels are very high because of the newly inundated soils and vegetation. In subsequent years, however, the watershed is not able to sustain that same level of nutrients. As the nutrient levels decline, so do the fisheries. Since most of the cooling water reservoirs in Texas are >30 years of age, they are all essentially in the decline phase.

From this description, it is easy to see that such reservoirs represent a contrived artificial ecosystem. The fisheries are created, modified, and managed for a variety of human needs, with little initial natural material or circumstances to build from. Texas reservoirs are also subject to wide swing in fisheries populations, distribution, and makeup because of their comparatively simple ecosystem. These reservoirs do, however, provide a highly valued perennial habitat where historically there may have been only an intermittent streambed. It is very important to note that as important as sport fishing is, the Texas Parks and Wildlife Department has never identified impingement or entrainment as an impact or concern on the fisheries of these power plant reservoirs.

Most of the power plant reservoirs in the state were built specifically to support that use. Because of the high value of water in Texas, re-circulating cooling systems (which conserve water when compared to cooling tower systems), are preferred. In a practical sense these reservoir are an extension of the plant intake that was installed for multiple uses including cooling and water storage/reuse. Most serve as classic “cooling ponds” although changes in state regulations and interpretations have in time changed their designation to “waters of the State”.

As artificial systems, it makes little practical sense to consider such reservoirs in the same manner as the other waterbodies in EPA’s proposal. Other than the generic term “reservoir”, Texas waterbodies share few characteristics with those on the Ohio River (cited by the Agency as the case study for losses and benefits in the proposed rule). They do not share the same flows, water quality, fisheries, climate, vegetation, management objectives, or concerns. It is even more difficult to equate a manmade waterbody with a natural lake. Even if a natural lake has been modified to control the water, it still has a significantly higher developed ecosystem, and much different physical circumstances.

It is apparent from this discussion that the proposed Existing Facility regulations are inappropriate for Texas waterbodies (and probably for other regions of the country). For instance, the establishment of a true “baseline” would be virtually impossible, and its subsequent applicability tenuous from year to year.

As proposed in the regulations, such a baseline would serve only as a “snapshot”. Dramatic changes to the fisheries, especially ones beyond the control of the power plant, can and do occur with surprising speed and can have longterm effects on the fisheries population and distribution. If they occur before, during, or after the establishment of the “baseline”, that information becomes necessarily useless. In any attempt, the baseline should not be a moving target.

For example, exotic fauna presents one of the more difficult problems. Their presence should not “count against” the permittee. By State law it is unlawful to possess many of these species unless they have been eviscerated, and it is the goal to remove them from Texas waters. Their presence does, however, alter the biology of the reservoir. It is an essentially similar situation for exotic flora. Its presence often does alter the biology, particularly the fisheries.

Any requirement to compare year to year conditions to the “baseline” is a basis for failure. A permittee should not be subjected to meeting a standard that, because of anthropogenic and natural factors, are beyond their ability and beyond their control.

The appropriateness and applicability of the proposed control methods is also in question for Texas waters. Cooling towers are wasteful, create new wastestreams, and extremely expensive to retrofit (if physically possible). The other technologies have never been applied on any realistic scale to southern waters. Apart from the expense, there are serious concerns about their ability to function in the biologically rich waters of Texas reservoirs.

Considering that most power plant reservoirs in Texas were built specifically for that purpose, do not support commercial fishing, do not contain endangered/threatened species, have an excellent history of providing public access and supporting sports fisheries managed by the State, the imposition of these regulations is unwarranted. The need and application of any regulations addressing this issue should be determined by the State. The State has the regional knowledge, and the experience, to apply any such requirements where and when needed.

EPA Response

See responses to 316bEFR006.001, 015.003, and 016.001. EPA also notes that under the final rule (i.e., § 125.90(c)) a State may administer alternative regulatory requirements where such requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

With regard to "baseline studies," EPA notes that the Comprehensive Demonstration Study is not required under every compliance alternative, and its components are applied only as appropriate under each alternative. Moreover, the point of these efforts to characterize the waterbody and any impacts to the waterbody associated with cooling water intake structures is to understand the specific waterbody and any environmental impacts, including any unique or unusual factors. Thus, the Comprehensive Demonstration Study can be used to identify variability and other important characteristics of the waterbody, including characteristics that perhaps there is reason to discount or distinguish, as well as to support decisions regarding how to most appropriately assess cooling water intake structure impacts, and distinguish non-cooling water intake impacts. Under the NPDES program regulations, Directors have reasonable discretion to apply these requirements as appropriate to achieve regulatory requirements and program objectives. Reasonable application of these rule requirements can accommodate unique waterbodies and, thus, EPA does not agree that such studies would be difficult or impossible to conduct, or of little value.

Comment ID 316bEFR.016.003

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Water Reservoirs

Of the estimated 60 in-scope facilities in Texas, the majority utilize cooling water reservoirs. Over half are on cooling water reservoirs that were built, and are operated, specifically to supply cooling water. Many of the remaining facilities are on reservoirs that were constructed in part as cooling water reservoirs. As discussed previously, these reservoirs are an essential component of the facility's cooling water system, equating to a close loop cooling system. As part of the project construction approval process, most cooling water reservoir projects, and the associated generating facility, have already undergone an extensive review by various government entities to insure minimal adverse environmental impact. Older cooling water reservoirs constructed before the requirements for review to evaluate adverse impacts have the benefit of history to show that the operation of the CWIS (cooling water intake structure) has had minimal impact. In fact, Texas cooling water reservoirs usually have thriving populations.

Based on these, and other reasons already discussed, cooling water reservoirs should be considered as closed-cycle cooling systems and not subject to these proposed regulations.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.016.004

Subject Matter Code 10.02

Benefit Estimation Methodology

Author Name William E. Driscoll

Organization TXU Generation Company

Benefits Analyses

Cooling water reservoirs, and the surrounding properties, are owned and operated by the facility to supply cooling water. Often, when access is allowed for recreation it is by permission of the facility through a state, county, municipal, etc., park leased (usually for a symbolic payment of $1/per year) or donated by the facility as a good neighbor gesture. In these cases, public recreation is more correctly considered a cost. In determination of Benefits, such facilities should not be subject to inclusion of public recreation value.

EPA Response

EPA has estimated benefits of public recreation to recreational anglers who benefit from increased catch rates in the public water bodies affected by power generating facilities. The Agency has not included benefits to people who recreate on property owned by the facilities. Thus, this comment is irrelevant to EPA's benefit analysis.

Comment ID 316bEFR.016.005

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Previous Demonstration Studies

The EPA should allow the use of pervious demonstrations studies, and grant a waiver for facilities that have been successful in showing minimal adverse impact. The waiver would only be granted if past demonstration reflects that the current conditions of the water body have not materially changed, and that CWIS location, design, construction, and capacity have not changed.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.016.006

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 6.08

Non-aquatic impacts

Impingement of exotic or nuisance species should not count in determining the percent reduction (or in establishment of any baseline) value. As described previously, exotic and nuisance are a frequent and significant problem in Texas reservoirs. Their presence creates a number of problems for the fisheries because the populations can expand rapidly (often at the expense of other desirable species), and the State has set a goal for their eradication.

EPA Response

Please see response to comment 316bEFR.015.005.

Comment ID 316bEFR.016.007

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 6.01

Overview of I & E effects on organisms

The regulations must also address the impingement of weakened or dead fauna. The induced current of a CWIS, and sometimes its location in relation to predominate winds, often make it a collection point in the event of a die-off or illness in the water bodies fauna. In those events, the facility should not be required to include the numbers in their evaluation of a either the CWIS impacts or a technologies effectiveness.

EPA Response

EPA acknowledges that intake structures can impinge or entrain organisms which may have already died. The Verification Monitoring Plan must include a proposal on how naturally moribund fish and shellfish that enter the cooling water intake structure would be identified and taken into account in determining compliance with § 125.94. By applying to naturally moribund fish and shellfish, the proposal needs to consider whether these organisms died prior to any influence of the cooling water intake structure and not due to a prior pass through the same cooling system and reenters the cooling system due to the circulation of water currents.

Comment ID 316bEFR.016.008

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 21.08

Burden on permitting agencies (general)

Impact on State Permitting Agency

TXU is concerned about the impact of these proposed regulations on state permitting agencies. While the Company feels strongly that the flexibility found in these proposed regulations is important and necessary, it also feels that several of the requirements may not be needed for every instance. This is particularly true with many of the studies and the volume of information required. In many cases where there already exist a large body of knowledge on a water body, the process could, and should, be streamlined. Any reduction in the volume and process will result in a cost saving to the agency.

The need and application of any regulations addressing this issue should be determined by the State. The State has the regional knowledge, and the experience, to apply any such requirements where and when needed. This will allow the agency to apply its resources in the most efficient manner, and focus on the identification of problem water bodies.

EPA Response

See response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Existing State 316(b) programs may be approved under today's final rule per the requirements in 125.90(d). See response to comment 316bEFR.023.001 for a discussion of State program approval.

Comment ID 316bEFR.016.009

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 21.09

Permit applications/implementation schedule

Permit Process

The proposed regulations provide little detail on actual permitting process/schedule, and a great deal more detail and guidance will be needed from the EPA before the true impact of the process can be assessed. Considering the scope, the number of affected facilities, and time involved in each stage, TXU's initial impression is that permitting process will be very labor intensive and time consuming for both the permittee and the state agency.

In developing this guidance, the agency must consider several factors. Examples of such factors include the impact on state permitting agency, the real lack of existing expertise and equipment, the uncertainty inherent in predicting the efficiency of a technology on a site specific basis, and the initial escalation in difficulty these factor present when a large number of facilities are affected at once.

EPA Response

As outlined in section 9 of the preamble to today's rule, EPA has clarified the timeframe for submitting the required studies. Please see response to comment 316bEFR.034.066 for a discussion.

In addition, EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements and speeding permitting. Please see response to comment 316bEFR.034.005.

Comment ID 316bEFR.016.010

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name William E. Driscoll

Organization TXU Generation Company

The EPA must also consider the cost and efficiency of requiring the application of relatively untested technologies on a large scale. It would be disastrous for any company with similar facilities to target a technology for multiple sites and then find out that it is ineffective. A related issue is the timing of technology installation for multiple sites and its potential impact on the reliability of the power network.

Each of these factors and potential problems illustrate the need for a gradual and well conceived permitting strategy. The strategy should acknowledge both the difficulty and the potential economic impacts to the permittee, the state permitting agency, and society. The most logical and workable process would be for the permittee to submit their plans for establishing the baseline, reviewing technologies, etc., with the application. Those plans could then be incorporated into the permit and implemented during the course of the permit.

EPA Response

As discussed in the preamble and ICR to today's final rule, EPA expects that some facilities may opt to conduct pilot studies for certain technologies to ensure appropriateness to the site conditions prior to full installation. This will assist in minimizing risk to the facility and provide a level of confidence in the technology. Plans for the use of technologies should be included in the Proposal for Information Collection for review by the Director. Timing of technology installations should be discussed with the Director and could also be raised in the Proposal for Information Collection. Please see response to comment 316bEFR.034.066 for a discussion of the timing of submitting the required studies.

Comment ID 316bEFR.016.011

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name William E. Driscoll

Organization TXU Generation Company

The agency must develop a permitting process that has a defined end point. It is absurd that this entire effort would again be required with each subsequent permit round. Once a facility has completed the process, regardless of the option selected, it should not be subjected to the exercise again unless there is a change in the CWIS location, design or construction.

EPA Response

Under 125.95(a)(3) of today's final rule, a facility may apply for reduced application requirements if conditions at the facility remain substantially unchanged from the previous permit issuance. Please see response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.016.012

Subject Matter Code 21.01

Submittal of required information

Author Name William E. Driscoll

Organization TXU Generation Company

TXU is also very concerned about the CWIS design and construction information/drawings required for the permit application. The agency must consider the national security risk associated with a requirement to provide that level of information critical to the operation of the nation's power plants in a public document format. CWIS, especially on public water bodies, are perhaps the most vulnerable point of a facility and would present the least risk to anyone who wished to disrupt the facilities operation

EPA Response

EPA appreciates the concern regarding a possible security risk in submitting CWIS design and construction information with the permit application. A facility may designate any part of its application as confidential business information (CBI) for review by authorized personnel only. If designated as CBI, the information will be housed in a secure facility with access by authorized personnel only.

Comment ID 316bEFR.016.013

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 21.01

Submittal of required information

Flexibility in Required Studies

The agency should provide the opportunity for both the permittee and the permitting agency to take advantage of occasions that might present an economy of scale. For example, if a facility has multiple CWIS on the same water body and in the same proximity, the permittee should be given the option to apply the baseline evaluation of the most utilized CWIS to all. It is even conceivable that a company that has several similar CWIS on the same type of water body, in the same region, could opt to apply the results from one facility's CWIS to each applicable site.

EPA Response

EPA agrees with the commenter and notes that the definition of calculation baseline in 125.93 allows a facility to estimate the calculation baseline using historical impingement and entrainment data from it's facility or another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of the cooling water intake structure; or current impingement mortality and entrainment data collected at its facility. EPA believes that this definition provides ample flexibility for the facility.

Comment ID 316bEFR.016.014

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Author Name William E. Driscoll

Organization TXU Generation Company

Low Capacity Facilities

EPA should also provide a waiver for facilities that have historical low capacity factors, sometime less than annual capacity factors. These low capacity factor sites are generally only brought into service during extraordinary or atypical circumstances. Most often, the extraordinary or atypical circumstances are the result of extremes in weather (winter ice storm or extended summer heat waves). As described by the agency, it is generally accepted that the peak winter or summer periods will not be the most crucial for aquatic organisms.

The agency must also appreciate the difficulty in designing and executing any form of sampling or monitoring plan (e.g., baseline) for a facility with low capacity. Since their operation is often based largely on unplanned events, the extent of their operation is dependent on the duration of the unplanned event. As a result, the window of opportunity to mobilization and execution of sampling and monitoring efforts will be very small and the facility may not operate for a sufficient period of time to complete the effort.

EPA Response

The Agency has considered the historical nature of capacity factors in determining those facilities that would qualify for the reduced requirements associated with low capacity utilization rates. Specifically, the Agency requires that the capacity factor analysis be based on several years of historical annual performance.

The Agency does not agree that a "waiver" should be granted for low capacity facilities. The Agency considers the relief for low capacity facilities from entrainment requirements to be a considerable reduction in burden for these facilities. See DCN 6-3586 for an analysis of the cost to revenue of facilities for a variety of capacity utilization thresholds. This reference outlines that impingement controls for low capacity facilities are reasonable in cost-to-revenue ratios. Further the Agency's analysis of the economic impacts of the rule (which included impingement only requirements for those facilities with low capacity) showed the rule to be economically practicable.

The Agency, by removing the entrainment requirement for those facilities falling below the capacity utilization rate threshold has also removed the entrainment monitoring requirements. Monitoring for impingement can be a very straight-forward exercise, when compared to entrainment monitoring. Monitoring for impingement is still feasible, however, as the intermittent nature of the operation of the plant should make the monitoring even more straight-forward and more affordable. Mobilization can be a concern, but with simple planning and contingency (that afforded by the fact that monitoring is intermittent, and therefore rarely is the full expense incurred) a facility with intermittent operation can and should be able to monitor. If the duration is so short that rigorous monitoring reasonably cannot occur, then the reasonable expectation is that significant impingement of organisms could be easily observed, noted, and qualified. Hence, by nature of the fact that the plant operates infrequently and has only impingement requirements, the burden of the monitoring program is greatly reduced, and the commenter's concerns have been met.

Comment ID 316bEFR.016.015

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

125.94(a)(1) Existing Design and Construction Technologies

This section should be expanded to include facilities that have already successfully completed a 316(b) demonstration. Of course, current water body conditions must be materially the same and the construction, location, design, and capacity of CWIS the same as during the previous demonstration.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.016.016

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 17.06

Option: Site-specific determination of BTA

125.94(a)(3) Site Specific Determination

TXU agrees with the EPA's belief that it is important to have a site specific option. This option is necessary and needed for those cases of exceptionally high cost and/or minimal benefits. The Company also believes it would be very useful for the agency to develop standards for the Comprehensive Cost Evaluation Study. The standards should, however, be flexible and in the form of a guidance document. This would help to minimize the impact of these regulations on both the permittee and the regulatory agency.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For more information on EPA's expectations for the costing efforts, please refer to section IX of the preamble to the final rule.

Comment ID 316bEFR.016.017

Subject Matter Code 7.02

Performance standards

Author Name William E. Driscoll

Organization TXU Generation Company

125.94(b)(4)(i) - Impingement Mortality for Facilities Withdrawing from a Lake or Reservoir

The use of the 80 to 95% reduction value for impingement from the baseline should be established as a target, not a firm performance standard. As described at several points in the discussion of Texas water bodies above, a number of factors beyond the control of the facility can, and do, affect the fisheries and their distribution in a reservoir. Any change in one or more of these factors from those that existed during establishment of the baseline value can, and will, alter the numbers of fish that are impinged. It is entirely conceivable that due to circumstances and conditions beyond the control of a facility that a performance standard will not be met on an occasional basis, regardless of the temporal unit of measure.

The circumstances are ill-suited to establish a firm performance standard for a technology that has been reviewed and approved in good faith by both the facility and the agency. It would also be inappropriate to impose such a performance range or limit on the technologies identified since they are unproven in many of the conditions and situations in which they will now be applied. The agency itself, in discussing the development of a performance range, acknowledges that there is "...uncertainty inherent in predicting the efficiency of a technology on a site specific basis".

EPA Response

Please see response to comment 316bEFR.307.064.

Comment ID 316bEFR.016.018

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 3.07

Special definitions

125.94(b)(4)(ii) Natural Thermal Stratification

The occurrence of a "natural thermal stratification" in many Texas cooling water reservoirs is neither reliable nor significant. Apart from the question of whether or not the agency has the authority to regulate the existence or location of the "natural thermal stratification" is the question of the effects of any disruption of that zone. Since the intent of these proposed regulations is to minimize adverse environmental impacts, the criteria should not be based on if a disruption is or is not beneficial, but if a disruption would or would not be detrimental to the fisheries. The language found in 125.95(b)(2)(ii) already reflects the distinction.

EPA Response

The standard found in § 125.94(b)(3) states that "If your facility withdraws cooling water from a lake (other than one of the Great Lakes) or a reservoir and you propose to increase the design intake flow of your cooling water intake structures, your increased design intake flow must not disrupt the natural thermal stratification or turnover pattern (where present) of the source water, except in cases where the disruption is beneficial to the management of fisheries." This standard reflects EPA's original intent with regards to disruption of natural thermal stratification: a facility should only be permitted to disrupt the natural stratification if a third-party fish or wildlife agency determines that it will benefit the management of fisheries in that waterbody. EPA therefore disagrees with the commenter that disruption of a waterbody's natural thermal stratification should be allowed even if it is not beneficial, or merely "not harmful."

Comment ID 316bEFR.016.019

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

125.94(d) Restoration

TXU applauds the agency's use of restoration as a means to off-set the impacts of a CWIS. The Company does, however, feel that the agency should clarify that existing restoration measures that have contributed to increases of fish and shellfish in the watershed are applicable. This would be consistent with the proposed credit for technologies already installed.

EPA Response

For a discussion of the use of existing restoration measures, see EPA's response to comment 315bEFR.034.032.

Comment ID 316bEFR.016.020

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 21.06.01

Implications for nuclear facilities

125.94(f) Nuclear facilities

The Company appreciated the EPA's recognition of the unique safety issues associated with CWIS operation and purpose at nuclear facilities. The agency should also acknowledge that these issues will also negatively impact the agency's estimates of the time and cost for all aspects of the proposed rule. The evaluation and installation of new technologies at nuclear facilities will necessarily require significantly more study, and will also necessarily result in significantly higher cost. Because of these same concerns, even the baseline sampling will be more difficult to design and execute than for traditional facilities.

EPA Response

The Agency disagrees that baseline sampling of a waterbody in the vicinity of a nuclear station will be significantly more difficult than that for non-nuclear facilities. The commenter provides no data to support the assertion that baseline sampling will be more difficult at nuclear stations, nor does the commenter provide a logical argument as to why it could be the case. The Agency notes that it has analyzed a multitude of biological sampling data from nuclear facilities in the record of this rule. Many nuclear stations across the country have demonstrated that sampling a waterbody in the vicinity of the intake is a straight-forward and widely practiced exercise.

The Agency has included additional cost factors for installing and operating intake technologies at nuclear facilities. These factors account for the additional costs of construction and labor associated with nuclear facilities. See the Technical Development Document for more information on the Agency's approach to estimating technology retrofit costs at nuclear stations. The commenter's concerns have been met.

Comment ID 316bEFR.016.021

Author Name William E. Driscoll

Organization TXU Generation Company

Subject Matter Code 21.01

Submittal of required information

125.95 Permit Application Requirements

A general comment concerning the requirements of this section is that it should be clarified that facilities that are identified as requiring only impingement technologies are not required to address entrainment in the various studies identified. This will allow both the facility and the agency to reduce the cost and effort associated with development and review.

EPA Response

EPA has clarified the preamble and rule language to reflect that facilities must submit studies containing impingement mortality and/or entrainment data, as appropriate to relevant performance requirements for that facility.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gordon H. Hart

On Behalf Of:

Performance Contracting, Inc

Author ID Number:

316bEFR.017

Comment ID 316bEFR.017.001

Author Name Gordon H. Hart

Organization Performance Contracting, Inc

Subject Matter Code SUP

General statement of support

Performance Contracting, Inc. agrees with the need and direction of Proposed Rule 316(b) for existing facilities. Clearly, most existing water intake screens have excessively high approach velocities and hence are detrimental to young aquatic wildlife. Further, in reviewing the history of this rule, it appears that the EPA has conducted thorough research to justify the need for a new rule. In general, as a company participating in the free market system, PCI also agrees with the EPA's recommending the best technology available as the solution for plants not currently in compliance. This allows for creativity and ingenuity to achieve least cost solutions, a hallmark of the free enterprise system.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.017.002

Author Name Gordon H. Hart

Organization Performance Contracting, Inc

Subject Matter Code 10.1

General: cost tests

The implementation of Rule 316(b) at existing facilities will involve some cost to the owners and operators of those electrical generating facilities. Short term, this may increase the cost of generating electrical power. However, long term, as pointed out in the rule, this should provide greater protection to juvenile aquatic wildlife and this, in turn, should have both financial and environmental benefits.

EPA Response

The commenter's general synopsis requires no response.

Comment ID 316bEFR.017.003

Author Name Gordon H. Hart
Organization Performance Contracting, Inc

Subject Matter Code 21.04
Determination of compliance

However, we at PCI believe that no regulation is meaningful until its objectives are defined in clear, measurable terms. This proposed rule begs the question: What will be measured at sites to confirm compliance? In the draft, this appears to be completely ignored. As engineers, we need to know how to design and measure the various solutions implemented as compliant, or not, before the best solutions can be implemented. The most disappointing aspect of this draft is its lack to define, in clear terms or otherwise, the acceptance criteria facilities shall be expected to meet when inspected for compliance.

EPA Response

Please see the preamble to today's rule and EPA's response to comment 316bEFR.063.005.

Comment ID 316bEFR.017.004

Author Name Gordon H. Hart

Organization Performance Contracting, Inc

Subject Matter Code NEW

Comment on new (Phase I) facility rule

In the Rule 316(b) for new facilities issued on December 18, 2001, the EPA was more prescriptive, specifying a maximum allowable approach velocity of 0.5 fps. PCI would strongly recommend that the EPA list this maximum allowable approach velocity as the recommended solution so as to make it easier and clearer for facility engineers to determine an acceptable solution for their particular existing facility. Otherwise, the solutions could become unnecessarily cumbersome, complex, and of questionable impact.

EPA Response

EPA agrees that reducing a facility's intake velocity may be an effective method to reduce impingement and entrainment. However, EPA does not believe that a prescriptive intake velocity standard is appropriate for all Phase II existing facilities, as some facilities may find that other solutions are more effective or more cost-effective for existing intakes. EPA would prefer to allow a higher degree of flexibility for facilities to meet the performance standards.

EPA does note, however, that a facility can demonstrate compliance with the impingement performance standards under § 125.94(a)(1)(ii) by demonstrating that it has, or will, reduce its maximum through-screen intake velocity to 0.5 ft/sec or less.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Athan A. Vinolus

On Behalf Of:

Dayton Power and Light Company

Author ID Number:

316bEFR.018

Notes

UWAG (316bEFR.041)

Comment ID 316bEFR.018.001

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

DP&L recognizes that U.S. EPA has not included within the Proposed Rules a definition of Adverse Environmental Impact ("AEI"). Given that the CWA statutory language requires a minimization of AEI in the location, design, construction, and capacity of cooling water intake structures, the interpretation of what constitutes AEI is of vital importance in regulating cooling water intake structures ("CWIS"). DP&L is aware that many commenters may advocate a definition of AEI that equates AEI with "one dead fish." Using that definition, the best technology available ("BTA") for minimizing AEI could be interpreted to require the installation of wet cooling towers at all applicable existing facilities as a minimum or even dry cooling towers in the extreme. DP&L strongly opposes such an approach to the extent it is presented and possibly considered by the Agency for incorporation in the final rule. DP&L insists that any definition of AEI that may be included in a final rule be one that specifies that adverse environmental impact is a phenomenon that occurs on a population level as a result of CWIS operation and significantly affects a population's ability to sustain itself. Anything in terms of a more severe definition of AEI is clearly counter to various federal statutes and mandates that specify that cost be considered in government decision making. These include Executive Order 12866 (1.a, 1.b (5), (6), (7)), the Unfunded Mandates Reform Act, 2 U.S.C. 1501 et seq., and the Small Business Regulatory Fairness Act, 5 U.S.C. 601 note.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.018.002

Author Name Athan A. Vinolus
Organization Dayton Power and Light Company

Subject Matter Code 3.02
Definition: Cooling Water Intake Structure

Preamble Section II.B (67 FR 17128-17129) What is a Cooling Water Intake Structure?

U.S. EPA includes a discussion of the definition of cooling water intake structure. The definition specifically includes the intake pumps as part of the CWIS under EPA's argument that they are an essential component of the CWIS "...since without them the intake could not work as designed." DP&L disagrees that the pumps are a component of the CWIS and, instead, insists that they are part of the cooling water system (CWS). Under U.S. EPA's mistaken theory, other components of the CWS could similarly be erroneously considered part of the CWIS simply if they are integral to its design and operation. This would include piping, valves, condensors, cooling towers (if the plant is so equipped), etc. The definition of CWIS should be limited to only those components that are actually physically part of the structure at which water is drawn into the plant.

EPA Response

EPA disagrees. As discussed in section II.B. of the preamble to the final rule and at 66 FR 65287 of the final Phase I rule (12/18/01), the explicit inclusion of the intake pumps in the definition reflects the key role pumps play in determining the capacity (i.e., dynamic capacity) of the intake. Under 316(b), the capacity of a cooling water intake structure is one of four specific aspects of the intake structure that must reflect the best technology available for minimizing adverse environmental impact. These intake pumps, which bring in water, are an essential component of the cooling water intake structure since without them the intake could not work as designed. EPA believes its definition of “cooling water intake structure” is reasonable given the wording and objectives of section 316(b).

Comment ID 316bEFR.018.003

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 6.01

Overview of I & E effects on organisms

Preamble Section V (67 FR 17136-17137) Environmental Impacts Associated With Cooling Water Intake Structures

U.S. EPA discusses the environmental impacts associated with CWIS, including both impingement and entrainment. The discussion of entrainment impacts, in addition to including the types of impacts, cites specific mortality rates for various entrained organisms. However, the discussion of impingement, while speculating on the types of impacts, offers no mortality or injury data to support the assumption that significant adverse impingement impacts occur as a direct result of large quantities of water being withdrawn for cooling purposes. While a number of the facility examples that follow in Section V.A of the Proposed Rules do include cursory data on number of individuals impinged at specific facilities, impingement mortality data seems to be lacking.

EPA Response

EPA did not review impingement survival studies as extensively as entrainment survival studies because the impingement studies are less controversial. However, the topic of impingement mortality was investigated in the section 316(b) Phase I new facility rule, and EPA considered those studies in taking final action in Phase II. Please see Section VI in the preamble to the Phase I rule for the discussion on impingement survival. The discussion of environmental impacts in the preamble of today's final rule focuses on those organisms killed as a result of impingement and entrainment by the cooling water intake structure. Although EPA did not have the time to extensively review impingement survival studies, EPA encourages Permitting Authorities to give these studies the same level of scrutiny as EPA did with entrainment survival studies.

Comment ID 316bEFR.018.004

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

The discussion in this section of the preamble also indicates that U.S. EPA is concerned about the cumulative overall degradation of the aquatic environment as a consequence of the following: (1) multiple intake structures operating in the same watershed or in the same or nearby reaches; and (2) intakes located within or adjacent to an impaired waterbody. As the primary example of this concern, the Agency states that the Atlantic States Marine Fisheries Commission has been requested by its member States to investigate the cumulative impacts on commercial fishery stocks attributable to cooling water intakes located in coastal regions of the Atlantic Ocean. While DP&L believes it may be admirable for this Commission to undertake such an investigation at the behest of its member States, DP&L believes this provides very weak justification for U.S. EPA to promulgate a significant rulemaking such as the. 316 (b) Phase II Proposed Rules. This is particularly true as U.S. EPA provides no data to justify the Agency's perceived concern since the referenced study presumably has yet to be undertaken.

EPA Response

The investigation by the Atlantic States Marine Fisheries Commission on the cumulative impacts of cooling water intake structures has not been completed to date; therefore, reference to it has not been included in the preamble to today's final rule. EPA continues to be concerned about the potential cumulative impact of multiple intake structures operating in the same watershed and intakes located within or adjacent to an impaired waterbody. See response to comment 316bEFR.099.004. Please see section IV of the preamble for the discussion on environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.018.005

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 6.03

Impacts of CWIS on impaired waterbodies

U.S. EPA further believes that cooling water intakes potentially contribute additional stress to waters already showing aquatic life impairment from other sources such as industrial discharges and urban stormwater. Specifically, U.S. EPA notes that the top four leading causes of waterbody impairment are siltation, nutrients, bacteria, and metals and that they affect aquatic life uses of a waterbody. U.S. EPA speculates that since organisms subject to the effects of cooling water withdrawals reside in impaired waters, they are therefore more susceptible to the cumulative impacts from a variety of physical, chemical and anthropogenic stressors (presumably including CWIS). DP&L does not dispute that there may be some contribution by cooling water intake structures to the total stress born by aquatic life in a particular waterbody. However, DP&L sees this as weak justification for a potentially significant 316 (b) rulemaking in light of U.S. EPA's admission that other more prevalent causes of impairment affect aquatic life use of a waterbody. If U.S. EPA truly believes that siltation (presumably from non-point source runoff), nutrients (presumably from agricultural runoff), bacteria (presumably from combined sewer overflows) and metals (presumably from various point source discharges or natural background sources) are the leading causes of impairment and that CWIS only serve to add incremental stress to the aquatic life, then U.S. EPA should implement additional regulations or enforce existing regulations to control the sources responsible for these impairments. Establishing regulations to control CWIS in an attempt to improve water quality and reduce impairment for aquatic life caused by other sources does not address the real source of the perceived problem.

Additionally, U.S. EPA admits there is much uncertainty and work to be done as to the contribution that any one stressor makes to a structural change in an ecosystem including the extent to which CWIS induce changes. As a result, there would appear to be incentive to resolve these issues prior to promulgating a potentially costly rulemaking.

EPA Response

Please see the response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.018.006

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 7.02

Performance standards

Preamble Section VI.A.1-A.1.a (67 FR 17140-17142) What is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

The Proposed Rules set technology-based performance requirements for minimizing adverse environmental impact at Phase II facilities. As proposed by U.S. EPA, facilities with cooling water intake structures that meet certain criteria would be required to reduce fish and shellfish impingement mortality by 80 to 95 percent. Facilities meeting certain additional criteria would be required to reduce fish and shellfish entrainment by 60 to 90 percent in addition to reducing fish and shellfish impingement mortality by 80 to 95 percent. DP&L commends U.S. EPA on its decision to forego requiring specific technologies and allowing industry to meet the requirements of reducing impingement and entrainment using whatever technologies best fit the plant-specific situation. DP&L further appreciates U.S. EPA's flexibility in proposing regulations that specify a range of impingement and entrainment reductions that serve to meet the BTA requirements. However, DP&L has concerns with the decision criteria that permitting agencies may use in determining whether a particular facility has met the impingement and/or entrainment reduction standards. Specifically, U.S. EPA states at 67 FR 17141-17142 that

"EPA is proposing performance ranges rather than a single performance benchmark because of the uncertainty inherent in predicting the efficacy of a technology on a site-specific basis....

EPA anticipates that facilities will select technologies or operational measures to achieve the greatest cost-effective reduction possible (within today's proposed performance range) based on conditions found at their site, and that Directors will review the facility's application to ensure that appropriate alternatives were considered....

EPA invites comment on whether the Agency should establish regulatory requirements to ensure that facilities achieve the greatest possible reduction (within the proposed ranges) that can be achieved at their site using the technologies on which the performance standards are based. EPA also invites comment on whether EPA should leave decisions about appropriate performance levels for a facility to the Director, provided that the facility will achieve performance that is no lower than the bottom of the performance ranges in today's proposal."

By not proposing specific mandated technologies and by proposing a range of reduction standards, U.S. EPA is allowing facilities to use the best combination of technologies to meet the optimal level of performance for that particular location. DP&L is concerned that permitting authorities will require additional impingement and/or entrainment reductions over and above those determined to be optimal by the regulated facility. By way of example, if a facility governed by the CWIS regulations as proposed arrives at an approach that will reduce impingement mortality by 85% and entrainment by 65%, it should by deemed to have met the standard. However, conceivably the permitting authority (for some reason possibly unbeknownst to the facility) could determine that those performance levels are not acceptable and could determine that additional controls are required to meet a higher performance standard. If U.S. EPA has determined that a performance standard range is acceptable in meeting the impingement mortality and/or entrainment reductions and as long as the facility's proposed BTA implementation will reduce impingement mortality and/or entrainment to a level within that range, the permitting authority should not have the authority to require additional controls.

EPA Response

As many commenters have noted, a determination of what constitutes Best Technology Available (BTA) for minimizing adverse environmental impact can be a highly site-specific inquiry. For this as well as other reasons, EPA has authorized site-specific determinations to be based on cost-cost and cost-benefit considerations. In addition, EPA recognizes that requirements of state, tribal or other federal laws might influence the determination of what is the best technology available for minimizing adverse environmental impact for any given facility. Today's rule acknowledges this type of site-specific analysis at 125.94(e).

Comment ID 316bEFR.018.007

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

Preamble Section VI.A.1.c (67 FR 17143) How Could a Phase II Existing Facility Use Newly Selected Design and Construction Technologies, Operational Measures, and/or Restoration Measures to Establish Best Technology Available for Minimizing Adverse Environmental Impact?

U.S. EPA solicits comment on whether the Proposed Rules should specify that proper design, installation, operation and maintenance of design and construction technologies and operational measures would satisfy the terms of the permit, in cases where the measures were properly installed and maintained but were not achieving compliance with the applicable performance standard. The preamble states that the permitting authority would have the option of modifying the permit requirements in such cases. In the meantime, the preamble states that the facility would be considered in compliance with its permit (assuming it was satisfying all other permit conditions). DP&L believes that the Proposed Rules should specify that proper design, installation, operation and maintenance should satisfy the terms of the permit at least until the permit is reissued pursuant to a revised Design and Construction Technology Plan. Given that wide-spread implementation of impingement and entrainment control technologies to meet a specific range of standards has not been required in the past, there is limited basis upon which to confidently predict whether a particular measure will be successful at a particular location. As a result, as long as the permittee complies with the requirement to submit a Comprehensive Demonstration Study as specified in proposed 125.95(b) and implements the measures described therein as approved by the permitting authority, the permittee should be deemed to be in compliance with the permit. As U.S. EPA points out, proper design, installation, operation and maintenance of design and construction technologies and operational measures would be a permit condition (as opposed to compliance with the performance standards).

EPA Response

EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan. Please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.018.008

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Preamble Section VI.A.3 (67 FR 17144-17145) Economic Practicability

U.S. EPA discusses its belief that the requirements of this proposal are economically practicable. As a demonstration of that belief, the Agency describes its examination of the annualized post-tax compliance costs of the Proposed Rules as a percentage of annual revenues to determine whether the options are economically practicable. At the facility level, U.S. EPA states that 409 out of 550 facilities subject to the rule (74%) would incur annualized costs less that 1% of revenues. Eighty-two facilities (15%) would incur costs between 1% and 3% of revenues and 46 facilities (8%) would incur costs greater than 3% of revenues. At the firm level, U.S. EPA states that "compliance costs will comprise a very low percentage of firm-level revenues." Specifically, U.S. EPA estimates that 104 entities would incur compliance costs less that 0.5% of revenues, 12 entities would incur compliance costs between 0.5 and 1% of revenues, 10 entities would incur compliance costs between 1% and 3% of revenues, and 3 entities would incur compliance costs of more than 3% of revenues. U.S. EPA appears to be basing its determination of economic practicability on the fact that its estimates of cost impacts would result in facilities and firms incurring costs that represent a small percentage of their revenues. However, just because an entity would be required to spend what U.S. EPA calculates and considers to be a small percentage of an entity's revenue on an endeavor does not necessarily make that endeavor economically practicable. As a medium sized utility, DP&L generates approximately $1,186 million in annual revenue. Based on U.S. EPA's moderate estimate of economic impact being 0.5% of revenue, this could result in an annualized cost to DP&L of $5.93 million. The higher estimate of 3% of revenue would equate to over $35.5 million in annualized costs. DP&L submits that this figure is not insignificant. In section VIII.A.1 of the Proposed Rules (67 FR 17181), the Agency estimates the total annualized post-tax compliance costs for facilities subject to the Proposed Rules to be $178 million. Furthermore, U.S. EPA estimates that the annualized benefits of the Proposed Rules would be $70.3 million for impingement reductions and $632.4 million for reduced entrainment (67 FR 17145). Based on these cost and benefit estimates, the average annualized entity cost is $1.36 million in order to achieve an average per entity benefit of $0.54 million in reduced impingement and $4.83 million in reduced entrainment. DP&L questions the economic practicability of the reduced impingement and even the reduced entrainment given the variability of site specific conditions and the uncertainty of the cost estimates.

EPA Response

Please refer to the response to comment 316bEFR.005.021 in subject matter code 9.01 for a discussion on EPA's economic practicability determination.

The commenter further "questions the economic practicability of the reduced impingement and even the reduced entrainment given the variability of site specific conditions and the uncertainty of the cost estimates." EPA notes that in the context of Section 316(b) of the Clean Water Act, the concept of economic practicability, among other things, refers to the rule's impacts on the economic viability of facilities and firms subject to the regulation. Benefits are irrelevant to the determination of economic practicability for Section 316(b) regulation. See also response to comment 316bEFR.060.060 in subject matter code 9.01.

Comment ID 316bEFR.018.009

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Preamble Section VI.A.4 (67 FR 17145-17146) Site-Specific Determination of Best Technology Available

The Proposed Rules allow for a site-specific determination of BTA if the owner or operator can meet one of two cost tests - (1) its costs of compliance with the applicable performance standard would be significantly greater than the costs considered by the Administrator in establishing such performance standard, or (2) its costs of complying with such standards would be significantly greater than the environmental benefits at the site (emphasis added). DP&L supports the option of a site-specific determination of BTA. However, DP&L has concerns with the potential application of this option given the fact that a cost standard of significantly greater is required and no definition of significantly is proposed. DP&L questions why costs have to be significantly greater than the costs considered by U.S. EPA or the costs have to be significantly greater than the benefits. Strictly speaking, an option that allows site-specific BTA based on a cost/benefit analysis should base its findings on the simple results of the analysis, not a qualitative significantly greater cost. As drafted, the Proposed Rule leaves open to interpretation the value of significantly. As a result, a permitting authority may interpret significantly as a much higher threshold to meet than does a regulated entity. As a consequence, potential site-specific technologies which may have beneficial environmental benefits at lower costs to the regulated community, may be eliminated from consideration simply because they do not meet the significantly greater cost test.

EPA Response

See response to 316bEFR.006.003. For the reasons noted in that response, EPA believes it is appropriate to set a distinct standard in this rule, one that is lower than the standard used in the Phase I rule but remains reasonable in the context of that rule. EPA also believes that, given the complexity and lack of absolute precision associated with the methods and data needed to conduct cost and benefit assessments, the Phase II standard should require a clear margin of distinction between costs or costs and benefits.

Comment ID 316bEFR.018.010

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 7.02

Performance standards

Preamble Section VI.A.5 (67 FR 17146-17148) What Is the Role of Restoration Under Today's Preferred Option?

U.S. EPA solicits comment on the role of restoration as an option in lieu of reducing entrainment and/or impingement mortality. DP&L supports the concept of restoration as an alternative approach under the Proposed Rules. Permittees subject to the requirements of this rule should have the flexibility to achieve compliance with the requirements in a number of ways. U.S. EPA specifically invites comment on whether restoration measures should be allowed only as a supplement to technologies or operational measures. Restoration should be allowed as a complement to technologies or operational measures in order to achieve the entrainment/impingement reduction targets but should not be limited to that role. If the permittee is able to demonstrate to the permitting authority's satisfaction that restoration provides benefits to the aquatic community comparable to technologies or operational measures, then restoration should be allowed as the sole strategy for satisfying the regulations.

EPA Response

EPA appreciates the comment and notes the inclusion of restoration measures as a component of today's final rule. For a more detailed discussion on the scope and applicability of restoration in today's rule, please see the preamble to today's rule.

Comment ID 316bEFR.018.011

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

In addition, U.S. EPA seeks comment on the most appropriate spatial scale under which restoration efforts should be allowed. DP&L posits that restoration efforts should be allowed on the broadest spatial scale possible. Restricting the application of restoration to the waterbody at which a facility's intakes are sited, artificially limits the potential benefits the restoration effort may achieve. It may be appropriate to give priority to waterbody-specific restoration, but watershed or State boundary level restoration efforts should be allowed as well, if feasible.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.018.012

Subject Matter Code 12.02

RFC: Monitoring frequencies

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Preamble Section VI.A.6.b (67 FR 17149) What Should Be the Minimum Frequencies for Impingement and Entrainment Compliance Monitoring?

U.S. EPA requests comment on including minimum sampling frequencies and durations in order to characterize impingement mortality and entrainment for determining compliance. While sampling to determine compliance is appropriate, site specificity of the aquatic environment should be the determining factor in what the frequency and duration of such sampling should be. What may be appropriate sampling frequencies at one facility may be too often or not often enough at another location. Similarly, what may be adequate sampling duration at one facility may be too long or too short at another location. U.S. EPA should not articulate specific sampling frequency or duration as a one-size-fits-all approach, but should allow site-specific determination of such monitoring.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.018.013

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 13.0

More Stringent Requirements

Preamble Section VI.A.9 (67 FR 17150-17151) When Could the Director Impose More Stringent Requirements?

U.S. EPA is considering the establishment of additional criteria for when more stringent requirements would be appropriate, namely when compliance with the Proposed Rule would - (1) result in unacceptable effects on migratory and/or sport or commercial species of concern, and (2) not adequately address cumulative impacts caused by multiple intakes or stressors within the waterbody of concern. DP&L appreciates that there may be specific circumstances when more stringent criteria may be appropriate. However, there is the possibility that CWIS may be held accountable for impacts to the waterbody resulting from non-related stressors. It is not clear whether the cumulative impacts U.S. EPA refers to in item (2), above, are impacts related to CWIS or whether they could be impacts associated with other stressors, etc. To the extent that U.S. EPA is considering instituting more stringent requirements on CWIS to compensate for inadequacies in controlling other non-related environmental stressors, DP&L opposes this consideration. DP&L appreciates U.S. EPA's attempts to provide a holistic approach to environmental regulation, but CWIS owners/operators should not bear the brunt of the blow for the Agency's failure to adequately control other pollutant sources.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.018.014

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Preamble Section VI.A.10 (67 FR 17151) Discussion of the 5% Flow Threshold in Freshwater Rivers

U.S. EPA solicits comment on the threshold of 5% of the mean annual flow of a freshwater river or stream as the determinant as to whether a facility is required to reduce entrainment by 60-90%. Other options the Agency is considering are (1) 5% of the mean flow measured during the spawning season; (2) 10% or 15% of the mean annual or spawning season flow; (3) 25% of the 7Q10; and (4) a species-specific flow threshold. DP&L believes that whatever flow threshold is used to trigger compliance with the entrainment requirements, it should be based on a valid scientific determination. To arbitrarily select a flow value that potentially triggers significant compliance costs by the regulated community without scientific justification is inappropriate and unreasonable.

EPA Response

EPA believes it has presented ample evidence demonstrating a significant decrease in the level of entrainment when intake flow is minimized in relation to the flow of the source waterbody. The documents DCN# 2-013L-R15 and 2-013J support the proposition that flow is related to entrainment. EPA believes the intake capacity standard established under today's final rule provides an adequate level of protection and is economically practicable and technically available to all Phase II facilities.

Comment ID 316bEFR.018.015

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Preamble Section VI.A.12 (67 FR 17152-17153) Comprehensive Cost Evaluation Study

U.S. EPA solicits comment on the burden that reviewing site-specific cost studies poses for permitting authorities and on its belief that site-specific provisions to address cases of unusually high costs or unusually low benefits are necessary. DP&L agrees with the Agency position that while many or most facilities will choose to comply with the presumptive standards, the option of a site-specific determination of BTA for minimizing adverse environmental impact based on high costs or limited benefits is important to the regulated community. DP&L realizes that the availability of this option could potentially impose additional review costs on permitting authorities but this cost may be overshadowed by the overall benefit to society and the aquatic environment that such an option affords. DP&L urges U.S. EPA to maintain the flexibility that this option provides.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA agrees that few facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Comment ID 316bEFR.018.016

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Preamble Section VI.B.1 (67 FR 17154-17155) Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities

U.S. EPA discusses its consideration of closed-cycle recirculating cooling systems as BTA for minimizing adverse environmental impact and its decision not to require facilities to meet performance standards for reducing impingement mortality and entrainment based on a reduction in intake flow to a level commensurate with that which can be attained by a closed-cycle recirculating system. DP&L supports this decision. Clearly the costs of retrofitting and operating such systems at facilities which do not now have them is disproportionate to the potential benefits derived. For one DP&L-operated facility, the capital costs to install closed-cycle recirculating systems on three of the four generating units that do not have them was estimated to be over $126 million in 1979. Escalating this estimate to current dollars results in a present value cost of approximately $250 million.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.018.017

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.03

Option: Technol. to reduce I&E regardless of WB type

Preamble Section VI.B.4 (67 FR 17158-17159) Impingement Mortality and Entrainment Controls Everywhere

U.S. EPA discusses an additional alternative under consideration whereby the Agency would establish national minimum performance requirements for the location, design, construction, and capacity of CWIS based on the use of design and construction technologies that reduce impingement and entrainment at all Phase II existing facilities without regard to waterbody type and with no site-specific compliance option available. Under this scenario, all Phase II existing facilities would be required to reduce impingement mortality by 80-95% for fish and shellfish and reduce entrainment by 60-90% for all stages of fish and shellfish. This alternative would not base requirements on the percent of source water withdrawn and entrainment performance requirements would be applicable to all Phase II existing facilities located on freshwater rivers or streams. While U.S. EPA does not discuss it, DP&L presumes that this option also would not take into account a facility's capacity factor in determining applicability of the regulations (as the current proposal does). Finally, under this alternative, restoration could be used only as a supplement to the use of design and construction technologies or operational measures, not as an option to them. DP&L opposes this alternative. To impose performance standards on all facilities without regard to their percent of the waterbody withdrawn or their level of operation (capacity factor) runs counter to U.S. EPA's presumption that CWIS impact is proportional to the amount of water withdrawn; i.e. the assumption that the aquatic community is randomly dispersed throughout the water column and a facility that withdraws 15% of a waterbody's volume has the potential to impact 15% of the waterbody's organisms (see 67 FR 17151, Preamble section VII.A.10). U.S. EPA estimates the post-tax annualized compliance cost for this option to be $191 million and the benefits to be $64.5 million/year for reduced impingement and $0.65 billion/year for reduced entrainment. Compared to the proposed requirements (compliance costs of $178 million and benefits of $70.3 million for reduced impingement and $0.63 billion for reduced entrainment (see 67 FR 17208, Preamble section IX.F.2, Exhibit 34)), the incremental benefits are disproportionate to the potential costs and verify that this option should not be selected.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.018.018

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Preamble Section VI.C.1 (67 FR 17159-17160) Sample Site-Specific Rule

In its Site-Specific Alternative: Sample Rule, U.S. EPA discusses the use of a previously conducted 316(b) demonstration if certain conditions are met. Among these conditions is that "[t]he available evidence shows that there have been no significant changes in the populations of critical aquatic species." DP&L proposes that the word negative or adverse be inserted prior to significant changes. This would allow the use of previously conducted 316(b) demonstrations (as long as the other applicable criteria are met) in situations where the populations of critical aquatic species have actually increased (for whatever reason) since the demonstration was conducted.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

With respect to previous studies, a goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.018.019

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Preamble Section VI.C.1 (67 FR 17160)

Section 125.97(b)(2) of the sample rule references 125.94(d)(1). There does not appear to be such a section in the sample rule.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.018.020

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 17.08

Option: UWAG's recommended approach

Preamble Section VI.C.3 (67 FR 17162) The Utility Water Act Group (UWAG) Approach

UWAG has provided U.S. EPA with a recommended site-specific regulatory framework, entitled "316(b) Decision Principles for Existing Facilities." DP&L endorses the alternative approach recommended by UWAG and appeals to U.S. EPA to give it careful consideration in its deliberations.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.018.021

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Preamble Section VI.C.5.a.4 (67 FR 17164) Questions for Comment on the Determination of Adverse Environmental Impact

U.S. EPA invites comment on various aspects pertaining to the definition of adverse environmental impact and on which approach the Agency should use if it adopts a site-specific approach for the final rule. DP&L believes the definition of adverse environmental impact needs to incorporate the following concepts. First, AEI should be determined to be those impacts that occur at a population or community level. The threshold for AEI should not be the simple occurrence of impingement and/or entrainment such that a single organism is harmed. Secondly, AEI (as defined in this rulemaking) must be the result of the operation of a cooling water intake structure. The alternative definition language as offered in VI.C.5.a (2) does not refer to AEI as being the result of CWIS operation.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.018.022

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Preamble Section VI.C.5.b.4 (67 FR 17165) Questions for Comment on Using Previous Demonstration Studies

U.S. EPA solicits comment on whether the final rule should permit the use of a previous section 316(b) demonstration for determining whether there is AEI and the BTA for minimizing AEI. Previously conducted 316(b) demonstrations should be allowed to be used in determining AEI and BTA, subject to certain conditions. Specifically, in order to be applicable, the results of a previously conducted demonstration must be representative of current conditions both in regard to the biological conditions in the waterbody and the current location, design, construction and capacity of the CWIS. In short, DP&L endorses the UWAG recommendation regarding the use of previous demonstration studies.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.018.023

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 18.03

Process for determining site-specific BTA

Preamble Section VI.C.5.c.4 (67 FR 17166) Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

U.S. EPA invites comment on the standard that would be included in any site-specific final rule for determining BTA for minimizing AEI, including the appropriate role for a consideration of costs and benefits. DP&L endorses the UWAG recommendation as outlined in section VI.C.5.c.3.A of the preamble. As described by UWAG, inclusion of a consideration of costs and benefits is appropriate for determining BTA for minimizing AEI. Furthermore DP&L reiterates its position that due to the uncertainty with the interpretation of wholly disproportionate and significantly greater, the technology with the greatest net benefit would be the best technology for a specific site.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information. For reasons stated in the response to UWAG's comments, EPA rejected the suggestion that framing the cost-benefit compliance alternative in terms of greatest net benefit.

Comment ID 316bEFR.018.024

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Preamble Section VI.C.5.d (67 FR 17166) Use of Voluntary Restoration Measures or Enhancements

U.S. EPA solicits comment on whether a final site-specific rule should permit voluntary restoration or enhancement measures to be taken into account in determining compliance with section 316(b). Voluntary restoration or enhancement measures provide necessary flexibility for the regulated community in complying with the potential section 316(b) requirements. DP&L endorses the UWAG comments on this issue.

EPA Response

For a discussion of the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.018.025

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 19.0

Dry Cooling

Preamble Section VI.D (67 FR 17168) Why EPA is Not Considering Dry Cooling Anywhere?

U.S. EPA discusses its decision not to consider dry cooling as an economically practicable option for a national approach to reducing impingement and entrainment. DP&L supports this decision.

EPA Response

No response necessary.

Comment ID 316bEFR.018.026

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Preamble Section VI.E.1.b (67 FR 17169-17170) Restoration Approaches Being Considered for the Existing Facilities Rule

U.S. EPA discusses various approaches to implementing restoration under the section 316(b) regulations. As is currently proposed, restoration would be allowed as one means of satisfying the compliance requirements. Also under consideration by U.S. EPA are discretionary restoration (whereby the permitting authority would have the discretion to specify appropriate restoration measures but would not be required to do so), mandatory restoration (whereby the use of restoration would be a required element of all 316(b) cases), and restoration banking (whereby restoration credits could be purchased by the permittee from an approved bank). DP&L does not oppose the concepts of discretionary restoration (assuming the regulated party has some recourse if it feels the discretionary application of restoration by the permitting authority is not appropriate) or restoration banking.

EPA Response

For a discussion the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

All restoration measures must meet the requirements for restoration measures as described in the final rule.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.018.027

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 11.11

RFC: Mandatory restoration approach

DP&L does have concerns with the concept of mandatory restoration. U.S. EPA envisions mandatory restoration as a supplement to the installation of control technologies to compensate for those organisms not protected by those technologies. DP&L considers this a method of de facto elimination of adverse environmental impact instead of minimizing AEI as required by the statute. Presumably the selection, design, installation and operation of impingement and entrainment control technologies would be the result of careful consideration by the regulated facility (with oversight and/or approval by the permitting authority) toward the goal of minimizing adverse environmental impact. To require additional mitigation through mandatory restoration measures goes beyond minimizing and should not be required. Conversely if the regulated entity determines that the best option for minimizing adverse environmental impact is to utilize restoration in lieu of installing control technologies, it should have the choice to pursue that alternative. In addition, restoration banking provides a valuable option for both the regulated community and the permitting authority to consider in selecting the appropriate approach to minimizing adverse environmental impact. The use of banking and credits has proven to be a workable concept in other environmental protection programs - namely the Acid Rain Program and the Wetlands Mitigation Banking Program.

EPA Response

Permit applicants need to meet the requirements for restoration measures as described in the final rule. For a discussion of the permitting authorities role in the assessment of restoration measures, see EPA's response to comment 316bEFR.060.026.

For a discussion of the extent to which restoration measures are voluntary in the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.018.028

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Preamble Section VI.E.2.a (67 FR 17170) Entrainment Reduction vs. Impingement Reduction as a Basis for Trading

U.S. EPA discusses entrainment trading/entrainment reduction vs. impingement reduction as a basis for trading and states its belief that a trading program based on entrainment is more viable than one based on impingement. DP&L in general would be supportive of an entrainment trading program as a component of the 316(b) regulation to the extent it enhances flexibility in achieving the goals of the regulation and to the extent it is workable. However, the language contained within the preamble describing the Agency's concept of entrainment trading is confusing. The Agency states that the concept of trading "would enable smaller facilities that cannot afford to install more costly technologies to reduce their costs by trading with other Phase II existing facilities that face relatively lower costs of entrainment reduction." Under an entrainment trading program, U.S. EPA envisions the authorized State setting a discrete watershed performance standard within the range of 60-90% for all life stages of entrained fish and shellfish. The preamble goes on to say that

[a]ll facilities located in the watershed would need to reach the performance standard through the installation of technologies to reduce entrainment (or, potentially, restoration measures to compensate for entrainment loses at the facility). A facility that can afford to implement technologies to reduce entrainment above the performance standard would have entrainment reduction credits to sell to other facilities that cannot afford or choose not to meet the performance standard by technology alone.

DP&L has the following questions related to the inclusion of an entrainment trading program in the 316(b) regulation as described by U.S. EPA.

-What is the reasoning for having the State set a discrete watershed performance standard within the range of 60-90%? It is DP&L's understanding that under the Proposed Rules, the entrainment reduction performance standard is in fact a range and not a discrete standard within the range. A facility that achieves an entrainment reduction (vs. the baseline) anywhere within the range is deemed to have met the standard. Now U.S. EPA is proposing that for an entrainment trading program to function the permitting authority must establish a specific standard within that range. If a discrete watershed performance standard is necessary to implement a trading program it should be the minimum entrainment reduction within the range (i.e. 60%). Facilities controlling entrainment to a greater degree (>60%) would generate credits for sale.

-What is the reasoning for requiring all facilities located in the watershed to reach the performance standard through the installation of technologies to reduce entrainment? If all facilities meet the performance standard through the installation of technologies, there would be no need for a trading program at all. The purpose of a trading program is to allow those facilities that find it too expensive or infeasible to install control technologies to purchase credits from those facilities that over-control. Having all facilities meet the performance standard to begin with negates the value of a trading program.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.018.029

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 20.04

RFC: Potential trading units/ credits

Preamble Section VI.E.2.c (67 FR 17171-17172) What Should Be the Unit (Credit) for Trading?

U.S. EPA discusses the potential units (credits) that could be used to implement an entrainment trading program. Units under consideration include 1) Species Density, 2) Species Counts and 3) Biomass. Entrainment credits would be created through the implementation of entrainment control technologies by Phase II facilities. DP&L has no specific comments on the type of units that should be used as the trading commodity. In addition to installation of control technologies, restoration measures should be an available means of generating credits. DP&L sees no reason why the implementation of restoration measures to establish or enhance a watershed should not carry value equal to those technology measures used to reduce entrainment in terms of creating tradable credits.

EPA Response

Please see the response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading. EPA has left to the discretion of the permit director any decisions regarding the nature of a potential trading program including whether restoration projects can be traded. EPA notes that there are uncertainties associated with quantifying the performance of restoration projects in relation to specific reductions of impingement mortality and entrainment; for this reason, in § 125.94(c), EPA requires only that restoration measures produce ecological benefits at levels that are substantially similar to the level achievable through attainment of the impingement mortality and/or entrainment requirements. Under § 125.90(c), meanwhile, alternative regulatory requirements for which EPA approval is sought must achieve performance that is comparable to the reduction in impingement mortality and entrainment required by § 125.94. In the case of restoration measures, this would mean substantially similar performance. EPA notes, however, that including restoration in a trading program can pose risks to trade participates: if a restoration project fails to perform as expected, the purchaser of trading units runs the risk of having insufficient units to meet its baseline requirements.

Comment ID 316bEFR.018.030

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 20.05

RFC: Include Phase I facilities in trading program

Preamble Section VI.E.2.e (67 FR 17172) Trading Option for New Facilities

U.S. EPA discusses considering extending a 316(b) trading program to include new facilities covered under the Phase I rule. DP&L supports this. As U.S. EPA has stated, a new facility is able to incorporate entrainment reduction measures into the design of the facility more easily and as a result, could more easily install reduction technologies that achieve entrainment reductions. Including new facilities in a trading program would have the potential to create greater overall entrainment reduction benefits since a broader range of facilities would be eligible to participate in the program. The ability to generate and sell credits could potentially entice Phase I facilities to control entrainment to a greater degree. There is no reason for the exclusion of new facilities from an entrainment trading program.

EPA Response

Please see response to comment 316bEFR.005.045 regarding new facilities and voluntary trading programs.

Comment ID 316bEFR.018.031

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

Preamble Section VII.A (67 FR 17173) When Does the Proposed Rules Become Effective?

U.S. EPA discusses that facilities subject to the requirements of Subpart J of the Proposed Rules would need to comply with the requirements of the subpart when an existing NPDES permit is reissued, modified or revoked and reissued. This is articulated in proposed 40 CFR 125.92. DP&L has two concerns with the implementation of this section. First, if the requirements to comply with Subpart J are not applicable until a permit containing requirements consistent with the subpart is issued to the facility, then there is nothing in the regulations that triggers the submission of information to the permitting authority in order to issue the permit containing the requirements for 316(b) compliance. Secondly, and more importantly from a permit-holder's perspective, U.S. EPA should clarify that compliance with the applicable requirements should be consistent with the terms and conditions of the permit. Presumably some time would be allowed, according to a schedule articulated in the permit, for a facility to implement control measures or restoration features to reduce impingement and entrainment. Permit holders should not be subject to potential immediate enforcement action due to misinterpretation of this language to mean that compliance is required commensurate with final permit issuance.

EPA Response

The application requirements in the final rule will become part of 40 CFR 122.21, not Subpart J. With regard to compliance and timing, EPA has not specified in this rule that compliance must be consistent with the terms and conditions of each permit because this requirement is a generally applicable requirement of the NPDES program, and it is addressed in existing regulations (see, 40 CFR 122.41(a)). As for the timing of implementation, as always, this must be consistent with the permit conditions, and also will be dependent on the compliance alternative selected. Some alternatives under this rule provide for the allowance of time for aspects of implementation. Under existing NPDES regulations, permits may, when appropriate, specify a schedule of compliance leading to compliance with the CWA and regulations. See, 40 CFR 122.47. Under this provision, any schedule of compliance shall require compliance as soon as possible but not later than the applicable statutory deadline under the CWA. See also preamble to the final rule.

Comment ID 316bEFR.018.032

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 21.01.02

CWIS data

Preamble Section VII.B.2 (67 FR 17174) Cooling Water Intake Structure Data (40 CFR 122.21(r)(1)(ii))

U.S. EPA discusses information required to be submitted regarding a facility's CWIS as part of the application process, including a flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges. U.S. EPA should clarify that the water balance diagram required as part of existing NPDES permit application Form 2-C requirements would also be sufficient to satisfy this obligation under the 316(b) regulation.

EPA Response

EPA agrees that the water balance diagram from NPDES application Form 2-C requirements would meet the water balance diagram requirements under section 316(b) as long as the diagram clearly depicts the proportion of intake water used for cooling, make-up and process.

Comment ID 316bEFR.018.033

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Preamble Section VII.B.4 (67 FR 17174-17178) Comprehensive Demonstration Study (125.95(b))

As discussed in this section of the preamble and articulated in proposed 40 CFR 125.95(b), facilities subject to the Phase II existing facility requirements would be required to submit to the permitting authority a Comprehensive Demonstration Study ("Study"). Elements to be included in the Study are (1) Proposal for Information Collection, (2) Source Waterbody Flow Information, (3) Impingement Mortality and Entrainment Characterization Study, (4) Design and Construction Technology Plan, (5) Information to Support Proposed Restoration Measures (if the facility proposes to use restoration to meet the performance requirements), (6) Information to Support Site-specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact (if applicable), and (7) Verification Monitoring Plan. U.S. EPA is proposing that this information be submitted at least 180 days prior to the expiration of an existing permit. DP&L has grave concerns with the proposed timing of this requirement both in general and with regard to specific elements of the Study.

In general, the proposed requirements are excessively burdensome. If the Proposed Rules become final near the time a facility's NPDES permit is up for renewal, there is no way the information required as part of the Study would be able to be obtained for inclusion with the NPDES permit renewal application. The information U.S. EPA is proposing to require could easily necessitate several years to gather, particularly since, as U.S. EPA recognizes, impingement and entrainment are dependent on site-specific conditions and are likely to vary from year to year. As a result, any representative characterization of a facility's CWIS impact on the biota of the waterbody would need to encompass at least two years, if not more, of monitoring and sample collection. To require this information without allowing facilities impacted by the regulations sufficient time to gear up is simply unrealistic. A possible solution would be to make the requirements for specific Phase II facilities applicable beginning with their 2nd NPDES permit after the effective date of the final regulations.

In addition, neither the preamble nor the Proposed Rules covering the Comprehensive Demonstration Study make clear whether the information to be submitted is required with each NPDES permit renewal. Proposed 40 CFR 125.95(a) states

You must submit to the Director the application information required by 40 CFR 122.21(r)(2), (3) and (5) and the Comprehensive Demonstration required by paragraph (b) of this section at least 180 days before your existing permit expires, in accordance with 122.21(d)(2).
(emphasis added)

However, there is no clarification as to whether the "existing" permit referred to is only the permit in place at the time the regulation becomes effective or whether the "existing" permit is the effective permit in place at any time in the future (and therefore would require a submission of the information with each subsequent renewal request). DP&L cannot envision that what U.S. EPA had in mind was the regeneration of this extensive data requirement each time a permit comes up for renewal. If in fact this is what U.S. EPA intended, DP&L ardently opposes this as a burdensome requirement with no commensurate environmental benefit. If this is not what U.S. EPA intended, then clarifying language should be included.

Preamble section VII.B.4.a (proposed 40 CFR 125.95(b)(1)) requires that a Proposal for Information Collection be submitted for approval by the permitting authority. As envisioned, the information collection proposal would include a description of the proposed and/or implemented technology(ies), operational measures, and/or restoration measures to be evaluated in the Study, a list and description of any historical studies of impingement and entrainment, summary of relevant consultations with fish and wildlife agencies, and a sampling plan for any new field studies. Again, DP&L has concerns with the timing of such a requirement. If permitting authority approval of the information collection proposal is a prerequisite and there is no specified timeframe for permitting authority approval, a permittee may not have sufficient time to implement the data gathering phase prior to its deadline for submission of the NPDES permit renewal application. If approval of the information collection proposal is deemed necessary, a timeframe for this approval should be specified. Alternatively, no prior regulatory approval of the information collection proposal should be required.

Preamble section VII.B.4.c (proposed 40 CFR 125.95(b)(3)) requires that an Impingement Mortality and Entrainment Characterization Study by submitted (as part of the NPDES permit renewal application). Among the items to be included in this impingement mortality and entrainment characterization study are (1) taxonomic identifications of those species of fish and shellfish and their life stages that are in the vicinity of the CWIS and are most susceptible to impingement and entrainment, (2) a characterization of those species including a description of the abundance and temporal/spatial characteristics in the vicinity of the CWIS, based on the collection of a sufficient number of years of data to characterize annual, seasonal and diel variations in impingement mortality and entrainment, (3) documentation of the current impingement mortality and entrainment of all life stages of fish and shellfish at the facility and an estimate of the impingement mortality and entrainment under the calculation baseline, and (4) an identification of species protected under law that might be susceptible to impingement and entrainment (emphasis added). It is obvious by the scope of these requirements that adequate data collection to characterize the impact of a particular CWIS on the local biota will take some time (possibly several years). It is also evident that the collection of such data (to the extent it is not already available) is contingent upon permitting authority approval under proposed 40 CFR 125.95(b)(1). Again, DP&L has concerns with the expectation that such information will be available to be included with the NPDES permit renewal application.

Preamble section VII.B.4.d (proposed 40 CFR 125.95(b)(4)) requires that if a facility chooses to use design and construction technologies or operational measures to meet the performance standards, it would need to also submit a Design and Construction Technology Plan with its NPDES permit renewal application. This plan would be required to demonstrate that the facility has selected and would implement the design and construction technologies to reduce impingement mortality and/or entrainment to the levels required. This compliance option would necessitate significant engineering studies to evaluate the feasibility, costs, and validity of possibly several impingement and entrainment control technologies in comparison to the calculated baseline. Such a task would involve significant time and expenditures in order to determine the optimal recommendation. Consequently, DP&L again expresses its concern with the requirement that such evaluations are to be completed in time to be submitted with the NPDES permit renewal application.

Preamble section VII.B.4.e (proposed 40 CFR 125.95(b)(5)) discusses the information submission requirements necessary should a facility opt to use restoration as a means of complying with the performance standards. Among the elements to be included with this submission are (1) a list and narrative description of the selected restoration measures, (2) a quantification of the combined benefits from implementing design and construction technologies, operational measures and/or restoration measures and the proportion of the benefits attributed to each, (3) a plan for implementing and maintaining the efficacy of the restoration measures selected and supporting documentation to show that the restoration measures will maintain the fish and shellfish in the waterbody, including community structure and function, (4) summary of relevant consultation with appropriate fish and wildlife agencies, and (5) design and engineering calculations, drawings and maps. As with the previous requirements with the Comprehensive Design Study, DP&L has concerns with the requirement that such information be included with the NPDES permit renewal application. Restoration measures will take time and effort to develop and verify. To require this information upon the first NPDES permit renewal application subsequent to the effective date of the final 316(b) regulations is not feasible.

Finally, preamble section VII.B.4.f (proposed 40 CFR 125.95 (b)(6)) discusses the information to be submitted by a facility if it chooses to request a site-specific determination of BTA for minimizing AEI because of costs significantly greater than those U.S. EPA considered in establishing the requirements or because of costs significantly greater than the benefits. Among the items to be submitted under this option are (1) a Comprehensive Cost Evaluation Study that documents the costs of the facility's Design and Construction Plan under 125.95(b)(4) and the costs of alternative technologies and operational measures proposed for the site (including detailed engineering cost estimates), (2) a Valuation of the Monetized Benefits of Reducing Impingement and Entrainment using a comprehensive methodology to fully value the impacts of impingement mortality and entrainment at the site and the benefits achievable by complying with the applicable requirements of 125.94, (3) a Site-Specific Technology Plan based on the results of items (1) and (2) above containing a narrative description of the design and operational technologies, operational and restoration measures, and an engineering estimate of the efficacy of the proposed and/or implemented measures, documentation to demonstrate that the measures would reduce impingement mortality and entrainment to the extent necessary, and design calculations, drawings and estimates. Once again DP&L has significant concerns with the availability of this information relative to the timing of the NPDES permit renewal application. Such analysis and documentation would take considerable time and to expect that a permittee would be able to submit it with the renewal application is not realistic.

EPA Response

EPA disagrees that the application requirements set by today's final rule are excessively burdensome. See response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added since the proposal and NODA, to reduce burden in today's final rule. For a discussion on the timing for submittal of the Comprehensive Demonstration Study, see § 125.95(a) of the final rule and accompanying preamble. With regard to the suggestion that EPA should make the requirements for specific Phase II facilities applicable beginning with their second NPDES permit after the effective date of the final regulations, EPA disagrees. Facilities are required to comply with permit conditions upon issuance of their new or renewed permits unless the permit expires before 4 years after the date of publication in the Federal Register. In that event, a facility may request that the Director approve an alternate schedule for submitting the information. In addition, EPA has provided facilities with the opportunity to reduce burden associated with the permit renewal cycle. Please refer to EPA's response to comment 316bEFR.034.005 for details on how facilities may request reduced submittal requirements following the first permit term. Finally, EPA disagrees that facilities requesting a site-specific determination of best technology available (BTA) lack ample time to conduct the required analysis and documentation.

Comment ID 316bEFR.018.034

Author Name Athan A. Vinolus

Organization Dayton Power and Light Company

Subject Matter Code 21.03

Monitoring requirements

Preamble Section VII.D (67 FR 17179) What Would I Be Required to Monitor?

U.S. EPA discusses the monitoring required by Phase II existing facilities to demonstrate compliance with the applicable requirements. DP&L has no issue with appropriate monitoring to demonstrate compliance. Virtually all environmental regulations require self-monitoring by the permittee. However, DP&L does question the language included in the preamble that states "[m]onitoring requirements could be imposed on Phase II existing facilities that have been deemed to meet the performance standard in 125.94(b)(1) to the extent consistent with the provisions of the NPDES program." Section 125.94(b)(1) indicates that one method of meeting the performance standard is by reducing intake capacity commensurate with the use of a closed-cycle, recirculating cooling system. If a facility is already meeting the performance standard through the use of a closed-cycle, recirculating cooling system (i.e. cooling tower), there is no purpose and/or need for imposing monitoring on that facility. How are the monitoring data to be used? DP&L can only think of one such use - to impose additional impingement and/or entrainment reduction requirements on that facility should U.S. EPA determine that the impingement and/or entrainment have not been reduced sufficiently. In addition, the meaning of "to the extent consistent with the provisions of the NPDES program" is vague and undefined. DP&L recommends that U.S. EPA include specific citations to the NPDES permitting regulations referencing the monitoring provisions applicable to this Proposed Rules.

EPA Response

In today's final rule, EPA has determined that facilities that choose compliance alternative 1, flow commensurate with closed cycle cooling, will not need to submit any components of a Comprehensive Demonstration Study and will not be required to monitor further to verify compliance with the performance standards (see § 125.94(a)(1)(i)).

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Richard J. Guinn

On Behalf Of:

Eastman Chemical Company

Author ID Number:

316bEFR.019

Comment ID 316bEFR.019.001

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 3.05

Facilities not covered by today's proposal

The applicability section of the proposed rule should be revised to clarify that manufacturing facilities are not covered by the Phase II rule.

Section 125.1 of the proposed rule provides a description of what existing facilities are covered by the Phase II rule. Wording is contained in several sections of the preamble indicating that the Phase II rule does not apply to manufacturing facilities including this statement contained in section IV, "Today's rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by co-generation." Under the proposed section 125.1, it is not clearly evident that power generation activities meeting the criteria stated in that section would be exempt from the rule if the power generation was owned or operated by, and used, solely for the support of the manufacturing facility. As discussed in the preamble, a provision stipulating that these facilities would be exempt from the Phase II rule should be added to the applicability section (125.1) of the rule.

EPA Response

See response to 316bEFR.050.002.

Comment ID 316bEFR.019.002

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 3.05

Facilities not covered by today's proposal

The provision requiring best professional judgment (BPJ) requirements for all existing CWIS not covered by the Phase II rule should be eliminated.

Section 125.90(c) requires that existing facilities not covered by the Phase II rule must meet 316(b) requirements as determined by the Director on a case-by-case, best professional judgment (BPJ) basis. Inclusion of this subpart is unnecessary and could be interpreted to mean that all existing CWIS not covered by the phase II rule require BPJ based requirements for their CWIS, regardless of their size, location, etc. In addition, since EPA is not providing any guidance on how to apply BPJ requirements to these CWIS, the provision will cause confusion and uncertainty for both the permit writers and the regulated facilities. Since the existing provisions of 316(b) already cover permitted facilities and a Phase III CWIS rule will be forthcoming, there is no need to include this provision.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.019.003

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Actual flow should be considered in the threshold for applicability.

A permittee whose actual CWIS flow is less than the 50 MGD threshold should be allowed to request exemption from the Phase II rule. Facilities may choose to operate at flow volumes below the design flow of the CWIS and should not be penalized for this voluntary flow reduction. If a facility chooses to select this option, EPA could institute maximum flow limits in the rule or individual permit to ensure that the threshold flow is not exceeded. Also, the facility would likely be covered under the Phase III CWIS rule thereby ensuring adequate environmental protection.

EPA Response

EPA has retained in the final rule the 50 MGD threshold based on design intake flow, rather than actual flow, for several reasons. Design intake flow is a fixed value set based on the design of the facility's operating system and the capacity of the circulating and other water intake pumps employed at the facility. This allows a clear and timely classification of facilities. The design intake flow does not change, except in those limited circumstances when a facility undergoes major modifications or expansion, whereas actual flows can vary significantly over sometimes short periods of time. EPA believes that an uncertain regulatory status is undesirable because it impedes both compliance by the permittee and regulatory oversight, as well as achievement of the overall environmental objectives. Further, using actual flow may result in the NPDES permit being more intrusive to facility operation than necessary since facility flow would be a permit condition and adjustments to flow would have to permissible under such conditions and applicable NPDES procedures. It also would require additional monitoring to confirm a facility's status, which imposes additional costs and information collection burdens, and it would require additional compliance monitoring and inspection methods and evaluation criteria, focusing on operational aspects of a facility.

Comment ID 316bEFR.019.004

Author Name Richard J. Guinn
Organization Eastman Chemical Company

Subject Matter Code 8.02
Proposed standards for lakes and reservoirs

Cooling ponds or lakes created specifically for cooling purposes should be considered as closed-cycle cooling systems.

Cooling ponds or lakes that were created specifically for cooling purposes should considered as closed-cycle cooling systems. The cooling ponds or lakes should be considered as part of cooling water treatment systems of the facility, not as "waters of the United States." In these situations, the CWIS flow determination should be measured at the CWIS used to provide the makeup water for the cooling pond or lake, not by the cooling water flow through the facility.

EPA Response

Please see the response to comment 316bEFR.006.001 for a discussion of the regulatory status of cooling ponds.

Comment ID 316bEFR.019.005

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 7.02

Performance standards

The proposed performance standard is based upon technology standards, which fail to consider if adverse environmental impact is occurring.

The proposed performance standards are based upon entrainment and impingement reductions that could be achieved if certain technologies are implemented. Although the proposed rule does not specify what technology must be used to meet the performance standard, the standard is technology based with an option to use restoration measures to supplement or replace implementation of technologies. The proposed rule with its performance standard, as well as the technology based approaches under consideration, both ignore the fact that adverse environmental impact may not be occurring in all cases. Therefore both of these approaches may result in significant expenditures of resources that are unwarranted by site-specific conditions.

In addition, EPA states that the performance standard of reduction of impingement and entrainment is a "relatively easy and certain metric". While impingement and entrainment studies may be relatively easy and certain, the performance standard being proposed requires the use of a "calculation baseline" from which the impingement and entrainment reductions are compared to demonstrate compliance. We believe that there is no scientifically sound manner to calculate that baseline where there is an existing CWIS in-place, therefore the assessment of the performance standard can be seriously flawed.

EPA Response

For a more detailed discussion on the scope and applicability of restoration in today's rule, please see the preamble to today's final rule.

For a discussion of the attainability of the performance standards as well a site-specific alternative, please see response to comment 316bEFR311.002.

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.019.006

Author Name Richard J. Guinn
Organization Eastman Chemical Company

Subject Matter Code 17.06
Option: Site-specific determination of BTA

A site-specific approach should be used to determine if adverse environmental impact (AEI) is being caused by an existing CWIS, and for determining the best technology available (BTA) to minimize the adverse impact if it is occurring.

EPA stated in its 1977 draft guidance document for evaluating adverse impact of CWIS that, "The environment-intake interactions in question are highly site-specific and the decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis." EPA also recognizes that there are major impact differences associated with CWIS based upon waterbody types (i.e., freshwater streams and rivers, lakes and reservoirs, tidal rivers and estuaries, and oceans). It should be obvious that there are also many other site-specific factors that affect potential CWIS impacts that cannot be dealt with in a prescriptive manner. EPA indicates that it is considering various site-specific based options for the Phase II rule. Eastman agrees that a site-specific based approach is the most appropriate method for determining BTA, and also believes the site-specific approach is also most appropriate for determining AEI. We offer the following specific comments related to the site-specific based options under consideration published in section VI.C. of the proposed rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.019.007

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Applicability of a site-specific based approach for facilities targeted under the Phase II rule should remain the same as described in the preamble of proposed rule.

If a site-specific based approach is implemented for the final Phase II rule, the applicability of that rule should not change from what is being proposed in the preamble to the proposed rule with the exception of comments presented above.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.019.008

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 17.08

Option: UWAG's recommended approach

Of the site-specific based alternatives described, Eastman supports the Utility Water Act Group (UWAG) approach.

Specifically, Eastman supports the UWAG definition of adverse environmental impact (AEI) and their proposed options for making determinations of AEI, the use of de minimis criteria to exempt small cooling water users that pose no appreciable risk of causing AEI, and the option to use voluntary enhancements and/or restorations for minimizing AEI. Specific comments on each of the items are provided below.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.019.009

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Site-specific determination of adverse environmental impact

Eastman agrees with the concepts of both the UWAG and PSEG definitions of AEI in that the focus should be on the health of critical aquatic populations or ecosystems and not based upon absolute numbers of fish impinged or entrained. EPA's current definition of AEI has often been interpreted in terms of absolute numbers of impinged or entrained fish without regards to impacts, or lack there of, to populations or overall ecosystem health. EPA's is soliciting comment on their proposed alternative definition of AEI. The alternate definition is an improvement over the definition provided in the 1977 draft guidance, however, the portion of the alternative AEI definition stating "entrainment or impingement of significant numbers of critical aquatic organisms" could continue to be interpreted in terms of absolute numbers instead of impacts on populations and used independently as a determination of AEI.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.019.010

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Eastman also supports the UWAG definition of AEI incorporating the use of representative indicator species and risk assessment approaches to ensure that populations can sustain themselves to provide commercial or recreational harvests or to maintain community structure and function.

We also support the three optional UWAG approaches for demonstrations of "no adverse environmental impact". The first of those approaches is the use of previous 316(b) demonstration studies. If a permittee has made a previous 316(b) demonstration that was accepted by the permitting authority it should only have to document that the biological conditions at the time of the study reflect current conditions, and that the CWIS operation or design has not been significantly altered. We also support UWAG's "Protective Criteria for Determining Adverse Environmental Impact" approach. We believe that each of the individual physical or biological criteria can be used as an independent conservative indicator of a lack of AEI. Eastman also supports the option of using a structured AEI decision-making process consistent with EPA's ecological risk assessment guidelines.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking. Since this is a new rule with new standards, all prior section 316(b) determinations must be revisited to be sure they coincide with the provisions in today's final rule. It is unclear in this comment what the author means by a structured AEI decision-making process consistent with EPA's ecological risk assessment guidelines as this was not a option presented in the section 316(b) Phase II proposed rule.

Comment ID 316bEFR.019.011

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Site-specific process for determining the best technology available for minimizing adverse environmental impact and the role of costs and benefits

Eastman believes that an evaluation of cost-effectiveness (i.e., the incremental cost to benefit) should definitively be a component of the analysis to determine best technology available (BTA) for minimizing adverse environmental impact (AEI). We also believe that a test based upon the "benefits should justify the cost" would be more appropriate than the "wholly disproportionate" cost-to-benefit test currently used, or the "significantly-greater" cost to benefit test proposed in the sample-site specific rule. We also believe that EPA should not establish minimum standards by regulation for cost evaluation studies due to the complexities involved with a site-specific approach. However, we encourage EPA to develop guidance for conducting these types of studies and provide examples of a variety of methods that may be used at the option of the permittee.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

Please see preamble section VII for a discussion of the incremental comparison of the waterbody-based capacity option versus the preferred option (i.e., the final rule).

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" and "wholly disproportionate" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.019.012

Author Name Richard J. Guinn
Organization Eastman Chemical Company

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Voluntary Restoration Measures or Enhancements

Eastman supports the option for facilities to undertake restoration or enhancement projects in combination with, or in lieu of, technologies to minimize AEI. There are certainly cases where much greater environmental benefit can be achieved by these types of projects. We agree with UWAG's approach that the objectives of enhancement or restoration projects should be established and agreed upon in advance, and appropriate monitoring and/or reporting obligations would be conducted to confirm that the objectives of the projects have been achieved.

EPA Response

For a discussion of the use of restoration measures in the final rule, see EPA's response to comment 316bEFR.060.023.

EPA agrees with the commenter that the objectives of restoration measures should be established and agreed upon in advance, and that appropriate monitoring and reporting should be conducted to confirm that the objectives have been achieved. EPA believes the requirements for restoration measures in the final rule include these activities, which can reduce uncertainty associated with restoration projects and enhance their overall performance.

Comment ID 316bEFR.019.013

Author Name Richard J. Guinn

Organization Eastman Chemical Company

Subject Matter Code 21.03

Monitoring requirements

Compliance Monitoring Issues

Eastman believes that once a facility and the permitting authority have agreed upon the appropriate BTA and it has been properly installed, operated, and maintained, the facility should be considered in compliance with the conditions of their permit. If compliance monitoring indicates that a performance standard or restoration/enhancement objectives are not being achieved, this should not be considered as non-compliance with the provisions of the permit. Because of the time and inherent variability involved with monitoring fish populations over multiple seasons, or the success or failure resulting from restoration/enhancement projects, we do not believe that re-opening of permits would be necessary except in extreme cases. Therefore, any modifications to 316(b) requirements should be dealt with during the normal permit renewal process.

EPA Response

Please see EPA's response to comment 316bEFR.021.007.

Comment ID 316bEFR.019.014

Author Name Richard J. Guinn
Organization Eastman Chemical Company

Subject Matter Code 21.08
Burden on permitting agencies (general)

Burden to Regulatory Agencies from Site-Specific Decision Making

EPA has expressed concerns about the burden that will be placed upon regulatory agencies if a site-specific approach is adopted. The promulgation of new CWIS rules for existing facilities will place burdens on both permittees and the regulating authorities, regardless of the approach adopted. However, we believe that any burdens arising from a site-specific approach may be less than the potential costs of complying with a prescriptive performance standard. We also believe that greater environmental benefit will be achieved with the use of a site-specific approach. It is also likely that the use of a scientifically sound, site-specific approach will result in fewer legal challenges, thereby reducing some of the burden to the regulatory agencies that may occur under a prescriptive approach. EPA has also invited comment on whether the resource requirements of the site-specific approach serve as a disincentive to a comprehensive revisiting of section 316(b) permit conditions during each renewal, despite advances in technologies for reducing impingement mortality and entrainment. We believe that once a facility has installed BTA there is no need for a comprehensive review at each permit renewal. It is unlikely that possible advances in technologies for prevention of entrainment and impingement will improve to the point that would warrant retrofitting of technology during each five-year permit cycle, nor would it be practical to expect permittees to make expensive technology changes on such a frequent basis. A facility should only have to demonstrate during permit renewal that there are no significant changes in the operation of the permitted BTA, and that conditions in the waterbody are similar to those occurring during the original 316(b) demonstration. If comprehensive reevaluations are deemed necessary, they should be conducted on a minimum of a ten-year cycle (every other permit renewal), which would reduce the burden to the permitting authority.

EPA Response

In today's final rule, EPA has preserved the site-specific determination of BTA option for facilities whose costs of compliance with the final rule may be significantly greater than the costs estimated by EPA, or whose costs may be significantly greater than the benefits of complying with the national performance requirements in 125.94(b). In addition, EPA has added four other compliance alternatives to provide flexibility for streamlining the permitting process (e.g., the pre-approved technology alternative at 125.94(b)(4)). EPA believes that this approach will provide the combined benefit of addressing site-specific concerns and also ensuring that permits are finalized in a timely manner. See response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

EPA also believes that the compliance alternatives available under today's final rule should yield determinations of BTA that are legally defensible provided that the supporting studies and subsequent monitoring show the necessary reductions in impingement mortality and entrainment (as appropriate). EPA recognizes that in many situations, a comprehensive review may not be necessary at each permit renewal once a facility has installed BTA and conditions have not changed substantially at the waterbody or facility. Per 125.95(a)(3) of today's final rule, the facility may apply for reduced application studies in subsequent permit terms. The decision to accept reduced application studies is up to the Director.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Marvin S. Fertel

On Behalf Of:

Nuclear Energy Institute

Author ID Number:

316bEFR.020

Notes

EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.020.001

Subject Matter Code 21.06.01
Implications for nuclear facilities

Author Name Marvin S. Fertel
Organization Nuclear Energy Institute

From the time the first reactor was built, the nuclear power industry has been concerned first and foremost about the safety and health of the people and the environment surrounding our power plants. Comprehensive water and air sampling programs ensure that nuclear power plants meet the strictest emission requirements in the electric industry. The nuclear energy industry's programs to minimize environmental impacts start before plant construction, long before power is generated. The U.S. Nuclear Regulatory Commission (NRC) performs a National Environmental Policy Act (NEPA) review during licensing. For existing nuclear plants, the NRC's NEPA analyses considered the effects of cooling water intake structures' (CWIS) operations, and the NRC included, as appropriate, requirements in a licensee's operating license to address any unacceptable effects. In addition, because nuclear power plants do not emit criteria pollutants or greenhouses gases, they contribute to achievement of the nation's goals in clean air and climate change mitigation.

The proposed CWIS rule for existing facilities provides a sound starting point for establishing a regulatory framework that will ensure power plants meet necessary requirements to minimize adverse environmental impacts in an efficient and economic manner.

EPA Response

EPA appreciates the support of the Nuclear Energy Institute.

Comment ID 316bEFR.020.002

Author Name Marvin S. Fertel
Organization Nuclear Energy Institute

Subject Matter Code 17.06
Option: Site-specific determination of BTA

Flexibility of Implementation

Every nuclear power plant in the U.S. today uses water to cool the nuclear reactor in a process that transfers the heat energy via steam to electricity generators. Access to an ample supply of water is not only necessary for electricity production, but critical for the safe operation of the nuclear reactor.

There are 103 operating nuclear units that generate 20% of the nation's electricity. Sixty-four of these units (62%) use once-through cooling systems and will be affected by this rule. Cooling water intake structure designs vary widely among the nuclear fleet. The plants are located on a variety of water body types with different flow and surge characteristics. Plants were built at different times, need different intake flows and have very different intake structures, ranging from shoreline intakes to submerged offshore intakes. Some intake designs incorporate fish deterrents and/or fish return systems. <FN 2> Because the NRC conducts NEPA reviews during licensing, all plants were designed to mitigate environmental impacts. Furthermore, some of the once-through nuclear plants likely meet the proposed rule with their existing designs and technologies.

For those plants that do not meet the proposed rule, it is important that EPA allow flexibility in the use of technologies and measures to be employed, individually or in combination, to minimize the adverse environmental impact that may result from impingement and/or entrainment of aquatic organisms by a CWIS. The fact that cooling water intake structures are so varied means that the technology additions appropriate for one plant may not be appropriate for another due to environmental, economic, and/or safety reasons.

By creating rules that establish realistic performance standards and are not prescriptive with respect to the technologies to be employed to meet those standards, EPA will encourage innovative and economic solutions.

Footnotes

2 The word "fish" is used to mean all aquatic life forms.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

Comment ID 316bEFR.020.003

Author Name Marvin S. Fertel

Organization Nuclear Energy Institute

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Any changes to the proposed rule that mandate closed-cycle cooling or dictate, without flexibility, the retrofit of other specific technologies will not only increase the cost of implementation, but also could jeopardize regional power supplies and National Ambient Air Quality Standards (NAAQS) attainment strategies. Specifically, mandating the use of closed-cycle cooling systems could well be prohibitively expensive for some plants, causing premature nuclear unit closures, and would certainly increase outages at plants forced to adopt such technology. If nuclear power plants shut down because mandated, expensive retrofits to meet new Clean Water Act requirements caused them to become uncompetitive, the lost base load capacity would be replaced by coal- and gas-fired generation. The proposed rule under §316(b) addresses impacts on aquatic ecology, but it should not cause increased air emissions, and it makes little sense to resolve a presumed water use issue by creating new air quality problems.

Retrofitting closed-cycle cooling on a plant with a once-through system may cause the overall environmental impact to increase. It could negatively affect the air, as noted above, and the subject water body itself. Closed-cycle cooling increases water consumption by 67% <FN 3> - 80% <FN 4> and may have greater impact on a water body than other technologies that could be retrofitted onto a once-through system.

The analyses used by the EPA when drafting the proposed Phase II rule significantly underestimates the time and capital outlays required to retrofit an existing nuclear unit with impingement/entrainment reduction technologies, particularly a closed-cycle cooling system.

Detailed risk assessments and multi-system harmonization studies must be conducted during the design stage of such a retrofit, and these analyses are unique to or significantly more rigorous for a nuclear plant. This process would increase design costs and lead times. After the analysis is complete, the nuclear industry estimates it could take two prolonged outages to retrofit a closed-cycle system, potentially one for foundation blasting and definitely one for system tie-in. Because of their length, these outages could overlap either winter or summer peak electricity demand seasons, which could put electricity reliability at risk and increase costs to consumers.

According to EPA's Technical Development Document (TDD) for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA 821-R-02-003, April 2002), EPA has data on closed-cycle cooling retrofit costs for only one nuclear facility: the Palisades Nuclear Generating Plant. This case study, based on experience thirty years ago, is not a valid representation of a closed-cycle retrofit at a nuclear plant today, nor does it even appear to support EPA's conclusions about the extent of a likely outage associated with retrofitting a nuclear plant.

The capital and operating costs of retrofitting a closed-cycle cooling system on an existing nuclear facility have been underestimated. From the TDD, the average mean annual and summer peak energy penalties calculated by EPA for use in estimating future operating costs are lower than those EPA calculated for Palisades and significantly lower than those NRC and Consumers Energy (owner of Palisades) calculated. (Please refer to the table on the next page.)

Wet Tower vs. Once-Through Cooling System Energy Penalty <FN 5>

Average Annual Energy Penalty	
Consumer Energy's Palisades Estimate	7%
NRC's Palisades Estimate	3%
EPA's Palisades Estimate	1.8%
EPA's Average Estimate Applied to EPA's Economic and Benefit Analysis (EBA)	1.7%

Furthermore, the summer peak energy penalty EPA calculated for Palisades (2.7%) is 40% greater than the average summer peak penalty (1.9%) used in EPA's Economic and Benefit Analysis (EBA) supporting the Phase II Proposed Rule. Even just 0.10% difference in an estimated energy penalty changes lost annual revenue by hundreds of thousands of dollars. Underestimating the energy penalty causes incorrect predictions in the EBA of individual nuclear unit approaches to compliance and, therefore, an underestimation of total industry cost.

In calculating the capital cost of adding closed-cycle cooling systems to nuclear units with once-through cooling in the EBA, EPA used estimates below all actual cost estimates of the Palisades retrofit in the early 1970s without considering the subsequent significant regulatory changes imposed on the nuclear energy industry in the 1970s and 1980s. For example, Appendix B quality assurance requirements, which require safety-grade equipment for systems critical to reactor safety, like service water flow, went into effect in 1970. Similarly, the emergency core cooling system regulation (10 CFR 50.46), which the CWIS changes would affect, was implemented in 1974. Neither of these regulations affected the closed-cycle cooling retrofit at Palisades, which was granted its construction permit in 1967. Because of the significant changes in NRC regulations that have been implemented since, it would be much more costly to make changes to an existing nuclear unit today than it was in 1973 when Palisades built and connected its closed-cycle cooling system.

Footnotes

3 The EPA in the Phase II proposed rule, 67 Fed. Reg. 17,157

4 EPRI

5 Technical Development Document, pages 5-2, 5-36 and 37.

EPA Response

The Agency notes that the final rule includes neither (1) requirements based on closed-cycle recirculating cooling or (2) mandates for retrofit of any technologies. In fact, the final rule includes provisions that, should traditional design and construction technologies (i.e., screens, nets, etc.) and operational measures (such as voluntary capacity modifications) not be acceptable for certain applications and sites, then alternatively or partially in lieu of these technologies, restoration measures may be utilized to meet compliance with the rule requirements. Therefore, the commenter's primary concerns have been met and national/regional electrical supplies will not be jeopardized.

The Agency notes that the actual capital costs of the Palisades cooling tower retrofit compare favorably with those estimated by the Agency for the proposal and NODA (see DCN 4-2526). However, the commenter is correct to point out that the operating energy penalty of the Palisades plant, as reported to the Agency generally exceeds those estimated by the Agency for the NODA and proposal analysis. As noted by the commenter, the Agency found the reported annual average energy penalty of Palisades to be erroneous. The Agency concedes that it only found the value of 7 percent to be an outrageous value, and notes that the NRC generally agreed with this through their estimate of 3 percent. Nonetheless, the Agency notes that the Department of Energy determined that annual average energy penalties estimated by the Agency for the proposal and NODA analysis generally agreed with their independent analysis. Regardless, the Agency notes that the 3 percent estimate for Palisades from the NRC does exceed the energy penalty estimate for Palisades calculated by the Agency and notes that if this value were projected to other nuclear plant retrofit analyses, that the overall national costs would increase accordingly.

The commenter's observation is noted that subsequent to the Palisades retrofit in the early 1970's, significant regulatory changes were imposed on the nuclear energy industry. The Agency did not consider this when comparing its analysis of the historical actual costs of Palisades to those developed by the Agency for the proposal and NODA. The subsequent safety-related regulations were not considered by the Agency in analyzing the historical Palisades cost data. The Agency agrees that these subsequent regulations could increase construction costs for nuclear facilities beyond those reflected in the capital costs of the Palisades retrofit project.

Comment ID 316bEFR.020.004

Author Name Marvin S. Fertel

Organization Nuclear Energy Institute

Subject Matter Code 10.1

General: cost tests

In addition. EPA's Economic and Benefit Analysis also misrepresents the outage time required to retrofit a closed-cycle system. The EBA suggests a plant would require a four-month outage to tie in a new cooling system, less than half that experienced at Palisades.

For all these reasons, it is essential to retain the cost-cost test and the cost-benefit test [§125.94 (a) (3) and (c) (1), (2) and (3)] in any final Phase II rule. If the term "significantly greater" has judicious meaning, then these provisions provide the necessary flexibility to ensure compliance with the intent of the rule, the protection of aquatic life, without imposing unwarranted cost on the nuclear industry. Some guidelines should be set around the term "significantly greater." Guidelines have been suggested by several industry associations and individual companies. The nuclear energy industry urges EPA to carefully consider these proposed guidelines as the final rule is prepared.

As the Phase II Proposed Rule stands, the flexibility for each generating station to meet Clean Water Act requirements in a plant-by-plant appropriate way largely exists; it is essential that the final rule incorporates provisions, such as the cost-cost and cost-benefit tests, and standards not tied to particular technologies that retain and ensure this flexibility.

EPA Response

The final rule is not based on recirculating wet cooling towers and the Agency determined that cooling towers were not an acceptable basis for requirements of the final rule, in part due to the potential for extended construction downtimes (such as in the Palisades example above). EPA notes that the downtime it analyzed for cooling tower outages at nuclear plants in the Notice of Data Availability was considerably longer than that referenced by the commenter. As such, the analysis of the cooling tower downtimes and the Agency's rejection of regulatory alternatives based on cooling tower reflects the comments.

The Agency has included cost-cost and cost-benefit provisions in the final rule. As such, the commenters concerns have been met.

Comment ID 316bEFR.020.005

Author Name Marvin S. Fertel

Organization Nuclear Energy Institute

Subject Matter Code 17.06

Option: Site-specific determination of BTA

The nuclear energy industry urges EPA: (1) to allow plants seeking NPDES permit renewals to choose those measures (technology or restoration) best-suited for environmental protection; and (2) to adopt reasonable definitions for the cost-cost and cost-benefit tests that are pre-requisites to submitting a site-specific demonstration. The inclusion of a site-specific option will allow each nuclear operator to address impingement and entrainment at plants, if necessary, in ways that will not compromise the nuclear plants' ability to provide economic, reliable, emission-free electricity. The nuclear energy industry strongly encourages the EPA to retain the flexibility mechanisms in the final rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

For information on the role of restoration, please refer to sections VII and VIII of the preamble to the final rule.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

Comment ID 316bEFR.020.006

Author Name Marvin S. Fertel

Organization Nuclear Energy Institute

Subject Matter Code 21.06.01

Implications for nuclear facilities

Nuclear Safety

The nuclear energy industry welcomes the inclusion in the proposed Phase II rule of §125.94 (f), which allows the NRC to intervene during the NPDES permitting phase if it finds that methods used to meet this Phase II rule could jeopardize nuclear reactor safety. Because many facilities utilize a common CWIS for circulating and service water and the service water system supplies cooling water to the reactor and other safety-related systems at all times, regardless of generating status, safety issues and increased risk may result from some impingement/entrainment reduction technologies. Including this section in the final Phase II rule will alleviate potential regulatory conflicts that could arise. It also ensures that the health and safety of the public and the environment remains the dominant consideration.

The nuclear energy industry also urges EPA to consider the negative impacts of prescribed retrofit technology as it relates to nuclear reactor safety. Currently, nuclear plants are required to evaluate design changes against existing plant configurations under 10 CFR 50.59. Certain changes require NRC pre-approval.

Significant changes to balance-of-plant systems could trigger technical considerations as yet unknown to the nuclear plant operators, NRC or EPA. Specifically, the EPA should be sensitive to the unintended consequences of prescribing any retrofit technology, especially new or immature technology that would be imposed on a proven integrated power generation system. Circumstances could exist under which the EPA rule would unintentionally reduce the margin of reactor safety. The EPA must obviate this consequence by providing flexibility in the rule for nuclear plant operators.

EPA Response

Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

Comment ID 316bEFR.020.007

Author Name Marvin S. Fertel

Organization Nuclear Energy Institute

Subject Matter Code 17.06

Option: Site-specific determination of BTA

In conclusion, EPA should promulgate a final rule that promotes flexibility in compliance options and explicitly recognizes the primary jurisdiction of the NRC over any issue that could affect the safe operation of a nuclear facility. EPA should not mandate a specific technology because 1) different technologies will work differently at different plants; 2) the incentive for creating new, more efficient and economic solutions will be taken away, and 3) certain technologies at certain plants may produce adverse effects including increased air pollution, increased water consumption, and other impacts on electric power reliability.

Allowing nuclear power plants flexibility in meeting the CWIS rule will accomplish the equally legitimate goals of minimizing any adverse environmental impact of generating facilities while minimizing impacts on the price and supply of the nation's electricity.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

William L. Neal

On Behalf Of:

The Large Public Power Council

Author ID Number:

316bEFR.021

Notes

UWAG (316bEFR.041)

Comment ID 316bEFR.021.001

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The LPPC and APPA support EPA's proposed regulatory approach. EPA indicates in the proposed rules that it considered other technology-based options. These options are: 1. Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems for All Facilities, 2. Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type, 3. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow, and 4. Impingement Mortality and Entrainment Controls Everywhere. The LPPC and APPA don't agree that a closed-cycle recirculating cooling system is an available technology for facilities that currently have once-through cooling water systems. For most existing facilities it is neither financially nor spatially feasible to replace a once-through with a closed-cycle cooling water system. Further EPA itself notes that even for option 3 (the most limited application of closed-cycle recirculating cooling water systems), the incremental costs of this option significantly outweigh the incremental benefits. Options 2 and 3 would also significantly concentrate the costs of compliance with this rule among facilities located in coastal areas. The LPPC and APPA also favor the proposed option over option 4 as it offers a site-specific compliance option.

EPA Response

Please refer to the preamble for a description of the framework of today's rule. EPA appreciates the commenter's support of the regulatory approach in the proposal, and notes that the final rule uses a similar approach.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

While EPA has concluded that cooling towers are not available to all existing facilities and, therefore, are not the technology bases for these national categorical rules, EPA recognizes that conversion of a once-through cooling system to a closed-cycle, recirculating cooling system has occurred at several facilities (see the Phase II proposed rule) and therefore may be available on a site-specific basis.

Comment ID 316bEFR.021.002

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Within the proposed option, the LPPC and APPA strongly support the inclusion of the third method for establishing the best technology available (BTA) for minimizing adverse environmental impact. This "site-specific" determination of BTA is an important option for a facility to have available for use in cases where its costs of compliance with the applicable standards are significantly greater than EPA's estimated costs or the benefits of complying with the standards at the facility's site.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.021.003

Author Name William L. Neal
Organization The Large Public Power Council

Subject Matter Code 3.01
Definition: Existing Facility

The LPPC and APPA support the EPA's decision that the 316(b) Phase II rule will determine the cooling water intake performance standards for a new electric generating unit constructed at an existing facility.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.021.004

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

The LPPC and APPA support EPA's determination that no further entrainment reduction is necessary for a facility that withdraws from a freshwater river or stream less than 5% of the annual mean flow.

EPA Response

EPA notes the comment.

Comment ID 316bEFR.021.005

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 7.02

Performance standards

The proposed rule, in compliance option 2, allows a facility to implement design and construction technologies, operational measures, and/or restoration measures that meet the proposed performance standards. These performance standards for reduction in impingement mortality and entrainment are expressed as a range of percentage reduction. The LPPC and APPA position is that the Director shall interpret any performance within the range for the appropriate waterbody type as meeting the proposed performance standard.

EPA Response

For a discussion of how compliance is to be ascertained, see the preamble to today's rule.

Comment ID 316bEFR.021.006

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 21.09

Permit applications/implementation schedule

The proposed rule states that 316(b) requirements for Phase II existing facilities would be implemented through the NPDES (National Pollutant Discharge Elimination System) permit program. Facilities subject to the proposed rule would comply with Phase II rules when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued. This implementation plan presents some significant scheduling problems for facilities where NPDES permits expire in the next several years. A NPDES permit renewal application is due 180 days prior to expiration. The proposed rule states this application would include new information requirements for a facility: physical data to characterize the source waterbody in the vicinity where the cooling water intake structures are located; data to characterize the design and operation of the cooling water intake structures; information describing the design and operating characteristics of the cooling water systems and how they relate to the cooling water intake structures at the facility; and all facilities (except those that already use a closed-cycle, recirculating system) must submit a Comprehensive Demonstration Study.

The Comprehensive Demonstration Study has seven components: proposal for information collection; source waterbody flow information; impingement mortality and entrainment characterization study; design and construction technology plan; information to support proposed restoration measures (only for facilities proposing to use restoration measures); information to support site-specific determination of best technology available for minimizing adverse environmental impact (only for facilities choosing a site-specific standard); and a verification monitoring plan. For the first component of the study, a facility would be required to submit a proposal to the Director for review and approval stating what information would be collected to support the study. Several of these components could likely require source waterbody studies conducted over multiple seasons and more than one year to obtain representative data. The data acquired will also require some time for analysis and the development of a report. The LPPC and APPA position is that any facility subject to Phase II with a NPDES permit expiring 3 years or less after the issuance of the final rule should not be subject to these requirements until the subsequent NPDES permit renewal. This staggering of the imposition of the requirements for the final Phase II rule will also allow States to better plan for the resources necessary for their implementation.

EPA Response

EPA has added many efficiencies to today's final rule since the NODA and preamble to provide additional flexibility and speed permitting. Please see response to comment 316bEFR.034.005 for a full discussion.

Comment ID 316bEFR.021.007

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 12.02

RFC: Monitoring frequencies

EPA requested comment on minimum frequencies for verification / compliance monitoring, specifically, for at least two years following initial permit issuance, impingement samples at least once per month over 24 hours and entrainment samples at least biweekly over 24 hours during primary period of reproduction, larval recruitment, and peak abundance. The LPPC and APPA position is that once the best technology available to meet the required performance standards (or site-specific requirements) has been determined and installed, a facility should only have to conduct monitoring to show the equipment (or other measures) are operated or utilized in accordance with permit conditions. Verification / compliance monitoring will be satisfied by monitoring the operations of the best technology available.

EPA Response

EPA disagrees that monitoring should cease after the installation of protective technologies. Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7). Specific study parameters may be proposed by the applicant for review and approval by the Director. The Director may also consider additional monitoring requirements. Facilities that demonstrate compliance with a Technology Installation and Operation Plan may do so in place of complying with numeric performance requirements. Please see the final rule preamble for a discussion of the Technology Installation and Operation Plan. For a detailed explanation of EPA’s monitoring requirements, please see EPA’s response to comment 316bEFR.307.027. Please also see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.021.008

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 21.09

Permit applications/implementation schedule

The proposed rule indicates that at each NPDES permit renewal, the same Phase II information requirements will be in place. The LPPC and APPA position is that once best technology available has been implemented for a facility, unless there have been significant changes to the waterbody / aquatic community, that technology remains best technology available. To interpret otherwise would mean a facility could be faced with the design and installation of a new best available technology at each NPDES permit renewal. A facility should not be required to submit a comprehensive data study with each permit renewal.

EPA Response

EPA agrees. Under 125.95(a)(3) of today's final rule, a facility may apply for reduced application requirements if conditions at the facility remain substantially unchanged from the previous permit issuance. Please see response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.021.009

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 21.01

Submittal of required information

With respect to the source water physical data, the comprehensive demonstration study, and any other biological studies, the LPPC and APPA believe that the Director should be given authority to determine which studies, and their parameters, are necessary and to determine which species are of concern.

EPA Response

EPA agrees that for many aspects of the study submission requirements, decisions should be made by the Director. EPA agrees that the Director should review the Proposal for Information Collection and decide which studies are necessary, the study parameters, and the specific species to consider. EPA believes that the Director is most familiar with site conditions in his/her purview and would be best positioned to make these decisions. During the permit application process, a facility may propose a methodology detailing these measures in the Proposal for Information Collection. However, the source water physical data is an application requirement that applies to all facilities (40 CFR 122.21(r)(2)). Source water physical data will be used by the Director to help characterize the facility and evaluate the waterbody type and assist in evaluating the appropriateness of design and construction technologies, operational measures, and/or restoration measures proposed by the applicant to reduce impingement mortality and/or entrainment.

Comment ID 316bEFR.021.010

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name William L. Neal

Organization The Large Public Power Council

The LPPC and APPA support EPA's recognition of the importance of voluntary restoration measures in maintaining a healthy fishery. Because the Director and the affected facility are the most familiar with local water body conditions and history, the LPPC and APPA position is that it be at the Director's discretion as to whether and what extent voluntary restoration is a part of best technology available for a facility to meet the performance standards of the Phase II rule.

EPA Response

For a discussion of the permitting authority's role in the approval of restoration measures, see EPA's response to comment 316bEFR.034.029.

Comment ID 316bEFR.021.011

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

A number of public power electric generating facilities use cooling ponds or reservoirs that have been constructed off of a main watercourse channel. Water withdrawn from the cooling reservoir is used for non-contact cooling and discharged back into the reservoir from which it can be withdrawn and recirculated. Such manmade cooling reservoirs or ponds are supplied with makeup water pumped from a nearby source, such as a river. Such cooling water ponds often provide a valued asset due to the enhanced aquatic habitat and recreation opportunities that they offer.

A cooling pond or reservoir meets the definition of a “closed-cycle recirculating system,” which as set forth in Section II, Scope and Applicability of the Proposed Rule [Page 17129] Section G “means a system designed, using minimized makeup and blowdown flows, to withdraw water from a natural or other water source to support contact and/or non-contact cooling uses within a facility. The water is usually sent to a canal or channel, lake, pond, or tower to allow waste heat to be dissipated to the atmosphere and then is returned to the system. New source water (make-up) water is added to the system to replenish losses that have occurred due to blowdown, drift and evaporation.”

Although closed-cycle, recirculating cooling is not one of the technologies on which the presumptive standards are based, the proposed rules recognize that the use of a closed-cycle, recirculating cooling system would readily achieve such standards. For that reason, the proposed rule, [124.94(b)] would allow the performance standard to be satisfied by reducing the “intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system.”

Based on the above, the LPPC and APPA readily conclude that those existing facilities, which are located on and use cooling water from a closed-cycle, cooling pond are in compliance with the proposed Phase II rule. This conclusion appears to be further bolstered in EPA’s assessment of impacted facilities [page 17142] in which EPA concludes based on an analysis of survey data that “the proposed rule would not require any changes at approximately 69 large existing facilities with recirculating wet cooling systems (e.g., wet cooling towers or ponds).”

However, what appears to be clear cut is muddled in the discussion on cooling ponds vis a vis “waters of the United States.” Under Section C., Is My Facility Covered If It Withdraws From Water of the US., EPA states that they “do not intend this proposal to change the regulatory status of cooling ponds.” EPA further clarifies that “cooling ponds are neither categorically included nor categorically excluded from the definition of waters of the United States at 40 CFR 122.2.” Accordingly, EPA has concluded “facilities that withdraw cooling water from cooling ponds that are waters of the U.S. and meet other proposed criteria for coverage would be subject to today’s proposed rule.”

In that a number of cooling ponds provide recreational and fishing opportunities for both in-state and out-of-state visitors, i.e., support interstate commerce, they often will meet the definition of waters of the United States. The issue, however, should not be whether or not they are defacto waters of the United States but, rather, whether they are a system that satisfies the performance standard or a system that must meet the performance standard. Or more simply put, are they part of the solution or part of the problem.

The uniqueness of a man-made, off-channel, closed-cycle, recirculating cooling pond is such that we believe they should not be lumped together with lake and reservoirs-regardless of whether or not they are determined to be waters of the United States. More appropriately, these man-made resources, which often provide a valued habitat and fishery that otherwise would not exist and allow a cooling water intake capacity at a level commensurate with the use of a closed-cycle, recirculating cooling system, should be explicitly defined as meeting the performance standards of this rule.

EPA Response

Please refer to the response to comment 316bEFR.063.011.

Comment ID 316bEFR.021.012

Author Name William L. Neal

Organization The Large Public Power Council

Subject Matter Code 7.02

Performance standards

With respect to the performance standard for reduction in impingement mortality of 80 - 95%, the LPPC and APPA offer the comment that this level of reduction may be possible ONLY with the use of advanced technologies that are not applicable to all water bodies, particularly so with regard to detritus-laden fresh water rivers. The Director should be given discretion on determining best technology available for a facility that may not meet the 80-95% impingement mortality reduction performance standard.

EPA Response

EPA disagrees with the commenter's assertion that the performance standards may only be met with the use of advanced technologies. Several of the technologies discussed in the Technology Development Document are not considered "advanced" and have been available and documented over the last 30 years. High-debris waterbodies may require additional measures to prevent debris from impacting the performance of the technology but EPA believes such issues can be successfully addressed.

Today's rule authorizes the Director to make site-specific determinations of Best Technology Available (BTA) for minimizing adverse environmental impacts.

Comment ID 316bEFR.021.013

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

Author Name William L. Neal

Organization The Large Public Power Council

EPA has expressed concern that the proposed performance standards could create an opportunity for "backsliding" from current impingement mortality and entrainment performance levels. The LPPC and APPA do not believe this concern is justified and that facilities will not remove or disable currently installed technology from their cooling water intake structures.

EPA Response

The final rule does not alter the existing anti-backsliding provisions that are part of the NPDES program regulations (e.g., 40 CFR 122.44(l)). In general, comments addressing this issue did not identify it as a concern based on the existing federal and state restrictions, the significant level of environmental protection provided by the final rule, and the expectation that facilities would be unlikely to abandon significant prior investment in cooling water intake technologies. EPA would add that the final rule allows existing facilities to rely on such prior investment in cooling water intake technologies to a significant degree (e.g., see, 40 CFR 125.94(a)(2)).

Comment ID 316bEFR.021.014

Author Name William L. Neal
Organization The Large Public Power Council

Subject Matter Code 21.0
Implementation

The LPPC and APPA believe the final rule should include a provision to cover facilities that will be decommissioned within 10 years (a period that also coincides with the timing for significant investment for air emission controls currently under consideration) after the Phase II rule becomes final. If the Director obtains necessary assurances that the facility (and its cooling water intake structure) will cease operation within a time certain, the final NPDES permit(s) should be renewed without the requirements imposed by the Phase II rule.

EPA Response

EPA disagrees that the final rule should include a provision to exempt all facilities that will be decommissioned within 10 years. Nevertheless, there are several ways for a facility that is scheduled to go off-line to be subject to minimal requirements. For example, during the permit application process, the facility may request a cost-benefit variance through the site-specific compliance alternative. If the facility demonstrates that the costs are significantly greater than the benefits of complying with the rule (due in part to the fact that the facility will be closing), that facility will be subject to less stringent and costly requirements. An additional factor that Directors consider is the capacity utilization rate. A facility that is in the process of decommissioning will experience reduced intake flow, and as such will be subject to less stringent requirements. A facility with no intake (decommissioned) will have no intake flow, and as such will not be subject to 316(b) requirements. For these reasons, EPA believes that it is not necessary to formally exempt facilities that will be decommissioned within 10 years, because the rule provides mechanisms to protect such facilities against unreasonable costs.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

J. Michael Childers

On Behalf Of:

Mirant Corporation

Author ID Number:

316bEFR.022

Notes

EPRI (316bEFR.074), EPSA (316bEFR.045), UWAG (316bEFR.041)

Comment ID 316bEFR.022.001

Subject Matter Code 17.08

Option: UWAG's recommended approach

Author Name J. Michael Childers

Organization Mirant Corporation

Of the alternative options EPA is proposing, Mirant believes that site specific approaches based on the UWAG or PSEG recommendations would serve as the best approach for the Phase II Rule. These site-specific approaches are based on aspects of successful State programs or concepts to facilitate effective decision making. Mirant, however, believes that EPA's preferred approach is workable with certain clarifications and could be enhanced with a certain modifications.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.022.002

Subject Matter Code 19.0

Dry Cooling

Author Name J. Michael Childers

Organization Mirant Corporation

Dry Cooling Technologies are not appropriate for this rulemaking. There are few facilities in the U.S. that currently utilize this technology. Currently we do not believe there is sufficient understanding of potential operational problems or environmental disbenefits with these technologies. Additionally, the high capital and operational costs, and the energy penalty associated with the technology are significant.

EPA Response

EPA agrees that dry cooling technologies are not appropriate for this rulemaking. However, the Agency somewhat disagrees that "few facilities in the U.S." currently utilize the technology. Dry cooling is a potentially viable alternative for some new facility installations. The important point, in the Agency's view, is that dry cooling is not a feasible technology for retrofitting into existing facilities of the size of those within the scope of the rule.

Dry cooling towers would probably be infeasible in certain locations. For instance, the turbine back pressure could increase beyond recommended manufacturer specifications for a number of existing units and would require severe curtailment of normal operations, or a redesign of the circulating water system and associated equipment. Modeling conducted by the DOE shows that during hot weather the dry cooling tower would not be able to safely (due to the operation of the existing turbines above back pressure design limits) supply sufficient cooling at a significant number of existing power plants .

Even if a company were able to use dry cooling as a retrofit option, the land area footprint would be very large and create other land use, and construction issues. For instance, a representative dry cooling tower installation at an existing power plant located in the Eastern United States would have a footprint area that is 50 percent to 100 percent the size of a typical power plant footprint. For a number of existing power plant facilities, this amount of additional space is simply not available.

Further, the DOE analyzed the energy penalties and air emissions resulting from retrofitting a power plant with once-through cooling to indirect-dry cooling towers ("Energy Penalty Analysis of Possible Cooling Water Intake Structure Requirements on Existing Coal-Fired Power Plants" June 14, 2002). The report concludes that dry cooling towers are not a viable option to be used as retrofits for once-through cooled plants. The primary reasons for such a stark assessment of this technology option are as follows: at the peak time of summer electricity demand many of the existing power plants' turbines could not perform safely; energy penalties associated with a dry cooling tower retrofit could range from 9 to 16 percent at times of peak electricity demand; the dry cooling tower system may require significant plant modifications to retain the integrity of power plant operations; secondary impacts of increased air emissions are significant (could be as great as 4 to 8 percent higher) for a dry cooling tower system; and, retrofit difficulty in a number of plant locations would be too great to warrant continued operations of the power plant.

Comment ID 316bEFR.022.003

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Retrofitting existing facilities with wet closed-cycle cooling is similarly inappropriate not only due to the significant cost and energy penalties, but environmental disbenefits such as consumptive water use. Mirant is engaged in a project to add additional generation at its Dickerson Station on the Potomac River in Montgomery County, Maryland. Wet closed-cycle cooling has been proposed for the new combined cycle units and the consumptive water associated with the cooling towers has been the most significant environmental concern for the Project due to current drought conditions and forecasts for increased water demands to accommodate growth. Mirant has agreed to not operate the new combined cycle units during drought emergencies unless it releases stored water to compensate for evaporative water loss. However, if the existing 500 MWe of baseload generation at this power plant were forced to retrofit with wet-closed cycle cooling, the result would be the loss of significant baseload generation during periods of peak summer demand when power is most needed. Further, Mirant's Potomac River Station in Alexandria and Lovett Station in New York are sited in areas with severe space constraints that preclude installation of cooling towers at these sites. However, we fully support EPA's decision to consider those Phase II facilities that employ use of wet closed-cycle cooling to be deemed in compliance.

EPA Response

The Agency has not based the final rule on wet closed-cycle cooling technology retrofits. As such, the commenter's concerns have been met.

Comment ID 316bEFR.022.004

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 17.06

Option: Site-specific determination of BTA

The general flexibility provided by EPA's proposal that includes use of a variety of BTA alternatives, the option of developing a site specific standard based on the cost-cost or cost/benefit test, and use of restoration in lieu of technologies for compliance.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to the preamble to the final rule.

Comment ID 316bEFR.022.005

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 7.02

Performance standards

Baseline Calculation

Mirant supports EPA's decision to allow credit to those facilities that installed design or operational measures under state 316(b) programs when calculating their baseline. However, Mirant recommends that EPA clarify that those facilities that are not planning to take credit for previously installed BTA measures or that did not implement such measures may calculate their baseline as it exists. This avoids the error associated with speculation on differences, to the extent they exist, from EPA's baseline scenario.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.022.006

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 7.03

Available I&E technologies

Proposed Technologies and the Performance Standards

Mirant's assets have been innovative in developing new technologies to reduce impingement and/or entrainment and recommends that there are several points that EPA should consider regarding the use of alternative technologies such as those specified by EPA in the Phase II rule. The technologies developed at Mirant's assets, in particular the Gunderboom, are likely to have wide application for use by facilities for compliance with the proposed performance standards. However, these and other alternative technologies proposed by EPA generally are not likely to be feasible at some sites and may not be effective at others and at still others may be feasible and effective but at a cost that far exceeds their benefit. Mirant therefore believes that one of the most essential elements of EPA's proposal is the site specific alternative.

EPA Response

EPA agrees with the commenter that the Gunderboom technology (aquatic filter barrier) offers great promise in reducing both impingement mortality and entrainment but may not be the optimal choice for all facilities. Thus far, aquatic filter barrier technologies have proven most successful in sheltered areas of waterbodies (coves, canals) with lower debris loads. EPA recognizes that research and development of this relatively new technology is ongoing and leaves open the possibility that aquatic filter barriers may become more widely deployable in the future.

Today's rule provides five compliance alternatives. Compliance alternative 2 allows the facility to demonstrate that its current design and construction technologies, operational measures and/or restoration measures meet the performance standards. Compliance alternative 3 allows the facility to demonstrate that it has selected design and construction technologies, operational measures, and/or restoration measures that will, when implemented, meet the performance standards. In both cases, EPA has refrained from making a determination of what combinations of technologies or measures constitutes Best Technology Available (BTA) in recognition of the fact that site-specific factors may warrant different determinations for different facilities.

Compliance alternative 4 allows a facility that meets certain operational and siting criteria to install and properly operate an approved technology. Today's rule designates cylindrical wedgewire screens as an approved technology for facilities meeting the criteria listed at § 125.99(a). Today's rule also reserves the right of the Director to approve other technologies as BTA for all facilities within his or her jurisdiction. For further discussion please see section V of the preamble and § 125.99(b).

Comment ID 316bEFR.022.007

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 10.02

Benefit Estimation Methodology

Benefits Quantification

Mirant believes that it is important that the benefits quantification be conducted correctly in this rulemaking. Not only is this essential to place the costs associated with compliance in perspective but it is important in establishing the basis for use of the cost benefit test for not only the preferred approach, but also for the other alternatives considered by EPA. Mirant is concerned that the quantification of benefits conducted in the proposal greatly overstates the proposed benefits. Specifically, the multiple compounding of a series of conservative assumptions is the basis of Mirant's concern.

EPA Response

EPA agrees that it is important for benefits quantification to be conducted correctly. EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003)(DCN #6-1931).

The commenter asserts that EPA's benefits estimates are "grossly overstated" because of "multiple compounding of a series of conservative assumptions," but provides no specific criticism of EPA's analysis. Therefore, the Agency is unable to respond to this comment. For EPA's response regarding multiple conservative assumptions, please see the response to comment #316bEFR.074.042.

Comment ID 316bEFR.022.008

Author Name J. Michael Childers
Organization Mirant Corporation

Subject Matter Code 12.03
RFC: Entrainment vs. entrainment mortality

Assumption of no entrainment survival - Mirant believes that at least for many commercially and recreational predatory species there is adequate data to use nominal conservative values for some species in the benefits analysis.

EPA Response

Please see response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival in site-specific benefit analyses.

Comment ID 316bEFR.022.009

Subject Matter Code 10.01.02.02

Fish Population Modeling

Author Name J. Michael Childers

Organization Mirant Corporation

The assumption to assume no compensation - Federal and state fisheries management policies are based on the assumption that fishery harvest rates can be set and sustained without putting populations at risk. While Mirant agrees that this is not appropriate for overexploited populations, it would be appropriate for many of the species and waterbodies considered in EPA's benefits analysis and case studies.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.022.010

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

Statements made by EPA indicating that impingement and entrainment numbers listed for facilities used in the analysis could be low and that actual numbers may be much higher. On the contrary, based on our own studies and analysis Mirant believes the opposite is true. Specifically impingement studies at our Chalk Point Station indicated that when samples were collected on a weekly or less frequent basis (as was commonly done in many facility studies) and extrapolated to an annual estimate, the estimate was an order of magnitude higher than a complete census based on daily sampling (details provided in Mirant's Coolfont Paper presented to EPA at the EPRI workshop). Similarly, when detailed studies of fish behavior were conducted to incorporate behavioral factors into entrainment effects models it was found that these factors resulted in the ability of larval fish to avoid entrainment at much earlier life stages than was originally assumed in the models. It is likely that similar overestimates resulted in model projections conducted in other studies that did not incorporate behavior factors into the models. Finally, many facilities chose to use life history parameters for broad life-stage categories to estimate production foregone or equivalent results EPA used such terms in its analysis. When analyzing this approach for the Chalk Point Station it was determined that this process may overestimate losses if not done properly. There is insufficient documentation to determine if this is the case.

EPA Response

EPA notes the commenter's assertion that extrapolated I&E data produced an overestimate of I&E rates at Chalk Point. However, the commenter does not provide the data referred to, and therefore EPA is unable to confirm or refute this assertion.

Likewise, although EPA agrees with the commenter that fish behavior may influence entrainment vulnerability, EPA is unable to comment on this assertion without seeing the data upon which it is based. In any case, it appears that the commenter is referring to a model of entrainment losses, not empirical data such as those used by EPA in its regional analysis for the final rule.

EPA notes that even if these assertions about Chalk Point data proved to be true, it does not mean that such patterns hold at other facilities.

Finally, EPA appreciates the commenter's concern about data uncertainties, as discussed by EPA in Chapter A6 of Part A of the Phase II Regional Study Document.

Comment ID 316bEFR.022.011

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

The use of Habitat Replacement Costs (HRC) to estimate benefits - UWAG, EEI and EPRI all retained natural resource economists to assists in preparation of comments. In addition, a utility member of EPSA hired an economist to assist with a facility that was also used in an EPA case study. Each of these four economists quickly pointed out that HRC is a method to quantify costs for creation of projects to offset an environmental effect and that costs are not benefits. HRC derived costs are simply not appropriate as a basis for analysis of benefits. While fish direct replacement costs, such as those developed by the American Fisheries Society (AFS), are deficient for the same reason, if replacement costs were to be used for benefits quantification analysis, Mirant believes it would be far more logical to use those costs than HRC costs for two reasons. First, they directly state the value to replace fish and second if one were using costs one would logically use a lower of two alternatives to replace a resource rather than a more costly method. Mirant does note that AFS has issued cost tables for various species of adult and juvenile fish but has not issued replacement cost values for early life stages. However, it would not be illogical to estimate the number of equivalent juvenile fish in order to be able to take advantage of the AFS replacement value tables (conversion to equivalent juveniles is used since juveniles are the earliest life stage included in the AFS tables). Again, Mirant believes the best course of action for EPA is to avoid confusing costs and benefits and use the generally accepted methods for natural resource benefits quantification as discussed in more detail in UWAG's comments.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.022.012

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

The assumption that a 0.5 factor is appropriate for quantification of non-use — Mirant notes there is a great deal of uncertainty involved in any attempt to estimate non-use benefits. EPA acknowledges this in the proposal and attempts to address the issue by inserting a nominal 0.5 adjustment factor to adjust for this error. Mirant sees no basis for the 0.5 factor and finds it inconsistent in the overall benefit analysis to not include a similar adjustment factor for entrainment survival or compensation that are also known to occur but which have uncertainty. Mirant strongly recommends the benefits assessment be revised and based on accepted natural resource quantification methods and use of a consistent methodology for addressing uncertainty.

EPA Response

For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

For EPA's response to comments on entrainment survival and compensation please refer to the response to comment 316bEFR.306.506. Also refer to Part A of the case study document for the final rule (DCN #6-0003), Chapter A7: Entrainment Survival.

Comment ID 316bEFR.022.013

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration

Based on Mirant's experience with restoration measures, Mirant believes the greatest benefit for use of this approach will be achieved if flexibility is provided in terms of species specificity and geographic siting of projects. In the case of the Chalk Point Station, aquaculture was one of the primary methods used to compensate for entrainment losses. The bay anchovy was the primary species of concern at Chalk Point. However, at the same time, striped bass had been declared threatened and endangered by Maryland Department of Natural Resources (MDNR). Striped bass were entrained in very low numbers due to their spawning much further upstream and were also impinged in very low numbers. One of Maryland's concerns over anchovy entrainment losses was that since anchovies are a striped bass food source, the striped bass population might be affected. MDNR asked that the Chalk Point Aquaculture Center to focus on production of striped bass directly rather than anchovies. As the striped bass began to recover in the Patuxent, MDNR had striped bass produced at the aquaculture center released in the Choptank and Nanticoke Estuaries on the eastern shore of the Chesapeake Bay rather than in the Patuxent where Chalk Point was located. This decision was made because MIDNR believed restoration of striped bass in the Bay could be best achieved by focusing on those restoring populations in those waterbodies. Later on MIDNR changed aquaculture production focus to American shad and hickory shad both of which had nearly disappeared from the Patuxent. All commercial fishing for these species continues to be banned. In addition, Atlantic sturgeon, another species that Maryland is contemplating for State threatened and endangered species status, has been reared for aquaculture at MIDNR's request. Neither the shad species nor the sturgeon are entrained, yet they are considered by MIDNR far more important for restoration focus than anchovy, naked goby or Atlantic silverside which make up the vast majority of entrainment. Mirant encourages EPA to allow flexibility in terms of species selected for replacement and geographic focus when using restoration measures to offset impingement and/or entrainment. This will continue to allow state natural resource management agencies the flexibility to obtain the greatest benefit to restore important depleted stocks and allow stocking or habitat creation projects to be located where they will provide the greatest benefit within state waters.

EPA Response

For a discussion of the use of restoration measures that address organisms other than those impinged and entrained by a particular cooling water intake structure (out-of-kind restoration), see EPA's response to comment 316bEFR.206.055.

Permit applicants may undertake restoration measures that produce fish and shellfish, while maintaining community structure and function, in their facility's waterbody or watershed. These restoration measures must produce ecological benefits at a level that is substantially similar to the level that would be achieved through compliance with the applicable impingement mortality and entrainment reduction requirements under section 125.94. For additional discussion of the spatial scale in which restoration may take place, see the preamble to the final rule.

EPA believes the requirements for restoration measures in the final rule provide a significant amount of flexibility to permitting authorities and permit applicants.

For a discussion of the extent to which restoration measures may support state natural resource management goals, see EPA's response to comment 316bEFR.099.029.

Comment ID 316bEFR.022.014

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Mirant also believes facilities that made use of restoration to compensate for impingement and/or entrainment under state regulatory programs should be allowed credit for the benefits of those restoration efforts. EPA has appropriately allowed facilities to take credit for use of technologies installed to reduce CWIS losses in determining their baseline. Just as EPA provides an opportunity for credit for those facilities that selected BTA to reduce CWIS impacts, similar credit should be allowed for those facilities that chose the restoration option.

EPA Response

For a discussion of the use of existing restoration measures, see EPA's response to comment 315bEFR.034.032.

Comment ID 316bEFR.022.015

Author Name J. Michael Childers

Organization Mirant Corporation

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Further, to facilitate use of restoration EPA should allow facilities and states some flexibility in scaling projects to impingement and/or entrainment losses. Based on quantification of impingement and entrainment losses in determining the baseline, Mirant believes facilities and states agree on reasonable and appropriate aquaculture production levels to offset losses or scaling of habitat creation or enhancement projects to offset those losses. Scaling of habitat replacement projects in particular is not an exact science and this would be especially true on species by species fish for fish basis. The costs associated with attempting to quantify habitat projects or aquaculture of species of unlike kind on such a basis would divert significant resources that could be better applied to restoration efforts.

EPA Response

EPA believes the requirements for restoration measures in the final rule allow permitting agencies and facilities flexibility in their determination of the appropriate scale of a restoration measure. There are a variety of methods available for scaling. The permitting authority has the responsibility to determine if a restoration measure designed according to a particular scaling method is appropriate.

All restoration measures must meet the requirements described in the final rule, including those under sections 125.94 and 125.95. EPA believes these requirements are important for helping to ensure that restoration measures are well designed and well considered before significant resources are devoted to their implementation. The requirements are particularly important in light of the uncertainties associated with restoration projects. EPA agrees with the commenter that there are uncertainties associated with scaling of habitat replacement projects. For a discussion of the types of uncertainties associated with restoration measures, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.022.016

Author Name J. Michael Childers
Organization Mirant Corporation

Subject Matter Code 20.01
RFC: Should EPA include impingement trading?

Trading

Mirant supports use of trading in the 316(b) program. Trading has been successfully used in EPA air programs and the potential to provide a similar benefits to water programs. It brings market forces to bear in addressing compliance issues with the potential to provide a greater environmental benefit.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.022.017

Author Name J. Michael Childers
Organization Mirant Corporation

Subject Matter Code 10.03.04
San Francisco Bay Delta

Comments on the San Francisco Bay/Delta Estuary Case Study

General — After careful review of the subject case study, Mirant Corporation believes that EPA in the case study significantly overestimates the economic losses due to impingement and entrainment of striped bass and special status species fish at its Pittsburg and Contra Costa plants located in Contra Costa County, California. Significant overestimation of current I&E losses causes EPA to significantly overstate the economic benefits of implementing proposed Section 316(b) Phase II regulations at these two Mirant plants. EPA has significantly overestimated E&I losses for the Pittsburg and Contra Costa facilities by making the following three erroneous assumptions for its I&E economic loss estimates:

1. EPA improperly uses 1978/1979 I&E data as its baseline for striped bass (recreational species) losses - As EPA acknowledges on pages E2-4 through E2-6 of the case study report, both plants implemented a best technology available (BTA) program after 1978/1979 to reduce the losses of striped bass. As indicated in Table E2-3 of the case study report, annual reductions in striped bass losses due to the application of the BTA program averaged 86.9 percent during the 1995 — 1999 five-year period. Accordingly, Mirant believes the EPA should have reduced the raw striped loss numbers reported in Tables E3-2, E3-6, E3-l0, and E3-14 by a factor of 86.9 percent to reflect the current striped bass baseline for these two facilities. These reductions in striped bass I&E losses should then have been factored in all subsequent EPA loss calculations (e.g., determination of Age 1 equivalents, determination of production foregone).

2. For special status fish, EPA inappropriately averaged impingement and entrainment data collected prior to installation of design and operational measures with data collected after deployment of such measures - Mirant believes that the 1978/1979 I&E data should not be used to represent current conditions at the cooling water intake structures at the two plants. These earlier data predates the striped bass BTA program which has direct benefits in reducing special status species fish I&E losses. Accordingly, Mirant recommends that only the 1987 through 1990 impingement data and 1987 through 1992 entrainment data be used for determining special status fish losses. In addition to making the mistake of using one year's (i.e., 1978/1979) of pre-BTA data, EPA made the mathematical error of averaging one year's of late 1970's data with an average representing a multi-year subsequent period.

3. EPA used an improper methodology to set the economic value for special status fish and additionally made a serious calculation mistake in applying this flawed methodology - To value special status species fish in Chapter E5 of the case study, EPA used a societal revealed preference approach. In Table E5-3, a low and high range of special status species fish is determined by summing the habitat restoration costs with water use foregone cost and dividing this sum by the number of fish that will be restored. Using this approach, EPA calculated an annual water use foregone cost ranging from $465,000,000 to $1,700,000,000 which results in fish values ranging from $83.72 to $288.28 per fish. Mirant believes there are two major problems with this approach as follows:

a. Mirant opposes use of replacement values as a means of economically quantifying the benefits of environmental regulations. As stated previously in these comments replacement values are costs, not benefits. Even if one were to decide to use replacement costs for this purpose one would logically use the most direct and lowest cost method of replacement rather than use a high cost method. In the case of Pittsburg and Contra Costa such values would be fish replacement costs developed by the American Fisheries Society Fisheries Society Special Publication 24 (1992) rather than much more costly habitat replacement cost used in the analysis. Mirant points out that California Department of Fish and Game (CDFG) established a cost for replacement of striped bass and that value has never exceeded $2.00 per fish of equivalent 150 mm size. Mirant expects special status fish could be reared for similar or lower cost if EPA were to continue to pursue use of costs as benefits the figure EPA should use for special status fish should be based on replacement costs for these species. AFS tables could be one way to estimate such costs.

b. EPA made the error of assuming that all water use foregone costs are for the purpose of restoring special status species fish. As stated in Section E5-3 of the case study report, “The Bureau had to cut back on the supply to its CVP customers to comply with various water needs and restrictions of the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA), the CPV Improvement Act (CPVIA) and the new bay-delta water quality standards issued in 1995 by the State Water Resources Control Board”. Therefore, it is evident that the cost of foregone water use is not just for the restoration of special status species. Mirant believes that 20.05% of the water foregone cost is a more appropriate measure of the fraction used to restore special status species since this is the mid-range percentage of the CALFED cost used for special status species fish protection. This percentage was determined by dividing the $3.81 billion reported in the second paragraph of page E5-3 by the $19 billion total estimated CALFED cost.

General — Since Mirant believes that EPA has greatly overestimated the I&E losses at the Pittsburg and Contra Costa facilities due to the three broad errors discussed in the previous comment, we have recalculated the losses using more appropriate assumptions. Mirant’s revised economic loss calculations are presented in four Exhibits that accompany these comments:

[see hard copy for figures]
Exhibit 1 — Revised Striped Bass Economic I&E Losses for the Pittsburg Plant

Exhibit 2— Revised Striped Bass Economic I&E Losses for the Contra Costa Plant

Exhibit 3— Revised Special Status Species Fish I&E Economic Losses for the Pittsburg Plant

Exhibit 4— Revised Special Status Species Fish I&E Economic Losses for the Contra Costa Plant

As can be seen in the two tables presented below, Mirant’s revised I&E losses are significantly less than those reported by EPA. Nevertheless, Mirant believes that its estimates are more accurate since they account for post-BTA striped bass loss numbers; more representative special status species fish loss numbers, and correct a significant error in EPA’s societal revealed preference value for special status species fish. Although Mirant continues to believe that habitat restoration costs are not an appropriate method for valuing special status fish, we use this method in the Exhibit 3 and 4 calculations to illustrate our dual concerns with EPA’s overestimates of special status fish I&E losses and value per fish.

Comparison of EPA and Mirant Revised Striped Bass I&E Estimates

	Pittsburg Plant		Contra Costa Plant	
	Impingement	Entrainment	Impingement	Entrainment
Low EPA Value	$167,201	$1,888,844	$204,531	$640,185
High EPA Value	$259,518	$2,931,750	$317,462	$933,657
Mirant Value	$24,015	$271,635	$29,430	$92,070
% of Low EPAValue	14.36	14.38	14.39	14.38
% of High EPA Value	9.25	9.27	9.27	9.86

Comparison of EPA and Mirant Revised Special Status Species Fish I&E Estimates

	Pittsburg Plant		Contra Costa Plant	
	Impingement	Entrainment	Impingement	Entrainment
Low EPA Value	$9,730,441	$16,901,645	$2,409,210	$5,646,988
High EPA Value	$33,505,631	$58,198,831	$8,295,843	$19,444,774
Mirant Value	$1,139,888	$677,254	$192,640	$617,083
% of Low EPAValue	11.71	4.01	8.00	10.93
% of High EPAValue	3.40	1.16	2.32	3.17

General — For practicality, Mirant has not commented on every section of the case study (or other EPA documents relating to the 316(b) Phase II proposed regulation) where Mirant believe its revised Pittsburg and Contra Costa I&E loss data should be used in lieu of EPA's I&E data. Accordingly, we encourage EPA to use Mirant's alternative I&E data throughout its studies and reports, including those that assess and report on the economic benefits of the Phase II regulations on the Pittsburg and Contra Costa plants.

General — Although Mirant has modified the water use foregone cost value used for the two facilities by proposing that the EPA use a more realistic value, Mirant is by no means endorsing the societal revealed preference approach for valuing special status fish species. Mirant has only commented on selected items and asks that EPA consider comments regarding the appropriateness of this method from UWAG, EPRI, and others with more expertise in valuing special status fish species I&E economic losses.

Page E1-7, Section E1-3.4 — The $3-5 million annual range for Bay Area tourism value appears to be extremely low.

Page E3-10, Section E3-3 — The sentence "Data for the 1-year monitoring period in 1978-1979 and the average for 1987-1090 (for impingement) and the average for 1986-1980 (for entrainment)" should read "Data for the 1-year monitoring period in 1978-1979 and the average for 1987-1990 (for impingement) and the average for 1986-1992 (for entrainment)".

Section E3-4 — As previously commented, only post-BTA striped bass and special status species fish impingement data should be considered for the case study.

Page E3-12, Table E3-6 — The table contains three values reported incorrectly from Appendix B in the draft Habitat Conservation Plan (Southern Energy Delta, LLC, 2000). The 1978-1979 value for Chinook Salmon should be 763, not 1,083. The 1978-1979 value for Steelhead should be 0, not 38. The Avg. 1987-1990 value for Longfin Smelt should be 366, not 336.

Section E3-5 — As previously commented, only post-BTA striped bass and special status species fish entrainment loss data should be considered for the case study.

Page E3-14, Table E3-1O — The table contains a value reported incorrectly from Appendix B in the draft Habitat Conservation Plan (Southern Energy Delta, LLC, 2000). The 1978-1979 value for Delta Smelt should be 65,239,484, not 65,839,484.

Page E3-15, Table E3-14 — The table contains a value reported incorrectly from Appendix B in the draft Habitat Conservation Plan (Southern Energy Delta, LLC, 2000). The 1978-1979 value for Delta Smelt should be 20,565,741, not 21,755,741.

Page E4-2, Table E4-1 — The1995 Agreement for the Monitoring and Mitigation of Striped Bass with the California Department of Fish & Game (CDFG) established a mitigation cost for the I&E loss of striped bass at the Pittsburg and Contra Costa facilities. This payment for striped bass mitigation has never exceeded $2.00 per fish since the program began in 1995. Mirant believes that the value ($9.11/fish to $14. 14/fish) EPA places on this recreational species using the “willingness to pay” methodology is valid. However, for consistency in valuation methods, it may be more appropriate to use a striped bass value closer to the CDFG replacement cost if EPA continues to insist on using the HRC method for valuing special status fish.

Pages E5-3 and E5-4, Section 5-3 — As previously commented, EPA made the error of assuming that all water use foregone costs are for the purpose of restoring special status species fish. As stated in Section E5-3 of the case study report, “The Bureau had to cut back on the supply to its CVP customers to comply with various water needs and restrictions of the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA), the CPV Improvement Act (CPVIA) and the new bay-delta water quality standards issued in 1995 by the State Water Resources Control Board.” Therefore, it is evident that the cost of foregone water use is not just for the restoration of special status species. Mirant believes that 20.05% of the water foregone cost is a more appropriate measure of the fraction used to restore special status species since this is the mid-range percentage of the CALFED cost used for special status species fish protection. This percentage was determined by dividing the $3.81 billion reported in the second paragraph of page E5-3 by the $19 billion total estimated CALFED cost.

EPA Response

I&E rates for the Pittsburg and Contra Costa facilities were used as part of the California Regional Study for EPA's final analysis for the 316b Phase 2 rule (DCN # 6-0003). In this regional study, EPA's analysis of I&E for these facilities was revised as suggested by the commenter.

For a discussion of the societal revealed preference analysis presented at proposal, please see EPA's response to Comment 316bEFR.005.006. This analysis was not included in EPA's final analysis.

For a discussion of replacement costs, please see the document entitled "The Habitat-Based Replacement Cost Method" (Docket #6-1003) and EPA's response to Comment 316bEFR.005.035.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Basil G. Constantelos

On Behalf Of:

Midwest Generation EME,LLC

Author ID Number:

316bEFR.023

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), EPSA (316bEFR.045), UWAG (316bEFR.041)

Comment ID 316bEFR.023.001

Author Name Basil G. Constantelos

Organization Midwest Generation EME,LLC

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Our comments here focus on the need for this rulemaking to retain a state's flexibility to implement the 316(b) rule for specific waterbodies. The Clean Water Act and its implementing regulations include repeated expressions of Congressional intent to delegate broad discretion to the States to implement programs that protect the quality of our waters. The 316(b) rule is among those provisions where Congress intended to provide the States with flexibility to address site-specific concerns while achieving the Clean Water Act's goal of protecting aquatic life in those waterbodies. As competitive suppliers of electricity to a deregulated marketplace, Midwest Generation supports the development of sound environmental regulatory programs that provide flexibility to enable affected facilities to meet the overall intent of the 316(b) rule through cost-effective, environmentally beneficial solutions that are based on site-specific circumstances.

The 316(b) rule for existing facilities can establish the necessary standards to protect the environment, while still allowing each State to use its own policies and procedures to implement the 316(b) standards for specific waterbodies. The 316(b) rule for existing facilities can and should address the States' flexibility needs. We offer the following comments in further support of that goal.

In developing the proposed 316(b) rule for existing facilities, Midwest Generation encourages EPA to build on the solid foundation created by years of state experience with site-specific decision-making under section 316(b) of the Clean Water Act. For nearly thirty years, the States have been allowed to apply sound science and judgment to site-specific data and conditions in order to implement section 316(b) standards. While improved consistency of decision-making can and should be brought to the regulatory framework presently used by some states to implement the 316(b) rule, the current methodology, particularly in Illinois, contains a number of features that should be retained because they provide for sound, scientifically credible decisions. The current Illinois methodology reflects a holistic approach to assessing how to ensure the environmental protection required by the 316(b) rule in site-specific situations.

EPA Response

As stated in the preamble to today's final rule, EPA recognizes that some States and Tribes have invested considerable effort in developing and implementing section 316(b) regulatory programs and acknowledges that some existing programs and determinations have been successful in reducing adverse environmental impacts to waters of the United States. As such, this final regulation allows States and Tribes to use these programs to fulfill section 316(b) requirements where the State/Tribe demonstrates to the Administrator that such programs will achieve comparable environmental performance (see § 125.90(d)). Specifically, the final rule allows any State/Tribe to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that will be achieved under § 125.94. The watershed level was selected to ensure protection of ecological resources within a hydrologic unit and for consistency with NPDES permitting efforts that place controls at the watershed level. A State or Tribal section

316(b) regulatory program should also consider reductions in impingement mortality and entrainment at the relevant watershed level. In addition, the final rule does not limit the ability of a State/Tribe to adopt or enforce more stringent controls (see § 125.90(e)) as per Section 510 of the Clean Water Act (33 USC 1370). In this way, today's final rule provides a reasonable degree of flexibility for States and Tribes to implement existing effective programs. See also 125.94(e), which allows States to establish more stringent BTA requirements if necessary to comply with State, Tribal, or other federal law.

Comment ID 316bEFR.023.002

Author Name Basil G. Constantelos

Organization Midwest Generation EME,LLC

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

The proposed rule fails to provide a suitable means for allowing the States to rely on the body of environmental and technical information they have developed over the years to implement the 316(b) rule for existing intake structures. The final rule should include a process for approving existing intake technology as Best Technology Available (BTA) if it can be shown that the facility is not causing adverse environmental impact or the technology has been deemed BTA by the state. For many electric generating facilities, extensive supporting data already has been collected at significant cost and effort to demonstrate that the facility is not creating an adverse environmental impact. This extensive supportive data may still be representative of existing site-specific conditions. The proposed 316(b) rule nevertheless would require a comprehensive 316(b) demonstration study to be performed as if both the State and existing facility were working from a “blank slate” rather than an extensive database. This proposed approach will result in duplicative data gathering efforts and redundant costs to again determine that no adverse environmental impact is occurring in the waterbody. There is no environmental benefit obtained by ignoring an established and reliable record showing that no adverse environmental impact exists.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today’s final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.023.003

Subject Matter Code 21.08

Burden on permitting agencies (general)

Author Name Basil G. Constantelos

Organization Midwest Generation EME,LLC

Further, the States will be unnecessarily burdened by the need to spend their limited time and resources to oversee and evaluate a new, but repetitive, 316(b) demonstration study for each existing facility in the state without regard to whether such a study will provide any new information. The proposed 316(b) rule should be revised to allow existing, relevant studies and data concerning the impact on aquatic life of existing intake structures to be deemed sufficient to satisfy the “comprehensive study” requirements of the proposed rule.

EPA Response

Today's final rule does allow the use of historical data provided that it is reflective of current conditions at the facility. Please see response to comment 316bEFR.040.001 for additional discussion.

Comment ID 316bEFR.023.004

Author Name Basil G. Constantelos
Organization Midwest Generation EME,LLC

Subject Matter Code 21.05
Role of States and Tribes (alt./equiv. programs)

The States are already empowered to take a comprehensive look at adverse environmental impacts. While the States consider the impact on individual organisms, that impact is also evaluated in relationship to the overall health of the affected population and the water quality of the waterbody. This holistic approach enables the State to improve its assessment of what is happening in the waters where cooling water intakes are located. Cross-media environmental impacts generally have also been considered by the States when making the appropriate technology choices for minimizing the entrainment and impingement of fish. Consequently, the States have been able to achieve the primary intent of section 316(b) without compromising other environmental priorities. The proposed 316(b) rule wrongly assumes that this is not the case.

Many States have a well-established approach to evaluating technology choices that consider cost-effective alternatives for achieving positive environmental outcomes. This is especially important because of the huge cost differential between certain technologies and correspondingly different levels of environmental benefits. The States' goal has been, and continues to be, to ensure the protection of the environment based on the application of sound science and engineering, while avoiding the imposition of unwarranted financial burdens on regulated facilities. Because both water and fisheries quality are site-specific factors, and the design, location, and circumstances of each power plant are unique, a site specific decision framework is the best approach to achieving the most cost-effective and environmentally beneficial outcome.

A specific example of such a unique situation involves Illinois waterbodies into which Midwest Generation plants discharge. In Illinois, there is currently a joint effort by the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Illinois Department of Natural Resources and other aligned groups to create a barrier zone in the Chicago Sanitary and Ship Canal which would be made devoid of, and impassible to, all aquatic life (through chemical, physical or other means). The purpose of this barrier is to prevent the migration of aquatic nuisance species into or out of the adjacent waterway systems, which include Lake Michigan. The current exotic invader, the Asian Carp, has the ability to decimate the aquatic ecosystem of Lake Michigan and the rest of the Great Lakes. Infiltration of this species also would destroy the popular sport fishing industry that has taken the States so long to build in these waterbodies. Midwest Generation has several open cycle power plants located on this particular waterway (the Chicago Sanitary and Ship Canal and adjoining Chicago River and Lower Des Plaines Rivers) that are subject to the proposed 316(b) rule.

Under the proposed 316(b) rule, these facilities should not be required to install control technology to minimize impingement and entrainment down to the proposed performance standards when state and federal agencies are simultaneously taking steps to create a "dead zone" in this waterway. The cost of adding any new control technology under such circumstances is clearly unnecessary. In the absence of the aquatic community that is intended to be protected under section 316(b), the proposed 316(b) rule imposes additional regulatory and financial burdens without realizing any additional environmental protection whatsoever.

EPA Response

EPA agrees that States should work collectively with other Federal and State agencies to address site specific issues within the State, where necessary. Under today's final rule, EPA is allowing approval of existing State 316(b) programs that meet the requirements of the final rule (see 125.90(c)). See response to comment 316bEFR.023.001 for additional detail.

Comment ID 316bEFR.023.005

Author Name Basil G. Constantelos

Organization Midwest Generation EME,LLC

Subject Matter Code 17.06

Option: Site-specific determination of BTA

The proposed 316(b) rule should allow the States to exercise discretion appropriate to the needs of the particular waterbody. As proposed, the 316(b) rule threatens to impose inflexible requirements on the States. The Chicago Sanitary and Ship Canal, as well as the adjoining waterways discussed above, are currently designated as Secondary Contact waters due to their inability to meet the "fishable/swimmable" standards required by the Clean Water Act. These waterways have been either created or significantly altered by human disturbances over the past more than one hundred years, and function largely as conveyances for treated effluents and barge transport, while still supporting a fair assemblage of aquatic organisms which are suited to this particular environment. The types of species expected to be entrained and/or impinged by power plants on these waterways are largely rough, low quality fish such as common carp, buffalo and gizzard shad, in addition to the invasive species noted above. These species do not warrant the same kind of protection as more desirable or ecologically important species, such as game fish, threatened or endangered species or other species important to the support of the food chain and/or recreational industry in any particular waterway. State natural resources management agencies have long been allowed to give greater protection to those waterbodies which can support the greatest diversity of quality aquatic species. This is another important example of why flexibility is required to allow the States to direct their limited resources to the protection of the most ecologically important waterways. The proposed 316(b) rule, as presently written, will result in the broad application of uniform controls for waterbodies without the necessary consideration of whether a comparable environmental benefit is attainable.

States should be allowed to make a determination on the overall quality of a particular waterbody, based on current 305(b) report data, and use this to support whether or not the imposition of 316(b) requirements is required for improvement of the indigenous fish community. If factors other than power plant operations are influencing the overall quality and biological potential of the system, then states should be empowered to make the determination that 316(b) requirements would not result in any overall environmental benefit. This determination should be accepted by U.S. EPA and documented in a given facility's NPDES permit in lieu of the imposition of 316(b) BTA controls and/or study requirements. This determination would remain in effect until significant changes occur either in the waterbody or in the facilities' operations, which could potentially effect the current 316(b) determination.

EPA Response

A facility may choose to seek a site-specific determination of BTA using the cost-benefit test and demonstrate that any expenditure by the facility is unwarranted due to the minimal benefits expected to be gained by any compliance action taken.

Comment ID 316bEFR.023.006

Author Name Basil G. Constantelos

Organization Midwest Generation EME,LLC

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

In conclusion, Midwest Generation believes that the ultimate decisions made by the U.S. EPA in this rulemaking have the potential to adversely affect energy costs and supply in our region of the country. These effects are potentially significant and may not be justified or necessary for all site-specific situations and circumstances. Accordingly, Midwest Generation urges the U.S. EPA to devise a workable, site-specific approach that gives to the states the necessary flexibility to make sound choices given the complexities of the issues involved.

EPA Response

EPA's economic impact analysis does not show any significant impacts to energy costs and supply as a result of the final Phase II rule. In the Midwest, less than 100 MW of incremental capacity closures are projected as a result of the final Phase II rule. In addition, projected increases in energy costs and prices are small (less than 1.0%). For responses to comments on a site-specific approach, please refer to subject matter code 2.04.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas J. Steinke

On Behalf Of:

JohnsonScreens

Author ID Number:

316bEFR.024

Comment ID 316bEFR.024.001

Subject Matter Code 7.03

Available I&E technologies

Author Name Thomas J. Steinke

Organization JohnsonScreens

Passive intake screening technology is considered as best available technology in EPA's 316(b) Phase I. The Phase I rule, published December 18, 2001, requires the maximum design through-screen velocity at each cooling water intake structure, be no more than 0.5 ft/sec (Section V.B.1.b.i. page 65274 and Subsection 125.84.b.2.). However, this technology is not mentioned in the current version of 316(b) Phase II. Additionally, Phase I identifies EPA case studies that implemented wedgewire screens for cooling tower intakes. (Section V.B.2.d., page 65279 – 65280).

Phase II also restricts the application of wedgewire screens to source waters with minimum current of 1.0 ft/sec, to allow debris to be carried past the intake screen, thereby preventing accumulation on the screen. Wedgewire screen technology has been improved over the years, allowing successful applications in rivers and streams with current velocity less than 1.0 ft/sec and in oceans, reservoirs, and lakes with no ambient current.

EPA Response

Compliance alternative 4 allows a facility that meets certain operational and siting criteria to install and properly operate an approved technology. Today's rule designates cylindrical wedgewire screens as an approved technology for facilities meeting the criteria listed at § 125.99(a). Today's rule also reserves the right of the Director to approve other technologies as BTA for all facilities within his or her jurisdiction. For further discussion please see section V of the preamble and § 125.99(b).

EPA agrees with the commenter that wedgewire technology has improved over recent years and is able to be deployed under a wider set of circumstances. Through consultations with vendors and laboratory analysts, EPA has determined that the requirement of a minimum ambient current of 1.0 ft/sec is too restrictive to apply to all cases. Instead, today's rule requires "sufficient ambient counter currents exist to promote cleaning of the screen face". EPA recognizes that the optimal ambient current may vary between facilities depending on debris loading, among other factors.

Comment ID 316bEFR.024.002

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.02

Performance standards

The rule does not require surface water intake systems to meet the industry-accepted standard of a maximum through slot velocity of less than 0.5 ft/sec. We would suggest language allowing any facility with an intake system that does not exceed a maximum through slot velocity of 0.5 ft/sec be approved as meeting Phase II requirements.

For further reference, please review the attached documents.

EPA Response

Compliance alternative 1 allows a facility that reduces its design intake flow to 0.5 m/s or less to be considered compliant with the today's rule.

Comment ID 316bEFR.024.003

Subject Matter Code 7.03

Available I&E technologies

Author Name Thomas J. Steinke

Organization JohnsonScreens

The rule does not mention Ranney well collector or infiltration gallery technology as an option to reduce impingement and entrainment in cooling water intake systems. We would suggest that this technology be mentioned in the rule to allow facilities to make an informed decision by having access to all available technologies that would serve to meet the requirements of the rule.

EPA Response

EPA did not discuss the technologies mentioned by the commenter due to the limited availability of performance data for them and instead focused on technologies that have a history of successful operation and wide use within the industry. EPA notes that today's rule does not prohibit the use of any technology in meeting the performance standards. Compliance alternatives 2 and 3 do not specify any design and construction technology or operational measure that must or must not be used to satisfy the performance standards. EPA and encourages the use of innovative technologies to address impingement mortality and entrainment losses and welcomes the submission of any data demonstrating their value.

Comment ID 316bEFR.024.004

Subject Matter Code 3.07
Special definitions

Author Name Thomas J. Steinke
Organization JohnsonScreens

Section II.G. page 17130.

This section defines the Design Intake Velocity of the intake system. Reference is made here to a design through-screen velocity being restricted to an average of 0.5 ft/sec. To ensure minimum impingement of species on the surface of the screen, the maximum through slot velocity should be no greater than 0.5 ft/sec. Allowing the average through screen velocity to be no greater than 0.5 ft/sec creates the possibility that local through slot velocities will be much greater than 0.5 ft/sec at some points along the length of the screen. We would suggest requiring a maximum through slot velocity of 0.5 ft/sec at any point on the intake structure. Additionally, we would suggest that any facility that meets a design maximum through slot velocity of less than 0.5 ft/sec, meets the requirements of the Phase II rule.

The rule also identifies a “zone of influence” around the screen without a clear definition of the “zone of influence”. Our experience and testing indicates that although a “zone of influence” does exist around the screen, defining the “zone of influence” can be difficult. By defining the proper maximum through slot velocity of the screen, the “zone of influence” becomes arbitrary, because the through slot velocity is the determining factor in ensuring protection of living organisms in the water column. We would suggest the removal of any language referring to the “zone of influence”.

For further reference, please review the attached documents.

EPA Response

For the purpose of today’s rule, EPA is treating the through-screen velocity limit of an average of 0.5 feet per second as a design criteria. EPA does not intend to require facilities to monitor the intake velocity at every slot on a screen face, but rather to ensure that their intake configurations are equipped to handle an intake velocity averaging 0.5 ft/s. EPA chose to make today’s final rule based upon these design criteria, realizing that in-situ circumstances may affect the actual velocity, such as turbidity, biofouling, and ambient waterbody flow. Furthermore, extensive research was conducted on the intake velocity issue during Phase I. At that time, EPA concluded that the velocity standard of 0.5 ft/s is sufficiently protective and eliminates significant potential for entrapping fish (see DCN #2-028 in the Phase I Docket). As this data shows, most fish can escape a 0.5 ft/s intake velocity. Therefore, even if the fish does not quickly or readily detect the intake, it still has every opportunity to escape the intake structure. EPA also notes that the intake velocity requirements are based upon the design through screen velocity. Due to the amount of open space in an intake screen face, a 0.5 ft/s through screen velocity will effectively reduce approach velocities to values lower than 0.5 ft/s. As such, the velocity in the vicinity of the intake will be further reduced, affording poor swimming fish an additional safety margin to escape an intake flow.

Additionally, EPRI’s Technical Evaluation of the Utility of Intake Velocity as an Indicator of Potential Adverse Environmental Impact under Clean Water Act Section 316(b) stresses the important relationship between intake velocity and injury to aquatic life when it states stating that “[t]here is a substantial literature of laboratory and field data that points to increased impingement with increased intake velocities.” The report also recommends that 0.5 ft/s be adopted on a national scale as a “screening value for the regulatory purposes of suggesting low potential adverse environmental impact.” EPA’s own research confirms both statements.

As evidenced by the data collected for the Phase I NODA and other material in the record of this rulemaking, the 0.5 ft/s requirement is scientifically based, is protective of aquatic resources with a reasonable margin of safety, and is technically available and economically practicable (as demonstrated for certain existing facilities by the fact that it is frequently achieved at recently built facilities). As such, EPA has concluded that it is an appropriate component of best technology available for minimizing adverse environmental impact at existing facilities.

EPA would emphasize that the final rule provides a site-specific alternative to the four national categorical compliance options. If the permit applicant proves through a cost-cost or cost-benefit test that it cannot meet the velocity requirement, the applicant can seek to demonstrate comparable performance through other means, including techniques which account for different intake designs and intake technologies. This site-specific provision in analogous to the variances authorized for existing direct dischargers under Clean Water Act 301(c), 301(g) and 301(n). Under these provisions, existing direct dischargers may obtain site-specific determinations of best available technology that is economically achievable; under today's rule, a qualifying facility can obtain a site-specific determination of best technology available for minimizing adverse environmental impact.

In response to the comment that EPA should remove language referring to an intake’s zone of influence, EPA disagrees. It is EPA’s position that such a zone of influence does exist at intake structures, and must be taken into account in today’s final rule. EPA concurs, however, that the zone of influence will differ from site to site. Therefore, EPA has decided to leave to the Director the determination of the range of their facilities’ zones of influence.

Comment ID 316bEFR.024.005

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 7.01
RFC: Three-option framework for determining BTA

Section VII. C., page 17178

We would suggest the following option be provided to facilities to meet the requirements of the rule: Facilities that have fine slot, wedgewire cooling water intake systems with maximum through slot velocities of 0.5 ft/sec or less, would meet the requirements of the rule and would not be subject to further performance standards. Facilities that have incorporated infiltration gallery technology would meet the requirements of the rule and would not be subject to further performance standards.

For further reference, please review the attached documents.

EPA Response

Please refer to the preamble for a description of the framework of today's rule. EPA notes that facilities using approved design and construction technologies (such as a wedge-wire screen in certain freshwater river environments) may demonstrate compliance with the rule under § 125.94(a)(4) or may request that the Director approve additional technologies under § 125.99(b).

Comment ID 316bEFR.024.006

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 7.02
Performance standards

Subsection 125.94, page 17221

We have the following suggestion to be included with paragraph (a) of this section to allow facilities to meet the requirements of the rule. This suggestion would allow facilities to choose from one of four options, not one of three options currently listed in the proposed rule.

Option (4): We would suggest language allowing any facility with an intake system that does not exceed a maximum through slot velocity of 0.5 ft/sec be approved as meeting Phase II requirements.

EPA Response

See comment 316bEFR.024.002.

Comment ID 316bEFR.024.007

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 7.02
Performance standards

Chapter 3: Efficacy of Cooling Water Intake Structure Technologies, Section 3.5.2, Technology Performance, page 3-5.

This section references two “high flow” installations of wedgewire screens located at power plants.

For further information, please reference the attached Johnson Wedgewire Screens Installation List.

EPA Response

No response necessary.

Comment ID 316bEFR.024.008

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 23.02

TDD related comments

Chapter 3 – Attachment A, page A-12, Fact Sheet No. 5: Wedgewire Screens.

Testing Facilities and/or Facilities Using the Technology comments.

For further reference, please review the attached Johnson Wedgewire Screens Installation List.

EPA Response

The Agency reviewed the attached fact sheet and wedgewire screen installation list. The Agency notes that it included wedgewire screens in the analysis and basis of the rules requirements to some degree. For further information on wedgewire screens and the Agency's technology analysis, see the Technical Development Document.

Comment ID 316bEFR.024.009

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 23.02
TDD related comments

Chapter 3 – Attachment A, page A-13, Fact Sheet No. 5: Wedgewire Screens.

Design Considerations comments.

Although locating an intake screen in an ambient current of at least 1 ft/sec is a typical application criterion, recent advances in air backwashing technology (Johnson Screens Hydroburst System) have improved the effectiveness of the cleaning cycle. Additionally, improvements of open pipe flow modifier technology (such as the Johnson Screens dual pipe flow modifier) allows placement of smaller diameter screens for a given flow, decreasing the likelihood of siltation of the screen barrel. These improvements have increased the applicability of Johnson Screens into water sources with low or no ambient current. Finally, Johnson Screens design considerations require the placement of the wedgewire screen to be greater than ½ the diameter of the screen above the bottom of the water source to aid in preventing siltation into the screen.

For further reference, please review the attached documents:

Fact Sheet No. 5 identifies that: A uniform velocity distribution along the screen face is required to minimize the entrapment of motile organisms and to minimize the need of debris backflushing. This design consideration becomes more critical if an allowance is made to use restricted flow modifier pipes – such as slotted pipe or perforated pipe, etc. – inside the intake screen. Restricted flow modifier pipes will not have radial symmetry and therefore will require a 3-D consideration of the through slot velocity. Intakes with open modifier pipe technology allow radial symmetry of the flow through the screen.

Restricted flow modifier pipes also create a potential plugging problem in the annular spacing between the wedgewire screen and the orifices of the restricted flow modifier pipe. Plugging of this space would create a difficult to clean condition, resulting in continued operation of a screen with through slot velocities higher than the maximum design through slot velocity.

Finally, restricted flow modifier pipes operate with a differential headloss that is up to 10 times greater than the headloss of open modifier pipe technology. Although the higher headloss of restricted flow modifier pipes can be overcome with larger pumps, operational costs will be increased as compared to open modifier pipe technology. For example, at 200,000 gpm withdrawal rate, each additional foot of head loss is roughly 0.5 million KW/hr per year in pumping costs.

Limitations section comments.

This fact sheet calls out some limitations of wedgewire screens, referencing a document from 1980 (Mussalli et al, 1980). This document does not accurately reflect the advances in intake screening technology that have occurred since 1980. Some of these technology advances have addressed the technology shortcomings called out by Mussalli. Siltation of the screen has been effectively removed with improved air backwashing systems (Johnson Screens Hydroburst System) that ensure removal of the material and improved modifier pipe designs.

For further reference, please review the attached documents.

Biofouling of the screen has been effectively addressed with the use of copper alloys (Johnson Screens Z-alloy Intake Screens). These copper alloy screens have successfully controlled zebra mussel infestation of the intake screen and other biological fouling of the intake screen. Additionally, copper coatings have been used in the marine industry for coating ship/boat hulls for many years. These applications of copper have been shown to be effective for the control of biofouling.

EPA Response

The Agency has reviewed the attached and referenced documents. The Agency notes that it included wedgewire screens in the analysis and basis of the rules requirements to some degree. For further information on wedgewire screens and the Agency's technology analysis, see the Technical Development Document.

Comment ID 316bEFR.024.010

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Eckholm, M.R. “Long Term Evaluation of Zebra Mussel Resistant Material of Construction for Intake Screens and Assemblies. Update on Field Installation Test."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.011

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Environmental Protection Agency. “National Pollutant Discharge Elimination System: Regulations Addressing Cooling Water Intake Structures for New Facilities; Final Rule. Phase I. December 18, 2001.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.012

Subject Matter Code 7.03

Available I&E technologies

Author Name Thomas J. Steinke

Organization JohnsonScreens

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Fournier, P. W. "New Technology for Environmentally Safe, Money Saving Water Withdrawal."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.013

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Fournier, P.W. “Passive Screening at Surface Water Intakes.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.014

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Hanson, B.N., Bason, W.H., Beitz, B E., and Charles, K E. "A Practical Intake Screen which Substantially Reduces the Entrainment and Impingement of Early Life Stages of Fish."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.015

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Heuer, J.H. and Tomjanovich, D.A. “A Study on the Protection of Fish Larvae at Water Intakes using Wedgewire Screening.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.016

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Key, T.H. and Miller, J.C. "Preliminary Studies on the Operating Aspects of Small Slot Width Wedgewire Screens with Conceptual Designs for Power Station Use."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.017

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Maxson, R.C. “Evaluation of Zebra Mussel Resistant Materials of Construction for Intake Screens and Assemblies.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.018

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Ranschaert, B. and Maxson, R.C. “Unique Alloys Prevent Zebra Mussel Attachment.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.019

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Richards, R.T. "New ideas for cylindrical pipe intakes can help reduce fish and larvae kill."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.020

Subject Matter Code 7.03

Available I&E technologies

Author Name Thomas J. Steinke

Organization JohnsonScreens

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Singh, K.P. "Lake Sedimentation Reduction Techniques."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.021

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 7.03
Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Shugrue, B.F. "Internal Johnson Screens Communication."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.022

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Shugrue, B.F. "Internal Johnson Screens Communication."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.023

Author Name Thomas J. Steinke
Organization JohnsonScreens

Subject Matter Code 7.03
Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): USFilter/Johnson Screens. “Z-Alloy Intake Screen — J.H. Campbell Plant Videotape.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.024

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Zeitoun, I.H, Gulvas, J.A., and Reynolds, J.Z. "Effectiveness of Small Mesh Cylindrical Wedge-wire Screens in Reducing Fish Larvae Entrainment at an Offshore and an Onshore Location of Lake Michigan."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.025

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Johnson Screens European Salt Water Z-Alloy Installations

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.026

Subject Matter Code 7.03

Available I&E technologies

Author Name Thomas J. Steinke

Organization JohnsonScreens

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Johnson Screens European Surface Intake Installations

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.027

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Johnson Screens Industrial Installations

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.024.028

Author Name Thomas J. Steinke

Organization JohnsonScreens

Subject Matter Code 7.03

Available I&E technologies

Johnson Screens submitted with its comments (OW-2002-0049, 4-1.24 in the docket or 316bEFR.024 in this database): Johnson Screens Z-Alloy Installations

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Michael J. Wallace

On Behalf Of:

Constellation Energy Group

Author ID Number:

316bEFR.025

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), EPSA (316bEFR.045), NEI (316bEFR.020), UWAG (316bEFR.041)

Comment ID 316bEFR.025.001

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code SUP

General statement of support

The New Regulation Has Many Favorable Features

EPA is to be commended for the considerable effort that has been put toward this regulation. There are a number of positive elements in the rule that we endorse and hope will be part of the final requirements. We appreciate that closed cycle cooling and dry cooling will not be mandatory requirements. We are grateful that the proposed framework has more flexibility and is willing to consider prior 316(b) studies to determine facility impacts. A 'baseline' approach that uses a rudimentary intake concept on which to base performance, cost and benefit tests to determine technology feasibility and allowing environmental enhancements in place of technologies are all positive developments.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.025.002

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code OPP
General Statement of Opposition

However, there are a number of significant problem areas and concerns with the proposed rule that we must bring to your attention. They relate to the basis for the rule and how the proposed regulations can be successfully implemented. They relate to our belief that a nationwide standard is not appropriate as proposed and that more site-specific considerations are needed. Finally, there are glaring issues that undermine the cost and benefit aspects of the proposed rule.

EPA Response

Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.025.003

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 18.01
RFC: Definition of "adverse environmental impact"

The Regulation Needs a Definition of 'Adverse Environmental Impact'

The statutory language of Section 316(b) in the Clean Water Act has been cited often in this debate and we might suggest the emphasis has been intentionally misplaced. The law says the following:

Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capability of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. (emphasis added)

The legal challenges that resulted in these new regulations were driven by a belief that §316(b) is absolutely a technology-forcing requirement. EPA has created a massive rule that is based on strict numerical performance through the use of technologies that are comparable to closed cycle cooling and it has avoided the rest of the statutory language. A major shortcoming in this regulation is the absence of a definition of adverse environmental impact. To have a regulation that is based on it and purports to reduce it yet refuses to define it is disingenuous at best. We strongly suggest that the final rule include a definition of this important statutory and regulatory term.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.025.004

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 6.01

Overview of I & E effects on organisms

EPA Should Recognize That There is Much Long-Term Information That Shows Many Plants Have Negligible Environmental Impact

We accept that there is a need for regulation of the impacts of cooling water intake systems. Some facilities do create adverse environmental impacts. Others might have assessed their impacts but it was long enough ago to warrant reconsideration at this time. However, at the same time, EPA must consider any comprehensive, long-term, valid monitoring program that has confirmed an absence of adverse environmental impact. The full body of information on this subject does not justify this one-size-fits-all approach. In fact, these conditions and the extensive body of work already conducted promote a site-specific approach to this issue.

EPA Response

Today's final rule contains many compliance approaches and is not a "one-size-fits-all approach". The approaches focus on reducing impingement mortality and entrainment and do not require the confirmation of a presence of adverse environmental impact attributable to the cooling water intake structure. If a facility is impinging or entraining a very small number of organisms, then a site-specific determination of best technology available is possible as a compliance approach. Please see the response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts of cooling water intake structures.

Comment ID 316bEFR.025.005

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 17.06
Option: Site-specific determination of BTA

Entrainment and impingement are largely determined by factors that vary from site to site.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.025.006

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 2.03

Purpose of Rule (General, incl. bckgrd., history)

The former guidance and regulations required site-specific considerations. There is no basis to change EPA's and Congress's 30-year record that recognizes consideration of site-specific factors.

EPA Response

Today's final rule includes a site-specific compliance alternative. Please see § 125.94(a)(5).

Comment ID 316bEFR.025.007

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Prior [site-specific] determinations should be considered if they are still valid. Also, if there are data that already show there is so little entrainment or impingement that the community is not affected or the economic impact is exceeded by the cost of a comprehensive study, there should be no need for further evaluation.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule. Please see response to comment 316bEFR.040.001 for details.

Additionally, in today's final rule, EPA offers a site-specific compliance alternative (see 125.94(a)(5)) in which an applicant may receive a determination of BTA from the Director for its facility provided it meets one of two cost tests. EPA believes that this alternative will provide additional flexibility for facilities who may find that the other compliance alternatives are not suitable for their site.

Comment ID 316bEFR.025.008

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Just because the proposed rule distinguishes certain water body types does not mean that everything after that is the same and amenable to one type of solution. Plants are still different, as are water bodies and their surrounding landscapes. In fact, one might suggest that no two plant sites are the same. Every locality has its distinctive environmental characteristics, independent of the facility. Aquatic populations vary and the technologies and control options that are feasible will not perform the same way in certain environments.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.025.009

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Allow states that regulate intakes well to continue — EPA should acknowledge that some states have had successful programs and have developed considerable data on certain facilities. They should be encouraged to continue what has worked.

EPA Response

EPA agrees with the commenter and has provided flexibility in today's final rule to approve State 316(b)programs that meet rule requirements at 125.90(d). Please see response to 316bEFR.023.001 for additional detail.

Comment ID 316bEFR.025.010

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 17.06

Option: Site-specific determination of BTA

EPA wants to include consideration of the impaired status of the affected [even nearby] water bodies and the presence of threatened or endangered species to justify regulation of CWIS [p. 17136-7]. Yet, these arguably unrelated elements are by their very nature site-specific considerations that further support site-specific solutions.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Impaired waters and the presence of threatened and endangered species are factors that may be considered in determining best technology at a particular facility. The Director may, if necessary to meet the requirements of state, tribal or other applicable federal law, make BTA determinations based on the potential for cumulative stresses upon organisms in these waterbodies.

Both the Director and the facility remain accountable for compliance with the Endangered Species Act (ESA), when applicable. The determination of best technology available, including for example, the selection of technologies, valuation of benefits, and monitoring requirements should reflect compliance with the ESA.

Comment ID 316bEFR.025.011

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 17.06
Option: Site-specific determination of BTA

We strongly urge EPA to craft a rule that allows for more site-specific determinations and factors into the analysis the extensive work that many plants and their state regulators have already done. If some plants have not yet conducted the studies and assessed the impact of their cooling water intake systems, EPA should not conclude this is a reason to make others revisit an issue that has been demonstrably resolved.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

A goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.025.012

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

The Regulation Should Consider Entrainment Survival

EPA is aware of numerous studies that show the presumption of 100% mortality is unjustifiably conservative. Power plants in many of the affected water body types have data that confirm substantial survival in many species. EPA should not determine impacts and benefits based on 100% mortality of entrained organisms if that is not what actually happens.

Asking for studies of entrainment survival as they relate to your preferred technologies [p. 17149] is not the point. There are not many examples of full-scale demonstrations of these controls. There are many more studies that confirm there is entrainment survival at plants without controls. EPA should have a complete understanding of entrainment survival when all forms of technologies and operational measures are applied as well as when no changes are made to cooling water intake systems. Only then will we have an understanding of whether the required alternatives are worth installing.

EPA Response

Please see response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. It is unclear how the commenter can expect EPA to have a complete understanding of entrainment survival when all forms of technologies and operational measure are applied when, as the commenter asserts, there are not many examples of full-scale demonstrations of entrainment survival with different controls in place.

Comment ID 316bEFR.025.013

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 8.03
Proposed standards for Great Lakes

The Great Lakes are unique but that does not make them uniquely sensitive. There are reasons to believe otherwise. The fishery has a disproportionate number of introduced species. Trout and salmon populations exist entirely because of stocking. This is one highly managed fishery. Due to the presence of zebra mussels, inshore regions have fewer fish because the planktonic food sources are depleted. The life history characteristics of the Great Lakes fish of concern [commercial and recreational species] are not put at risk by power plant operations. Therefore, the Great Lakes should be subject to the same requirements as other lakes and reservoirs.

EPA Response

Facilities located on the Great Lakes (and having a capacity utilization rate greater than 15%) are subject to additional requirements, as these waterbodies are similar to estuaries in that they have areas of high productivity and sensitive habitat.

EPA continues to believe that the Great Lakes are a unique system that deserve additional protection from the impact of cooling water intake structures. The Great Lakes are each a large waterbody with a variety of habitats. While EPA recognizes that not all habitats in the Great Lakes may be as sensitive as others, there are many areas that are similar to an estuary in terms of productivity, and therefore similar in sensitivity. EPA also notes that the more sensitive areas are often located in the nearshore areas of larger waterbodies, which is also a common location for cooling water intake structures. Facilities may also be located in proximity to migratory pathways.

EPA recognizes that the species present in a waterbody may not reflect natural or "pristine" conditions. With their presence, nuisance species and introduced species will affect the impingement and entrainment rates. Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). A site-specific compliance option might also be available. The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

EPA agrees that the biological communities in some waterbodies are not natural and are, in fact, heavily influenced by human management or by nuisance species. However, EPA remains responsible for the protection of water quality under the Clean Water Act and continues to believe that national performance standards are appropriate for these waterbodies. EPA also notes that these waterbodies likely still are considered to be waters of the United States and therefore subject to regulation under section 316(b).

Comment ID 316bEFR.025.014

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 8.04

Proposed standards for tidal rivers and estuaries

Estuaries, because of their productivity and popularity, seem to be viewed as especially vulnerable to the activities of mankind. Because they are productive, they experience considerable commercial and recreational fishing pressure. Because of this, we urge EPA to acknowledge the substantial impact over-fishing has had on populations.

Estuaries, by their nature, often have wide-ranging salinity and temperature conditions. That the creatures that live there thrive despite these challenges speaks to their durability. Also, many important estuarine species reproduce by broadcasting vast quantities of eggs and larvae into the environment. This strategy makes then susceptible to entrainment but not necessarily endangered by it.

Estuaries are often areas where human populations are concentrated. The waters can experience the effects of development with its wastes and runoff. However, that many estuaries continue to be productive in spite of over-fishing, pollution and habitat degradation speaks to their resilience not their sensitivity. Unless a power plant is located in a migratory, spawning or nursery area, there are few characteristics of estuaries that make them uniquely susceptible to power plant impacts. We suggest that the proposed regulations reflect this.

EPA Response

EPA disagrees. Facilities located on estuaries and tidal rivers (and having a capacity utilization rate greater than 15%) are subject to additional requirements, as these waterbodies have areas of high productivity and sensitive habitat. EPA examined the issue of increased potential for adverse environmental impact in estuaries and tidal rivers in the Phase I NODA and included several documents to support the assumption. These documents (DCN 2-013 A through O) include information on larval densities in selected estuaries and tidal rivers, impingement and entrainment rates for facilities located in these areas, conditional mortality rates of organisms in selected estuary and tidal rivers (requires calculation of larval densities), and discussions of the life history and reproductive strategies of marine and estuarine organisms that are relevant to EPA's consideration of whether these locations may be sensitive to impingement and entrainment impacts associated with cooling water intake structures. EPA has concluded that estuaries deserve the most stringent protection because of the abundance and diversity of aquatic life they harbor. Estuaries are also an important habitat for the vast majority of commercial and recreational important species of fin fish.

EPA acknowledges that other factors such as overfishing or declining water quality may also affect fish populations. However, these factors do not diminish the increased potential for adverse environmental impact from cooling water intake structures in tidal rivers and estuaries.

Comment ID 316bEFR.025.015

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 10.01.02.02
Fish Population Modeling

The Regulation and its Implementation Should Recognize the Existence of Compensation in Aquatic Populations

Compensation is an accepted cornerstone of fisheries management science. The NMFS and every state natural resource agency use compensation-based principles and regulations in their operations. The proposed regulation must acknowledge that aquatic populations have the capacity to offset variations in mortality. This will help put power plant impacts in perspective.

EPA Response

Although EPA's I&E analyses do not consider density dependent compensation or stock recruitment dynamics, EPA does not maintain that stock dynamics are, in fact, density independent. Rather, EPA believes that use of a static model can provide reasonably valid estimates of foregone harvest projected directly within a cohort.

The knowledge required to model compensation reliably, and hence refine EPA's estimates of foregone harvest, include current, stock-specific understanding of relevant stock-recruitment relationships. This information is unavailable for most of the species that are vulnerable to impingement and entrainment.

Another reason for omitting compensation from the 316b benefits assessment is that any population stressor, including I&E mortality, that might lead to a compensatory response does so at the cost of removing some portion of the population's compensatory reserve. It is not possible for a population to absorb a limitless set of stressors through biological compensation. As such, if compensatory mechanisms were included in EPA's analysis, then EPA would be required to discount the associated benefits by an amount associated with the loss of compensatory reserve. It is unknown what this amount might be for any particular stock.

Because information on compensation and compensatory reserve is not available for the majority of the fish stocks impacted by I&E, EPA concluded that quantitative estimation of compensatory response was not a practical option for the 316b benefits analysis. EPA acknowledges that, in principle, compensatory responses to I&E can occur, but EPA does not believe that inclusion of compensation in its analysis would necessarily lead to better benefits estimates.

EPA agrees that density dependent population regulation and the concept of compensation are accepted in general terms. However, without knowledge of the underlying mechanisms that govern how compensation occurs, the realizable compensatory response of a given fish population to CWIS losses remains subject to substantial uncertainty.

Indeed, natural recruitment variability makes it necessary to have a very long time series of population data to detect any potential density dependence. Even when such data are available, there may be no clear relationship between spawning stock and recruitment. In some cases there is so much variability in the available data that a statistically significant density dependent relationship cannot be detected. Even with a long time series of observations, it can be very difficult to determine the shape of a stock-recruitment curve and project compensatory population response over a range of environmental conditions.

EPA acknowledges that omission of compensation from its analysis may cause benefits estimates for some particular fish stocks to be overestimated. However, considering the wide variety of factors that could overwhelm compensatory mechanisms, EPA does not believe that overestimates are substantial or common.

Comment ID 316bEFR.025.016

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

The 15% 'Capacity Utilization Rate' Threshold Should be Higher

A capacity factor of 15% is below what some energy agencies use to describe "peaking facilities." It is unreasonable to place this kind of requirement and the potential for expensive capital additions on a plant that operates so seldom. This would be even more true for plants in winter peaking regions where operations would not coincide with spawning activity.

EPA Response

The Agency notes that the definition of the capacity utilization rate threshold has no bearing on whether or not a facility is a "peaking facility" by another entity's definition. As a matter of fact, the point made by the commenter (if it were valid) could be used to justify a "lower" threshold. For instance, the general definition of a "peaking facility" according to the Agency's air program is 10% capacity utilization. For this water regulation, the Agency, instead, prefers to base its threshold on an analysis of the facilities and their characteristics within the scope of the rule and not an unrelated definition pertaining to another media or regulatory body. The principle of the threshold cutoff is unrelated to whether or not a facility is termed a "peaking facility", but rather relies on the analysis the Agency conducted for the Notice of Data Availability and the final rule (see DCN 6-3586).

Comment ID 316bEFR.025.017

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

The Preamble [p. 17180] recognizes that some states already have substantial regulatory programs of their own and suggests they will be permitted to continue these programs if they demonstrate “that such programs would achieve comparable environmental performance” [emphasis added]. If this is the case, just about every state program in the union would not qualify because EPA appears to suggest that it is about nothing but numbers and technology “If the state doesn’t already require cooling towers or technologies that reduce entrainment and impingement to the degree that cooling towers do, the program is not acceptable." We do not agree. We do not believe that a state has to demonstrate that its program is “functionally equivalent” if that means comporting with the numeric percent reduction standards in the rule. There are comprehensive programs that emphasize larger scale conditions, population effects and adverse environmental impacts. These programs have succeeded and should not have to be reconstituted to force-fit a new EPA standard.

EPA Response

EPA recognizes that some States have worked diligently over the years to develop comprehensive 316(b) programs. However, EPA's goal under today's final rule is to set national minimum performance requirements for cooling water intake structures that reflect the best technology available for minimizing adverse environmental impact. EPA believes that these clear national standards will promote more effective and consistent implementation of section 316(b) requirements and ultimately result in reducing impingement mortality and entrainment at these structures. In today's final rule, EPA has allowed approval of State programs that meet rule requirements at 125.90(c). See response to 316bEFR.023.001 for additional detail.

Comment ID 316bEFR.025.018

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 6.01
Overview of I & E effects on organisms

Constellation Energy operates on the Chesapeake Bay and its tributaries. This is one of the premier estuaries on the planet, a major commercial and recreational fishing ground and breeding area for many important species. Before the Clean Water Act was passed [1971], the State of Maryland established the Power Plant Research Program (PPRP) within the Department of Natural Resources. It exists to review and evaluate the impacts to Maryland's environment from the construction and operation of electric power generating stations. The agency takes particular interest in the resources of the Chesapeake Bay. The state Department of the Environment has promulgated its own regulations to address entrainment and impingement impacts at power plants [COMAR 26.08.03.03-.05].

Over the past 25 years, dozens of studies have been conducted on power plant entrainment, impingement and discharge effects in Maryland. Assessments have included determinations of the value of the lost resources based on dollar figures also codified in state regulations [COMAR 08.02.09.01]. Together, the studies conducted by PPRP and the utilities have thoroughly documented the impacts from electric generation facilities to the aquatic environment and supported operational changes and/or mitigation where it was warranted.

Since 1975, PPRP has published eleven reports that summarize the current knowledge of acute and cumulative impacts from electric utility facilities. With regard to impingement, the reports note that the dominant fishes that are impinged are all abundant, ubiquitous species that occur throughout the mesohaline reaches of the Bay and its tributaries. No important commercial or recreational species spawn in the mesohaline zones. In addition, trawl studies confirm that impingement is a non-selective cropping mechanism - species are impinged at a rate proportional to their abundance in the plant vicinity.

Over the years, PPRP reports have compared impingement losses to natural die-offs, commercial and recreational landings, predation and the natural densities that some fish demonstrate in the region. The reports conclude that impingement losses are small compared to mortality from other causes. Because the populations are large, widely distributed and demonstrate the ability to survive impingement, the agency has concluded that impingement does not adversely affect the region's aquatic populations.

With regard to entrainment, the conclusions are the same.

"Results of these studies show that while operations of individual power plants impact various ecosystem elements in various ways, those impacts, taken together, have had no identifiable substantive cumulative impact on Maryland's aquatic resources to date. Although large entrainment losses of some types of aquatic organisms have been measured frequently, no consistent depletions in numbers of organisms have been found… At Wagner [Constellation Energy Group's 4-unit fossil plant], data from field studies reveal the actual entrainment impacts are substantially less than predicted by computer screening models, and PPRP concluded that mitigative measures at this facility are not warranted"

[Maryland Power Plants and the Environment, PPRP-CEIR-10, January 1999, pp. 49-50].

The following was published in a peer-reviewed scientific journal:

“At the Calvert Cliffs Nuclear Power Plant, which is located on the mainstem of the Chesapeake Bay, nearly two decades of studies were conducted during the construction and initial operation of the two units that comprise the facility. Entrainment at the plant was determined not to be a major concern because the cooling water intake was not located in a spawning area of significance SNAC model estimates of economic loss due to entrainment were $200 annually, with overall ecological loss being 0.1% of net primary productivity. Naked goby eggs and larvae made up a large proportion of the ichthyoplankton entrained, primarily because this species colonized the rip-rap used to line the intake embayment and their eggs and larvae were being released into the cooling water withdrawal flow.

“Impingement at Calvert Cliffs was initially substantial… Those … episodes were associated with low dissolved oxygen in the intake embayment, a problem resolved in part by removal of several skimmer wall panels. Monetary value of fish lost to impingement averaged less than $25,000/year as a result of the relatively high survival of many species impinged and as well as the relatively low value of the dominant species. No CWIS modifications were required in the Calvert Cliffs permit. However, over a 14-year period, BGE optimized their intake, screening structures and operations such that impingement losses in the early l990s were 10 to 50% of the losses in the 1970s.”

[R.McLean, W. A. Richkus, S. P. Shreiner & D. Fluke. 2002. Maryland Power Plant Cooling- Water Intake Regulations and Their Application in Evaluation of Adverse Environmental Impact. The Scientific World JOURNAL, 2:573-583]

We suggest that the EPA rules need to recognize the millions of dollars that some utilities have directed toward* investigating and mitigating their cooling system impacts, the substantial regulatory attention that some states have directed to this issue and the sound science that has been applied to determine that adverse environmental impact has not occurred.

EPA Response

In EPA’s assessment of environmental impacts associated with cooling water intake structures (see section IV, Environmental Impacts Associated with Cooling Water Intake Structures, of the preamble to today's final rule), EPA aimed to highlight the types of impacts that occur and did not intend to fully assess the specific impacts of each facility within the scope of today’s final rule. EPA notes that most facility-sponsored studies in the past 30 years have not shown a significant impact to fish populations that can be directly attributable to a specific cooling water intake structure. However, EPA does not believe that the facilities are causing zero impact to fish populations and the studies point more to the fact it is extremely difficult to prove that the cooling water intake structure is at fault; indeed, it may be impossible unless a facility commences or significantly changes operation and the nearby populations instantly crash in response. Many anthropogenic factors work concurrently on the environment. It is extremely difficult to separate the effects of any one factor. A facility will always be able to blame another factor and claim it is not the real source of the problem. In addition, the changes in populations may be masked by the considerable natural variation in the size of fish populations. The intention of section 316(b) of the Clean Water Act is to minimize the adverse environmental impact specifically of cooling water intake structures and does not seek to eliminate stress on fisheries due to overfishing, invasive species, habitat degradation, dredging, coastal development, overfishing, industrial pollution, nutrient pollution, wastewater runoff and climate change. Therefore, it was not necessary to include a quantitatively determine the proportion of degradation due to each of these stressors in a rule that seeks to minimize the adverse environmental impact of cooling water intake structures. There are other sections of the Clean Water Act that seek to reduce other environmental stressors to improve fishing and swimming in the waters of the United States.

Section 316(b) of the Clean Water Act seeks to minimize adverse environmental impact of cooling water intake structures because they can have a significant negative impact on aquatic organisms by culling very large numbers of aquatic organisms from the aquatic ecosystem. The Agency believes that it is necessary to minimize impingement mortality and entrainment of the large numbers of aquatic organisms without waiting for a detectable decline at the population level. Structural changes at the population level are influenced by a large number of forces at work within the ecosystem. Many cooling water intake structures have been in operation for decades. During these years, fish populations have been affected by other factors such as overfishing, habitat alteration and water quality changes. Because of the large number of anthropogenic forces and the complexity of their interactions, ecologists find it difficult to determine the contribution of any one stressor to a structural change in an population. In order for a change in the population level to be detectable and attributable to a particular cooling water intake structure, when so many factors are simultaneously affecting populations of aquatic organisms, the change would have to be so great that the extent of the damage would likely be irreversible. EPA has received data which indicate that billions of fish are killed by cooling water intake structures yearly. Populations of aquatic organisms in the vicinity of cooling water intake structures may appear to remain stable despite the impingement and entrainment of vast numbers; however, this stability may be due to improvements in water quality and implementation of fishery management plans, which should result in a steady increase in fish populations. At the same time, habitat degradation may be reducing fish populations. There are a number of different stresses acting on the nation's fisheries at any one time. Section 316(b) is an important tool to reduce one stressor recognized by Congress: the continued killing of billions of fish yearly by cooling water intake structures. This rule will complement fishery management plans and water quality improvements that aim to reduce stress on the nation's fisheries. EPA has determined that reducing impacts by cooling water intake structures by reducing the numbers of organisms impinged and entrained is appropriate. See preamble today's rule for a discussion regarding why EPA chose impingement and entrainment. These reductions will reduce stress on fish populations which EPA believes is the intention of section 316(b).

EPA acknowledges that some permitting authorities are doing a good job implementing section 316(b) of the Clean Water Act. Under § 125.90 of today's final rule, the State may demonstrate that it has adopted alternative regulatory requirements in its NPDES program that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. See also the preamble to the final rule for a discussion of site-specific compliance alternatives.

Comment ID 316bEFR.025.019

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Utilities Need Clear Guidance Regarding the Effective Date and Implementation Requirements in the Rule

There is considerable vagueness in the proposed rule with regard to the implementation and compliance requirements. We know little more than the rule will be final in August Of 2003. We need an effective date that recognizes what the permit holder has to do and not some reference to the time when the permit is issued [67 FR 17173; proposed §125.92].

The rule proposes that a permit renewal application should include all the information required under 40 CFR 122.21(r)(2) — Source water physical data, (r)(3) - Cooling water intake structure data, (r)(5) — Phase II existing cooling water system data and 40 CFR 125.95 — The Comprehensive Demonstration Study. We should not be expected to have all of this information completed, absent final regulatory guidance, six months before a permit expires if that expiration date is anywhere close to August, 2003.

States will need more than time to revise their own regulations. It's fine to give them a year to do this and two years if they have to make statutory changes [p. 17180], but a rule as comprehensive and complex as this is requires implementation guidance. EPA even says it will develop implementation guidance but we should not expect it before 2004.

Since the proposed rule is so vague about effective dates and the necessary guidance we will need, we suggest that it would be better to make the schedule for compliance a permit condition so the clock can begin with the renewed permit. This alternative will lay out a clear five-year plan within the time frame of the new permit — two years to study the affected populations and the facility's impacts, along with a study of the engineering/economic feasibility of control options; one year to propose and install control technologies or make the case for a site-specific determination; two years to monitor the effectiveness of the changes that are made. This alternative will allow time for the states to establish their programs and review the applicant's key steps as they occur.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies and permit compliance issues in today's final rule. See response to comment 316bEFR.034.066. The preamble to the final rule also describes how compliance with the rule will be determined.

Comment ID 316bEFR.025.020

Author Name Michael J. Wallace
Organization Constellation Energy Group

Subject Matter Code 7.02
Performance standards

The Rule Needs a Better Definition of 'Calculation Baseline' and Guidance on How it is Determined

While we appreciate that there will be a primitive basis to which the proposed performance standards will be applied, the regulatory definition at § 125.93 is particularly vague. If it is about impingement, it should mention the presence of some sort of [3/8"]? screens. Further, there must be acknowledgement that many cooling water intake systems have always had features that are improvements on [or just different from] the 'baseline' condition. We need guidance on how the important 'calculation baseline' should be derived.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.025.021

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 10.1

General: cost tests

As noted earlier, we are encouraged that EPA has included cost and benefit considerations in the proposed rule. There has to be some reasonable bounds for the potential capital expenses based on the cost of the technologies and the value of the resources saved. It is most important that these provisions are retained in the final regulations.

We refer the agency to the positions articulated by UWAG, EEI and EPRI regarding the costs of retrofit technologies and related economic considerations. We would only add that, at nuclear facilities, the size, cooling water volumes, safety and other regulatory considerations would further compound the chances for cost-effective solutions.

EPA Response

EPA has included cost-cost and cost-benefit provisions in the final rule. Therefore, the commenter's primary concerns have been met. The Agency has addressed the comments of UWAG, EEI, and EPRI in the respective response to comment sections. The point regarding nuclear facilities has been addressed by the Agency in its costing analysis, as the Agency fully considered whether nuclear fuel plants had specific costs associated with complying with the rule. The Agency found that for some cases, the compliance costs of nuclear plants is higher than that for non-nuclear plants and has incorporated these factors into the final rule analysis. See the Technical Development Document for specific documentation of the development of compliance costs and how they may individually differ for nuclear plants.

Comment ID 316bEFR.025.022

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

"Significantly Greater" Must be Defined and Quantified

We welcome an economic test that improves on the 'wholly disproportionate' model. However, 'significantly greater' is a vague, subjective alternative that clearly needs clarification. Without some numeric basis (e.g. 2:1 or Maryland's 'five times the value of the fish lost in a single year'], we face different interpretations across the country and the potential for regulators to say "the difference is not significant enough."

EPA Response

See response to 316bEFR.006.003.

Comment ID 316bEFR.025.023

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.03

Monitoring requirements

Compliance Monitoring — Two Years for Verification of Technology Success is Not Always Necessary

Verification monitoring will be required to demonstrate that the performance standards are being met [125.95(b)(7)]. While the rule states that a minimum of two years of monitoring is needed, there can be situations where compliance is assured in less time. Conversely, there are environments that are highly variable where more time might be needed [this is presumed as EPA refers to the two-year requirement as ‘minimum’]. However, if the performance requirements are to be met with environmental enhancements and mitigation, considerable regulatory discretion will be needed to craft a monitoring program that answers the right questions but doesn’t burden the applicant with perpetual studies.

EPA Response

See EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.025.024

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Also, there is no good reason to consider a “comprehensive reevaluation” of the §316(b) demonstration every time a permit is renewed. Once a successful §316(b) demonstration is made, maintaining the technology for the life of the plant should be enough.

EPA Response

EPA agrees that a comprehensive demonstration study may not be necessary at every permit renewal. Under 125.95(a)(3) of today's final rule, a facility may apply for reduced application requirements if conditions at the facility remain substantially unchanged from the previous permit issuance. Please see response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.025.025

Subject Matter Code 21.04

Determination of compliance

Author Name Michael J. Wallace

Organization Constellation Energy Group

Compliance Monitoring — Failure of a Control Technology to Meet the Performance Standard Should Not be Considered a Violation of the NPDES Permit

Verification monitoring should continue long enough to show that the performance standards are met. Once compliance is demonstrated [performance within the required range], no further biological monitoring should be required. We agree that the permit writer has the option to modify the permit further but this should not happen until the next-renewal cycle. After two years of monitoring, unfavorable performance [especially for restoration/enhancement measures] should not be a cause to reopen the permit. The facility should be considered to have done enough for one round. There needs to be some latitude and judgment applied that recognizes we are dealing with natural systems and the variability that is inherent with them.

If a technology is not achieving reductions that meet the performance standards, it is reasonable to require additional study to determine why. However, failure to meet the performance standards for a technology that was approved by the agency and installed/operated in good faith should NOT be considered a violation of the permit.

EPA Response

EPA disagrees that monitoring should be conducted only to gather information or should be discontinued if a facility achieves the performance standards. EPA also disagrees that good faith should be tantamount to compliance with today's final rule. However, EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. For a discussion of how compliance is to be determined, please see the preamble to the final rule EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's responses to comments 316bEFR.307.027 and 316bEFR.063.005. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.025.026

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 21.06.01

Implications for nuclear facilities

The Rule Must Acknowledge Nuclear Operations Issues

Another reason to allow for more flexibility and site-specific considerations — nuclear implementation issues. Clearly, we need to allow for the consideration of how proposed control options will impact safety-related systems, as the proposed rule appears to do at §125.94(f). An example would be fabric filter barriers and their potential, if they broke loose, to block the service water intakes. We suggest that a more credible assessment of implementation costs be applied to nuclear plants given their operating and regulatory requirements. Bottom line — retrofits are more problematic and more expensive at nuclear plants. Outages are longer and more expensive at nuclear plants.

EPA Response

Today's final rule allows for a site-specific determination of
best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)). The five compliance alternatives are also available to these facilities.

The concern that fabric filter barriers might break loose and block service water intakes at nuclear facilities is not supported by evidence or logic. Filter systems have not show evidence in their deployment to experience catastrophic failures such as those theorized by the commenter's concerns. In fact, fabric barrier net systems have been deployed nation wide for better than three decades, and sometimes at nuclear facility intakes. There is no discussion of this deployment in the commenter's unsubstantiated concerns. Further, a fabric filter system could potentially save catastrophic service water intake blockages such as those that commonly occur due to migratory and periodic fish events, such as alewife surges on the great lakes. Nonetheless, the Agency points out that technology selection is not prescriptive in the final rule. Facilities may choose from a wide variety of measures (and combination of measures) that meet the entrainment and impingement requirements of the final rule. As such, even if an aquatic filter barrier system were to have implementation issues for a nuclear plant (which is not proven by this comment), then this rule would not force any facility to install such a barrier, as many other technology options are open to complying facilities, including intake screening technologies, cylindrical wedgewire t-screen systems, fish avoidance systems, fish handling and return systems, acoustic and light deterrent systems, relocation of intakes to far offshore, operational flow reduction measures, and restoration measures, to name but a few.

Comment ID 316bEFR.025.027

Author Name Michael J. Wallace

Organization Constellation Energy Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Allowing Restoration and Environmental Enhancements is Good Policy

We appreciate the compliance options that are possible with this voluntary alternative to control technologies. On a site-specific basis, these measures have more potential to achieve net environmental benefits for a water body than many CWIS technologies. A liberal application of banking and trading options should also be encouraged if it will result in net environmental benefits. We agree with UWAG [and the environmentalists] that environmental enhancements are not “intake structure technologies”; therefore, §316(b) can not require them. However, if there is adverse environmental impact and the technology options are too costly or show little benefit, enhancements could be considered. Also, EPA should show an understanding that the approved enhancement and its verification monitoring would not be based on entrainment/impingement performance standard. More appropriate evaluations of the enhancement’s efficacy should be encouraged.

EPA Response

EPA acknowledges the commenter’s appreciation of the compliance alternatives that are possible with the inclusion of restoration measures in the final rule. EPA believes that including restoration measures in the final rule provides the benefit of additional compliance flexibility for permit applicants and permitting authorities.

For a discussion of the extent to which restoration measures are voluntary, see EPA’s response to comment 316RFR.060.022.

Restoration measures must meet the benefit level requirements described in section 125.94.

EPA believes design and construction technology and operational measure performance forms an appropriate basis for setting the performance requirements for restoration measures. For a discussion of how performance requirements for restoration measures are based on the performance standard for impingement and entrainment reduction technologies, see EPA’s response to comment 316bEFR.060.025.

Under the final rule, state permitting agencies may develop trading programs. For additional discussion of trading programs, see the preamble to the final rule.

EPA believes that restoration measures are an aspect of cooling water intake structure design and disagrees with the commenter on this point. For discussion of restoration measures as an aspect of cooling water intake structure design, see the preamble to the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

E.D. Sonny Vergara

On Behalf Of:

Southwest Florida Water

Author ID Number:

316bEFR.026

Comment ID 316bEFR.026.001

Author Name E.D. Sonny Vergara

Organization Southwest Florida Water

Subject Matter Code MISC

Miscellaneous comment

Section V Environmental Impacts

The primary concern of the District is the possibility that the proposed rule will merely transfer environmental and water resource impacts from one source to another, a topic which is not addressed in the document. The proposed changes may result in existing sea-water cooled plants losing their source, which then may need to be replaced with a freshwater source. Withdrawals in southwest Florida from freshwater sources, especially ground water, are at or beyond sustainable yield in many areas. Overuse of these sources has caused adverse environmental impacts to wetlands, lakes, and streams, as well as induced salt-water intrusion. If the true cumulative impact of withdrawals for cooling water purposes is to be assessed, it must include an evaluation not only of the potential impacts of the existing source, but also of potential replacement sources. This important element is lacking in the proposed rule.

EPA Response

EPA does not anticipate that a significant number of facilities will be forced to change their intake from a saltwater source to a freshwater source as a result of the 316(b) final rule. However, if such transfer is deemed necessary, the facility should consult with his or her permitting Director well in advance of permit expiration.

Comment ID 316bEFR.026.002

Author Name E.D. Sonny Vergara

Organization Southwest Florida Water

Subject Matter Code 15.01

RFC: State or Tribal alts. achieve comparable perf.

Section VI A. 11. State or Tribal Requirements

The District supports an allowance for State or Tribal agencies to propose alternative requirements. In keeping with the comment made in 1, above, we do not feel that such alternatives should be limited to demonstrating performance at a watershed level, but rather that a more wholistic, regional approach be allowed. Allowing impacts to occur in one area that prevents greater impacts occurring at another through environmental impact transfer should be considered. Additionally, positive environmental benefits of site location (e.g., creation of thermal refuge for endangered manatees) should be allowed to be taken into consideration.

EPA Response

Please see response to comment 316bEFR.099.020.

Comment ID 316bEFR.026.003

Author Name E.D. Sonny Vergara
Organization Southwest Florida Water

Subject Matter Code 17.02
Option: Reduce capacity comm. with closed-cycle

Section VI. B. Other Technology-based Options

The District generally supports economically feasible requirements that reduce overall cooling-water consumption, such as closed cycle cooling, wet/dry or dry cooling, or increased recycling of cooling water. However, an allowance should be made for facilities co-located with a desalination plant where the intake and discharge quantities are important to the feasibility of the desalination facility.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

If a desalinization plant is a permitted point source and uses some of the water it withdraws for cooling, then the 316(b) regulations (Phase I or Phase III) could apply to it. The Phase II regulations apply only to facilities that generate and transmit or sell power and, therefore, would not apply to desalinization plants unless they share an intake with a power plant.

Apparently there are two different methods for taking salt out of water -- reverse osmosis and distillation. The distillation plants use water for cooling, but they probably also use the cooling water for process water, so they probably would not meet the threshold for national regulation established in Phase I. Under the Phase I regulations, facilities are covered by the national rule if they have a design intake flow of more than 2 MGD and if 25% of their intake is for cooling, but facilities do not need to count water withdrawn for cooling if it is recycled and used for another process. Facilities that do not meet the threshold requirements regarding the amount of water withdrawn for cooling purposes must meet any requirements established on a case-by-case, best professional judgment basis.

Depending on the regulatory thresholds established in Phase III, existing distillation plants that are point sources and use water for cooling nonetheless could be excluded from the national rule if EPA determines not to count water withdrawn for cooling if it is recycled and used for another purpose -- as EPA did for the Phase I rule. Reverse osmosis is a process which does not require cooling water, and because it is more energy efficient, new desalinization plants are likely to use that method. Therefore, the universe of desalinization plants that are potentially subject to a 316(b) regulation are likely to be existing distillation plants.

Some desalinization plants share intakes with power plants. In such situations, the 316(b) regulations would apply to the intake flow attributed to a desalinization plant if the intake flow exceeds whatever regulatory threshold is established in the Phase I, II, or III regulations, but the power plant would be the permitted entity. For example, in Tampa, co-location of a 100 MGD intake/50 MGD freshwater output desalinization plant at a large once-through power plant allows the desalinization plant to use power plant cooling water as its intake without increasing overall water withdrawals and impingement and entrainment from Tampa Bay. The desalinization plant discharges 50 MGD brine to the power plant's large discharge flow, which minimizes the salinity impacts on Tampa Bay (no more than 0.1 part per thousand increase at the outfall and no change from background a short distance from the outfall). There may be more situations like this in the future because of the availability of a large piece of waterfront industrial property or an existing intake structure that the desalinization plant can use without having to go through the permitting process and NEPA/SEPA reviews, or because of some other useful feature of the power plant.

Comment ID 316bEFR.026.004

Author Name E.D. Sonny Vergara
Organization Southwest Florida Water

Subject Matter Code 7.01.03
Option 3--Site-specific determination

Section VI. C. Site-Specific Based Options

The District supports the concept of allowing for site-specific approaches for determining best-available technology, allowing facilities to demonstrate the effectiveness of existing methodologies. As noted in comment no. 2, above, there should also be an allowance for demonstration of offsetting environmental benefits.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.026.005

Author Name E.D. Sonny Vergara

Organization Southwest Florida Water

Subject Matter Code 6.08

Non-aquatic impacts

Section VI. C.5. a. Determination of Adverse Environmental Impact

As noted in several comments above, an allowance should be made to recognize any positive environmental impacts that occur as a result of the facility, such as thermal refuge for manatees.

EPA Response

EPA has not based the requirements of today's rule on closed-cycle cooling systems. Therefore, the commenter's concerns have been addressed.

Comment ID 316bEFR.026.006

Author Name E.D. Sonny Vergara

Organization Southwest Florida Water

Subject Matter Code 10.03.03

Tampa Bay

Section IX. E. 5 Case Studies - Tampa Bay

The adverse economic impact of impingement and entrainment at Big Bend presents an incomplete picture as it does not account for the benefits of creation of a thermal refuge for manatees. Additionally, the benefits due to co-location of a desalination plant at the site were not addressed (were the 25 MGD developed from a freshwater source instead of the desal facility, adverse environmental impacts would likely occur to wetlands, lakes, streams and associated wildlife at that location of withdrawal).

EPA Response

The final regulation does not require technologies that will change water temperatures. For a discussion of the effect of hot water discharges and manatees, please see EPA's response to comment 316bEFR.051.016. Desalination plants are discussed elsewhere in this comment response document.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

A.Christopher Gross

On Behalf Of:

Keyspan Corporation

Author ID Number:

316bEFR.027

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), UWAG (316bEFR.041)

Comment ID 316bEFR.027.001

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Background

The EPA is promulgating standards for the location, design, construction and capacity of cooling water intake structures (CWIS). Under the Clean Water Act, the EPA is directed to determine whether a power station's CWIS demonstrates the Best Technology Available (BTA) for minimizing adverse environmental impacts (AEI). It is under a Consent Decree (Riverkeeper Inc, et al. v. Whitman, No. 93 Civ 0314) to have final rules by August 28, 2003. Comments on the proposed regulations are due to the EPA by August 7, 2002.

The final rules, if approved as proposed, will establish BTA requirements for power producing facilities that utilize at least 25% of their water intake for cooling purposes and that (1.) have or are required to have an NPDES permit and (2.) have a design intake flow of 50 million gallons or greater of water per day. The design intake flow is defined as the value assigned (during the facility's design) to the total volume of water withdrawn from a source water body over a specific period of time. As mentioned above, all KeySpan plants are included by these criteria.

Under the proposed rule, a plant would have three options to establish that its CWIS is BTA: 1) demonstrate the existing system and operation currently meets the proposed specified performance requirements; 2) select, design and construct technologies and/or operational measures or restoration measures that meet the specified performance standards; or 3) demonstrate that the facility qualifies for a site-specific BTA determination because its costs of compliance are either significantly greater than those developed by EPA or the costs of compliance would be significantly greater than the environmental benefits of compliance with the proposed performance standards Facilities may also use restoration measures in addition to or in lieu of technology measures to meet performance standards or to establish BTA on a site-specific basis.

As we interpret this, our plants regulated under the above inclusive criteria must follow the following basic BTA determination process:

1.) First, answer the questions:

a.) Does the existing facility currently meet the proposed (estuarine) performance standards:
Intake capacity equivalent to a closed-cycle, recirculating system, or
Reduce impingement mortality 80-95% and entrainment 60-90%, from baseline.

If yes, then approval of the CWIS as BTA should be granted.

b.) If no, the following are options to meet the standards.

2.) Demonstrate (through new studies?) the plant currently meets the performance standards in 1a, or

3.) Select and implement design and construction technologies, operational measures and/or restoration/mitigation measures that meet the standards, or

4.) Demonstrate that the facility qualifies for a site-specific determination of BTA because its costs of compliance are significantly higher than estimated by EPA or significantly greater than benefits of compliance.

5.) In any event, it appears that a two-year study to demonstrate the CWIS is BTA would be required.

The proposed regulations also specify studies that must be implemented to document Impingement and Entrainment (I&E), and goes into detail on various methodologies, including economic models, to determine whether a plant may be employing BTA. Case studies are used as templates for the rationale behind I&E reduction.

EPA Response

Please refer to the preamble for a description of the framework of today's rule, which largely follows the approach discussed in the proposed rule. Facilities now may choose between five compliance alternatives. For a discussion of these alternatives, please refer to the preamble to the final rule.

EPA notes that the Consent Decree has since been amended and that final action for Phase II existing facilities is now due by February 16, 2004.

Comment ID 316bEFR.027.002

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code 6.01

Overview of I & E effects on organisms

BTA Determination

We feel that the process of determining BTA is flawed in that it appears to only allow for demonstration of BTA by meeting specific percentage reductions in fish impingement mortality and total entrainment numbers (not a reduction in entrainment MORTALITY). The process as proposed is inappropriately skewed toward the application of engineering controls for determining BTA. It makes no allowance for a demonstration that the plants may have been historically operating for decades without a demonstrable adverse impact on populations of fish in the adjacent waterbodies (even though EPA does acknowledge that reductions in I&E at certain locations may have benefits at population, community or ecosystem levels of ecological structures).

Our plants, and others, have been extensively studied over the years and those results have been scrutinized by regulators at the state and federal level as well as the lay public.

In our case, at least, it was determined that the plants demonstrated BTA as there was no discernable impact upon indigenous populations and Representative Important Species (RIS). Adult equivalent models were utilized that found that losses due to I&E were de minimis when compared to sport and commercial landings. The CWIS were declared BTA.

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion regarding environmental impacts associated with cooling water intake structures. For the discussion regarding entrainment mortality and compliance with the performance standards, please see the response to comment 316bEFR.305.001. See the preamble to the final rule regarding the availability of site-specific compliance alternatives.

Comment ID 316bEFR.027.003

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

It should be noted that these models were run assuming 100% I&E mortality when, in fact, subsequent studies demonstrated that mortality of many impinged and entrained species were far less than 100% and that survival was, in fact, quite good. We note that EPA has discounted entrainment survival as being unsubstantiated. We choose to differ; our studies, and others, have proven that survival is real and can approach 100% depending on the species and the time of year and plant operating characteristics. At the very least, EPA should allow for site-specific data on survival of species impinged and entrained at a specific plant, as well as extrapolation of survival data to nearby facilities with similar operating characteristics.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Due to the high variability and unpredictability of entrainment survival estimates, EPA does not support the extrapolation of survival data to nearby facilities with similar operating characteristics.

Comment ID 316bEFR.027.004

Subject Matter Code 10.01.02.02
Fish Population Modeling

Author Name A.Christopher Gross
Organization Keyspan Corporation

We also believe that it is inappropriate for EPA to disregard compensation as a legitimate mechanism that serves to maintain populations at or near equilibrium despite cropping pressures from natural sources as well as power plants and other anthropogenic sources (e.g.: recreational and commercial fishing). Compensation is a well-established natural mechanism, and applicants should be allowed to include it where it occurs in a relevant species.

EPA's sole determinant of CWIS impact and determination of BTA seems to rely on the "body count" of numbers of fish, fish eggs and larvae impinged and entrained. As noted, we encourage EPA to allow these numbers be adjusted by applying survival and compensation factors to determine ultimate impact to the total population, as has been successfully implemented and accepted in the past. If the ultimate population will not benefit from a reduction in power plant -induced predation on individual fish, neither the population nor the rate-paying public is well served by non-effective expenditures on alternate technologies.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.027.005

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

While EPA states that they will not specify any individual technique, structure or operational strategy as being BTA at a facility, the emphasis on body count reduction limits BTA options to very few, including various straining/filtering devices or cooling water flow reduction. Implementation of intake filtering, devices at salt-water sites is problematic as the marine environment is replete with a wide variety of aggressive fouling organisms that will likely occlude any filtering system in short order. Flow reduction techniques can cause an increase in cooling system discharge temperature exposure that might ensure that entrainment mortality is 100% rather than some lower percentage. And finally, off stream cooling forces a shifting of impact from the water to the land and air if cooling towers are employed.

EPA Response

EPA disagrees. To determine compliance with the performance standards, a facility is not required to use a specific methodology (e.g., body count, total biomass, etc.) to determine the reduction in impingement and entrainment. Please refer to section IX of the preamble to the final rule for more information on determining compliance and monitoring requirements.

EPA acknowledges that biofouling can be a problem at some intakes. However, EPA also notes that a variety of design and operational techniques (e.g., nickel alloy screens, air burst systems, chemical treatments, etc.) can reduce the negative effects of biofouling organisms.

EPA recognizes that the use of flow reduction measures or closed-cycle recirculating cooling can produce some secondary impacts. However, today's rule focuses on section 316(b) and applicable portions of the Clean Water Act. EPA has considered these other impacts in promulgating the final rule.

Comment ID 316bEFR.027.006

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

The calculation of the economic benefits and costs of applying BTA play a crucial role in whether or not existing facilities would qualify for site-specific BTA determinations. In addition, the manner in which the economic calculations are considered m the decision process also is critical to which technologies will be required for the site-specific cases We are concerned that EPA has employed inappropriate methodology and models in development of their economic criteria For instance, EPA appears to have employed avoided costs as a measure of benefits, which assumes that individuals would voluntarily pay those replacement costs. We seriously question that assumption and do not believe it is supported in the literature or in practice. We also question the validity of using habitat replacement costs to measure benefits. It seems basic economic principles have been misapplied. It would seem to be more appropriate to apply actual costs of production lost against mitigation costs. And finally, we believe that EPA has seriously underestimated the costs of providing off-stream cooling or other mitigative measures to plants located on saline waters. Once again, we will leave the detailed analyses and critique of the economic analyses to the comments that will be provided by EPRI, UWAG and EEI.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA’s response to comment #316bEFR.005.035.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.027.007

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name A.Christopher Gross

Organization Keyspan Corporation

The Process

After review of the proposed BTA determination process summarized above, we are unsure of the sequence and timing of activities required on the part of the applicant and the agency to demonstrate and determine BTA for a plant. We submit that demonstrations of compliance should be triggered by incorporation of such a requirement in the NPDES permit renewal process. In other words, if the permit administrator or his designee, upon review of the applicant's renewal application, determines that the applicant's CWIS may not be BTA, the issue could be addressed through a formal process and, if necessary, the permit could be modified to include a condition that the applicant then demonstrate, through studies or other means, that the CWIS is BTA. Absent such a process, the applicant would have to presume that his CWIS did not meet the BTA standard and would unnecessarily expend considerable time, effort and resources on a speculative assessment of risk.

EPA Response

EPA has clarified timing requirements in today's final rule. Please see response to comment 316bEFR.034.066.

Comment ID 316bEFR.027.008

Subject Matter Code 21.0

Implementation

Author Name A.Christopher Gross

Organization Keyspan Corporation

Applicability

We must assume that the proposed rules are intended to be implemented by EPA or designated representatives on a consistent basis. We are concerned that individual state permit administrators will not be constrained by the proposed rules but may use them as a stepping stone to force ever tightening restrictions on an applicant. With deregulation of the industry this could put certain regions or companies or individual plants at a competitive disadvantage, which could ultimately create an adverse impact upon electric reliability and cost to the consumer. We urge that EPA require consistency of approach and evaluation on a national or at least regional scale. Failing such a leveling of the playing field, regulators may advance individual agendas which could cause excessive energy costs and diminish energy reliability without commensurate improvement to aquatic populations.

EPA Response

EPA disagrees that it should prevent States from mandating more stringent performance standards than those set by today's rule, and it also disagrees that allowing States to set more stringent requirements will cause excessive energy costs. With the promulgation of the 316(b) Phase II final rule, EPA has set national performance requirements for the reduction of impingement mortality and entrainment that are based on a facility's flow and source surface waterbody type. EPA understands, however, that the original intent of the Clean Water Act includes broad authority for States to implement CWA requirements. Thus, EPA has left a great deal of discretion to the individual state permit administrators (Directors) in setting the appropriate requirements for their facilities, as long as the requirements are not less stringent than minimal federal requirements established by today's rule. While States are obligated to ensure that the facilities in their jurisdiction comply with minimum federal requirements, they are also authorized to set more stringent standards if they desire. EPA does not believe that allowing States to set more stringent requirements will negatively affect energy costs or reliability. Facilities have five alternative through which they may comply with the today's requirements. For examples, if a facility can demonstrate that its costs of compliance with the rule's performance standards would be significantly greater than the costs considered by the Administrator when establishing such performance standards, or that its costs would be significantly greater than the benefits of complying with the national performance requirements, it may be granted a site-specific determination of best technology available. This site-specific option addresses cases of exceptionally high costs or minimal benefits, and protects facilities against excessive costs and problems with energy reliability. This provision ensures that the costs of the rule are economically practicable and that there is a reasonable relationship between the costs of cooling water intake technology and the environmental benefits associated with its use.

Comment ID 316bEFR.027.009

Author Name A.Christopher Gross

Organization Keyspan Corporation

Subject Matter Code OPP

General Statement of Opposition

The document leaves many questions unanswered and it does not allow applicants to consider scientifically verified aspects of natural population dynamics such as entrainment survival and compensation. We respectfully submit that any regulation that will significantly affect the cost and reliability of electrical energy must incorporate the best scientific information available. We are concerned that the proposed regulation does not do so; instead, it will raise costs to achieve benefits that good science suggests will be illusory.

EPA Response

For information on entrainment survival, please refer to the entrainment survival chapter in the Regional Studies document (DCN 6-0003 in OW-2002-0049, the docket for the final rule).

For information on compensation in fish populations, please refer to the response to comment 316bEFR.025.015.

EPA disagrees that the final rule will have adverse effects on the energy supply and cost, and also disagrees that the rule will result in minimal environmental benefit. Please refer to sections XI and XII of the preamble to the final rule, as well as the Economic and Benefits Analysis (DCN 6-0002) and the Regional Studies document (DCN 6-0003) in the docket for the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Teresa Pugh

On Behalf Of:

American Public Power Assoc

Author ID Number:

316bEFR.028

Notes

UWAG (316bEFR.041)

Comment ID 316bEFR.028.001

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 6.08

Non-aquatic impacts

An introduction to public power and "green power":

In public debates about environmental protection, the various energy sources are often identified as either "dirty" or "green" power. However, electricity generation has a broad spectrum of environmental impacts. Each electricity generation source has distinct environmental impacts across the broad spectrum of generation sources, within certain generation sources, and between different sectors of the electric utility industry. Green power sources or programs are those that minimize negative impacts to the environment.

What is 'green power' and why is it important?

Public Power utilities have a great stake in generating energy in a manner that minimizes harm to the environment while promoting economic growth. The environmental impacts of generating power by a local, publicly owned electric utility affect its customers and its owners who are, in fact, one and the same.

APPA and conventional environmental impacts:

-Public power emissions rates of sulfur dioxide per Btu are 53 percent lower than IOUs and 37 percent lower than co-ops;
-Public power emission rates of nitrogen oxides are 18 percent lower than IOUs and 23 percent lower than co-ops;
-Public power emission rates of carbon dioxide are 5 percent higher than IOUs and 1 percent lower than co-ops;
-Public power has a greater mix of generation from sustainable resources, including hydro power and other renewable fuels;
-Many public power utilities, particularly large utilities, have begun to offer green pricing programs to their consumers;
-Over 56 percent of public power's operating coal units are less than 20 years old, while only 23 percent of the IOU coal units are under 20 years of age; and
-Public power has many other utility-specific programs to protect the environment and improve the sustainability of our energy resources.

EPA Response

EPA thanks the commenter for these observations; however, no further response is necessary.

Comment ID 316bEFR.028.002

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 17.0

Other technology-based opt. under consideration

APPA appreciates the effort that the EPA put into examining a variety of alternative approaches to the regulation.

EPA Response

EPA thanks the commenter.

Comment ID 316bEFR.028.003

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 17.06

Option: Site-specific determination of BTA

APPA is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.028.004

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

APPA is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the waterbodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

Comment supports rule. See section VII of the preamble to the final rule for a discussion of site specific determinations of BTA under this rule.

Comment ID 316bEFR.028.005

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 17.06

Option: Site-specific determination of BTA

APPA is encouraged that the Agency has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. APPA is a strong believer in deferring, where possible, to the states.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to the preamble to the final rule.

Comment ID 316bEFR.028.006

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 22.06

UMRA/Impacts on local governments

APPA believes that the EPA has underestimated the impact on public power systems. APPA believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power).

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.028.007

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 21.09

Permit applications/implementation schedule

APPA urges EPA and the states to implement the new 316(b) requirements with coordination with Regional Transmission Organizations (RTOs) to ensure reliable grid operations. APPA is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. APPA believes that the EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases—particularly during a peak use time such as mid summer or mid winter.

APPA believes that the EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies. These are not trivial concerns.

EPA Response

EPA expects Regional Directors and States to coordinate with Regional Transmission Organizations for downtime issues, as appropriate.

Comment ID 316bEFR.028.008

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code 22.03

Other regulatory requirements

ASSESSMENT OF EPA'S UNFUNDED MANDATES ANALYSIS ON PUBLIC POWER

Summary

The 316(b) Phase II regulation will impose greater compliance costs on in-scope public power systems than those estimated by EPA in the analyses required by the Unfunded Mandates Reform Act of 1995 (UMRA). Unfunded mandates pose a particular problem for local governments at this time, and the compliance costs have the practical effect of mandating a raise in the rates of the customers of municipally-owned systems. This equates to a tax increase at a time when many state and local governments are already raising taxes due to economic conditions. These rate increases deserve to be fully considered in the EPA analyses.

These comments address concerns with the EPA analyses in the following areas:

-The total estimated cost of the proposed option;

-Costs disproportionately borne by small power producers;

-The omission of the alternative with the greatest net benefits; and

-The effects of the rule on small governments.

UMRA requirements

Title II of UMRA requires that EPA conduct a series of economic analyses for any rules, proposed or final, that would impose unfunded mandates of $100 million or more in any one year on state, local, and Tribal governments, or on the private sector. The required analyses take two forms:

-A comprehensive benefit-cost analysis that considers a variety of alternatives. If EPA does not select the least-costly, most cost-effective alternative it must explain why in writing.

-An analysis of the regulation's effects to determine if the regulation will "significantly or uniquely" affect small governments. A finding that the regulation will "significantly or uniquely" affect small governments would necessitate that the Agency prepare a small government agency plan.

Both requirements are discussed in the following comments.

Issues of concern

1. EPA's benefit-cost analysis underestimates the costs of compliance, and does not include the most cost-effective alternative

The first requirement for a regulation meeting the $100 million threshold is a cost-benefit analysis that evaluates the proposed option and a "reasonable number" of regulatory alternatives. Section 205 of UMRA directs the Agency to adopt "the least costly, most cost-effective, or least burdensome alternative" that achieves the objectives of the rule. <FN 1>

APPA commends the Agency for proposing the alternative that maximizes net benefits according to EPA's analysis. Two issues remain, however:

-EPA substantially underestimates the costs of the proposed option, particularly as it applies to small businesses/public power systems; and

-The costs of the proposed alternative can be significantly reduced without a commensurate reduction in benefits.

2. EPA underestimates the costs of the proposed option for small facilities

The EPA analysis assumes that all of the costs are borne as easily by small facilities as by large ones. Most of the costs, however, are fixed costs that affect facilities equally, regardless of facility size. The resources available to large facilities permit greater flexibility in the resource shifts required to comply with the new requirements. EPA cannot fully determine the costs of compliance without adjusting the cost categories to reflect the fact that fixed compliance costs have a disproportionately greater impact on small facilities.

Two categories that the Agency needs to consider are provided below.

a) Permitting costs

Permitting costs are fixed costs incurred by all facilities regardless of size. In large facilities, environmental compliance staffs have the capability to more easily absorb the additional workload. Conversely, APPA members (predominantly small facilities) typically have environmental compliance staffs of 1-3 people (or full time equivalents). Small entities of this size have greater difficulty absorbing the labor/overhead costs of compliance associated with items such as:

-Preparing a compliance plan;
-Commissioning/overseeing the necessary scientific studies;
-Shepherding the applications and reapplications through the permitting process; and
-Complying with the various verifications and updates required by the permit.

EPA’s Economic and Benefits Analysis does not provide any indication that it takes into account the size of the firm/facility when calculating average costs. Correctly calculating the costs to small firms is particularly important as EPA fulfills its statutory requirements to consider the economic impact on small governments (UMRA) and small businesses (RFA/SBREFA).

B. The costs of downtime

EPA’s analysis assumes that compliance technologies will, on average, take only one month to install. EEI and others have commented that this is an optimistic figure – two months represents a better estimate of installation time. Public power systems, many of which are small and cannot make up production shortfalls by simply increasing generation from within their own systems, are obligated to provide uninterrupted service to specific territories. Consequently, when shutdowns occur, these systems must purchase power to balance the production loss. The public power system would be exposed to potentially volatile wholesale prices. This results in higher electricity costs for the population served by the public power system – a circumstance not accounted for in the EPA analysis.

c) Including a presumption of compliance for approved technologies will reduce the costs of the rule without reducing the benefits, thereby furthering the goals of UMRA

EPA's analysis is predicated upon the carefully vetted conclusion that the evaluated technologies will, in fact, result in the anticipated reductions in impingement and entrainment. The compliance requirements, however, still mandate that extensive studies take place after facilities install the approved technologies. Facilities must evaluate a defined set of baseline conditions at the facility (some of which may not even exist), model the effectiveness of the control technologies (which EPA claims to have already done), and monitor continued effectiveness.

A considerable percentage of the costs of the rule would be eliminated if the regulation permits the assumption of compliance when facilities install one of the EPA-approved technologies. Given EPA’s stated confidence in its evaluation of the modeled technologies, the Agency should be willing to forgo the substantial additional costs resulting from the post-installation demonstrations of efficacy. Facilities should only need to demonstrate that they properly installed the control technologies and continue to operate them effectively. If the facility meets these simple tests it should be deemed to be in compliance.

Such a presumption would significantly reduce the cost burden for both facilities and the State permitting agencies. It would not, however, reduce the benefits at all, presuming that EPA correctly evaluated the technologies.

Facilities that elect to install technologies other than the suites pre-approved by the Agency would still be required to provide a comprehensive, site-specific evaluation of the impingement and entrainment effects, thereby ensuring compliance.

3. EPA incorrectly determines that small governments would not be significantly or uniquely affected by the proposed rule

a) The UMRA Process

In order to fulfill the second of its UMRA responsibilities, EPA must determine whether or not the regulatory requirements will significantly or uniquely affect small governments. If compliance will impose significant or unique effects, the Agency must develop a small government agency plan in accordance with Section 203 of UMRA. The plan must provide for:

-Notifying potentially affected small governments;

-Enabling officials of affected small governments to have meaningful and timely input into the development of the rule; and

-Informing, educating, and advising small governments on the compliance requirements.

b) EPA’s determination

EPA determines that the proposed rule would not have significant or unique effects on small governments. The Agency reaches this conclusion after a cursory and flawed analysis summarized by the following statement:

The per-facility average compliance cost incurred by facilities owned by small governments is less than the per-facility compliance costs incurred by facilities owned by large governments and privately-owned facilities subject to the proposed Phase II rule. <FN 2>

EPA bases this conclusion upon Table B5-6: <FN 3>

[see hard copy for table]

These numbers present a meaningless snapshot of relative costs, and do not address either the “significant” or the “unique” thresholds mandated by statute.

a) “Significant” effects

EPA never defines "significant" as it applies to the evaluation of economic impact on small governments, such as public power. In the absence of a definition, a simple comparison of per-facility costs cannot possibly determine whether or not small governments will incur significant costs as a result of compliance. For example, all of the facilities, small-government owned or not, may be "significantly" impacted, thereby rendering the comparison irrelevant.

A reasonable definition of “significance” might include whether or not:

-The costs will be sufficient to affect the economic viability of the facility;

-The costs will place “significant” financial or legal pressure on the affected governments (e.g., breach of contract with the service area); and/or

-Compliance will disproportionately affect small-government-owned facilities.

At the very least, EPA must describe the criteria by which the Agency determines that the costs to small governments are "insignificant." Why does EPA believe that the per-facility cost is the accurate measure? Would the Agency have considered a higher per-facility cost “significant?” If so, how much higher must it be? How many facilities would have to close? According to a recent APPA study, governments running small public power utilities (defined as those under $100 million) make significant payments to a local government. The median value of the net payments from the utility to the government’s general fund is 5.7% of the total electric operating revenue. <FN 4>

The additional costs of compliance with this rule could erode or completely erase those payments.

Small governments would then be forced to decide between two damaging measures – increasing electricity rates or increasing taxes. Either option could constitute a “significant” impact, depending upon the severity of the shortfall. EPA clearly needs to consider the ramifications of depleting these payments prior to determining that compliance will not “significantly” impact small governments.

b) “Unique” Effects

EPA once again fails to define what would constitute “Unique Effects” on small governments. What would a unique effect look like? Since EPA cannot possibly make an UMRA-compliant certification without defining “unique”, the Agency should inform the regulated public what definition it uses to make the determination of “no effect.”

APPA feels that a reasonable definition would take into account:

-The potentially “unique” impacts of the contractual obligations public power facilities have with their service areas to provide reliable electricity; and

-The substantial revenue generated for the city by the power facilities, and the subsequent effects on the rate base should compliance costs significantly affect a given public power system.

Both of these criteria reflect the circumstances that make public power systems unique in the utility industry. Given the captive nature of the population served and the interdependent relationship between the municipality/government entity and the electric utility, APPA feels that there are certainly “unique” effects that deserve special consideration.

Conclusion regarding the EPA “Unfunded Mandates Act Analysis”

A regulation that forces local governments to raise rates at a time when they can ill-afford to do so certainly deserves careful scrutiny prior to promulgation. Small public power systems frequently face additional friction when increasing the cost of power to cover the costs of compliance. For example, some have rate contracts that can only be changed through rate hearings. A comprehensive UMRA analysis will help the Agency to fully account for these and other economic impacts of the Phase II regulation. EPA needs to make the following additions to its benefit-cost analysis:

-A more rigorous examination of economic costs disproportionately borne by small businesses; and
-The inclusion of the technology-based option that would reduce the costs associated with permitting, monitoring, and uncertainty, yet would not reduce benefits.

In addition, APPA believes that the Agency needs to revisit its determination under Section 203 of UMRA by both reconsidering the effects on small governments and explicitly stating the Agency’s assumptions and definitions. Small governments, with their unique status, face significant challenges that deserve consideration prior to the promulgation of the rule.

Footnotes

1 Unfunded Mandates Reform Act of 1995, Title II, Pub. L. 104-4, Section 205

2 U.S. Environmental Protection Agency, 2002. Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule, p. B5-7

3 U.S. Environmental Protection Agency, 2002. Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule, p. B5-7

4 American Public Power Association, 2002. Payments and Contributions By Public Power Distribution Systems to State and Local Governments, 2000 Data.

EPA Response

See response in file "Comment Response 316bEFR.028.008.wpd", DCN# 6-4003.

Comment ID 316bEFR.028.009

Author Name Teresa Pugh
Organization American Public Power Assoc

Subject Matter Code 22.02
SBREFA requirements

ASSESSMENT OF THE ECONOMIC IMPACTS ON SMALL BUSINESSES

Summary

EPA does not accurately assess the probable economic impacts of compliance with the 316(b) proposed rule on small businesses for the following reasons.

-The methods used to determine economic effects are inaccurate and poorly defined, resulting in highly questionable conclusions. These methodological flaws are correctable using widely-accepted economic principles that are consistent with EPA's own guidance.

-The definition of "small business" as it applies to the industry is too narrow and requires revision. APPA provides an alternative definition that provides the opportunity for a more comprehensive evaluation of the proposed rule's true impact on small businesses.

RFA/SBREFA Requirements

The Regulatory Flexibility Act as amended by the Small Business Regulatory Enforcement Act of 1996 (RFA/SBREFA) requires that EPA determine whether or not the proposed rule will have a significant economic impact on a substantial number of small entities. If the Agency determines that the rule will not have a significant economic impact, it must certify that finding. If, however, the Agency finds that the rule will impose a significant economic impact on small businesses, it must undertake further analysis and provide for additional public comment.

EPA SBREFA Analysis

For the purposes of the 316(b) Phase II proposed rule, "small entity" is defined as one with the following characteristics:

-A small government jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000;

-A small organization that is a not-for-profit enterprise which is independently owned and operated and is not dominant in its field; or

-For private firms, the size threshold is 4 million MWh, and is set by the Small Business Administration (SBA) size standards.

For 316(b) Phase II, EPA certifies that the proposed standards would not have a significant economic impact on a substantial number of small businesses based upon three findings:

1. The limited absolute number of small entities expected to incur compliance costs (28 total

facilities);

2. The low percentage of all small entities in the entire electricity generating industry expected to incur compliance costs (1.3 percent); and

3. The insignificant magnitude of compliance costs as a percentage of sales revenue (no facility incurs compliance costs of more than 5.3 percent, and 17 faced less than 1 percent).

Issues of concern

1. EPA needs to expand the definition of "Small Business" for Public Power utilities

To meet the current definition, a public power producer must have a service area of fewer than 50,000. This definition is too narrow to include all of the public power systems that have significant small business characteristics. The EPA analysis of the small business universe for the Phase II rule found that 39.4 percent of the municipalities, municipal marketing authorities, and political subdivisions that would be defined as "small" under the threshold for private utilities (4 million MWh) did not meet the population threshold for public entities. There is no reason why facilities producing fewer than 4 million MWh should have to meet an additional threshold that results in exclusion from the small business universe. These facilities face the same relevant small business issues as their private counterparts.

APPA recommends that the following threshold be implemented

-Eliminating the population threshold altogether and base inclusion solely on the generation ceiling

This change will result in an additional approximately 90-100 public power facilities <FN 5> meeting the definition of “small business” in the final Phase III rule. EPA has the authority to change the small business definition through consultation with SBA and affected industry, provided that all parties agree.

2. EPA’s certification of “No Effect” is flawed

APPA believes that EPA has incorrectly analyzed the effects of the regulation on small businesses by neglecting both basic economic theory and EPA’s own guidance for determining economic impact. The three findings listed above do not accurately reflect the true economic impacts of the regulation, leading to a potentially erroneous determination that a “substantial number” of small businesses will not suffer “significant economic impact” as a result of the rule.

a) Determination of a “substantial number” of small businesses

The EPA analysis concludes that a “substantial number” of small businesses will not be affected. This conclusion is based upon an analysis that identifies only 28 facilities. As stated earlier, APPA believes that this number is too low because of the criteria EPA used to define “small business.” <FN 6>

In addition, APPA believes that a finding based upon numbers alone is insufficient to meet the

RFA/SBREFA test – EPA also needs to consider the effects resulting from geographic distribution. EPA's own Revised Interim Guidance for EPA Rulewriters clearly states that the threshold for a "substantial number" should be lowered in those instances where region-specific costs are "substantial."

It is appropriate for EPA to consider whether alternative approaches to defining "substantial number" should apply because:

"Where the extent of the impacts, measured in economic or non-economic terms, would be of sufficient magnitude (e.g., potential collapse of a viable regionally-concentrated fraction of an industrial sector)..." <FN 7>

EPA did not assess whether or not the unique nature of municipal/state-owned facilities will result in substantial regional impacts, despite the fact that its own guidance explicitly directs the Agency to do so. Given that EPA's analysis indicates that all 28 of the "small" in-scope facilities are owned by municipalities, political subdivisions, or rural electric cooperatives, EPA clearly needs to reassess the definition of a "substantial number" to potentially include the local and regional effects resulting from the cost impacts of compliance.

b) The estimated compliance costs would significantly erode the contributions from Public Power systems to municipal governments.

The cost of compliance of this rule could equal a significant portion (if not all) of the utility's contribution to the municipality. Any shortfall in the expected payments would have to be made up, either through rate increases to the municipality's power customers or by raising taxes in another sector. Neither option is a popular one from the perspective of the affected public.

c) EPA's methodology used to determine "no significant impact" is inappropriate

EPA's methodology for determining significance of economic impact is inappropriate. EPA uses the ratio of compliance costs to sales revenue as the criterion to determine whether or not the proposed regulation would impose a "significant" economic impact on the in-scope small businesses. EPA evaluates each category of small entity individually, and concludes that the regulation will not "significantly impact" any of the small business segments.

Table B4-5 of the Economics and Benefits Analysis Document provides the results: <FN 8>

[see hard copy for table]

This test is insufficient in two ways. First, EPA does not consider the full range of costs that compliance will impose on small businesses. A list of these costs is described in detail in the UMRA section of these comments. Second, EPA evaluates the costs through the Cost-To-Revenue Test (CRT), also known as the "sales test" method, which calculates the ratio of the annualized post-tax compliance cost for each firm or facility against the firm/facility's total annual gross revenue. If this ratio is smaller than three percent, the entity is judged not to be "significantly impacted" as a result of the rule.

i. The method is not economically sound

The CRT method cannot, except through sheer chance, provide a meaningful estimate of economic effect. The CRT compares annualized compliance costs against annual gross revenues for each facility. Gross revenue is a meaningless measure of economic viability -- a large company can have annual gross revenues exceeding hundreds of millions of dollars, and yet still have negative annual net revenues when costs and debt are taken into consideration. The net margins within the electric power markets are low (this is consistent with most commodity markets), and are expected to shrink even further in the wake of expanding deregulation.

ii. A better method exists

An effective analysis of the economic impact of compliance on firm/facility viability must examine compliance costs against some form of net revenue in net present value terms. In the case of investor-owned utilities, this takes the form of profit. Public power systems do not operate on a “profit” basis. However, a public power system’s responsibilities to its parent entity (municipality, political sub division, etc.), generally involves making transfers to the “general fund” of the parent in the form of net payments and contributions. These net payments are approximately equal to the amount by which the system’s revenues exceed its costs of production, and are generally factored into the parent entity’s expected revenue stream as a form of return on investment.

iii. Illustration of misleading results from the application of the Cost-to-Revenue Test (CRT)

This is particularly the case in industries, like electric utilities, with low net margins. The example below illustrates the misleading nature of CRT in the utility industry and the importance of basing economic impact evaluations on a relevant form of net revenues.

Hypothetical Public Power Example

-Annual Gross Revenues: $12.0 million

-Annual Outflows (O & M costs, debt servicing, etc): $11.44 million

-Annual Net Payments and Contributions to Municipality: $564,000

-Net Payments to the General Fund: 4.7 percent

Assume that the facility described above would only incur the average EPA-estimated compliance cost per small government-owned facility of $273,000. EPA would conclude from the CRT analysis that the firm is not significantly affected by the imposition of compliance costs since the ratio of cost of compliance to gross revenue is less than 2.3 percent - well short of the 3.0 percent threshold.

If the analysis is done correctly, however, the conclusion is exactly the opposite. As a result of compliance, annual net payments and contributions to the municipality decrease by 51.6 percent. This shortfall in the expected revenues of the municipality must then be recovered, either through a rate increase or additional taxes.

iv. EPA's guidance shows a preference for the alternative method

EPA does, in fact, recognize that measuring costs of compliance against some measure of net revenues is the best available measure. In the 1999 Revised Interim Guidance for EPA Rulewriters, EPA states that:

"Conceptually, we believe that a profits test represents the most accurate screening analysis for determining whether a regulation will pose a significant economic burden on small businesses…" <FN 9>

"Our goal is to develop a profits test that may be used in addition to, or in preference to, the sales test when there are sufficient reliable data to support it..."

Comparing the cost of compliance against this margin provides a better estimate of economic impact than the CRT. The transfers to the general fund are a very important source of funds to the municipality/political subdivision, and represent a reasonable approximation of public sector "profit."

v. The necessary data is available for public power systems to construct an alternative analysis

The EPA guidance explains that the profits test is generally prohibitively difficult to implement because it requires that EPA either obtain actual profit information from a given industry or estimate those profits off of incomplete data. In the case of this regulation, however, the universe of small government-owned businesses is composed of facilities/firms that must report net payments as a matter of public record through the city budgets. Since the Phase II universe of small businesses is exclusively composed of public power systems, the net payments data for the entire small business impact evaluation is available.

Conclusions regarding the EPA analysis of "significant impact"

The CRT is an unreliable method of assessing the economic impact of a regulation on a specified population. Given the availability of the net payment/contribution data, a comparison of compliance cost to net payments/contributions is entirely consistent with both generally accepted economic principles and EPA's own internal guidance. In addition, EPA should factor the full range of costs, including those that are unique to small businesses, into the net effects calculation. This adjusted analysis should be done prior to EPA certifying that the regulation will have not have "a significant economic impact" on small businesses.

Footnotes

5 Based upon EIA's 767 2000 analysis of facilities with < 50 MGD average withdrawal rate.

6 It is possible that EPA's number is too low because the EIA database or EPA Detailed Questionnaire did not cover all public power facilities.

7 1999 Revised RFA/SBREFA Guidance for EPA Rulewriters.

8 U.S. Environmental Protection Agency, 2002. Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule, p. B4-7

9 1999 Revised RFA/SBREFA Guidance for EPA Rulewriters, p. 20

EPA Response

BACKGROUND

The results of EPA's small-entity impact analysis for the final 316(b) Phase II rule show that the rule will not have a significant economic impact on a substantial number of small entities (see Chapter B4 of the Economic and Benefits Analysis Document, DCN 6-0002). EPA disagrees with the commenter's statement that EPA has incorrectly analyzed the effects of the 316(b) Phase II rule on small businesses.

For the proposed 316(b) Phase II rule, EPA estimated that 28 total entities were small. EPA has updated its analysis for the final Phase II rule and estimated that only 25 Phase II entities are considered small. This estimate is not materially different than that estimated for the proposed rule (see Chapter B4, DCN 4-0002). Final rule estimates of the number of small entities with cost-to-revenue ratios in certain ranges and the percentage of all small entities affected are also not materially different from the proposed rule. EPA's response to this comment on proposal results therefore equally applies to the final rule.

The commenter raises two principal issues:
(1) "The definition of "small business" as it applies to the industry is too narrow and requires revision."
(2) "The methods used to determine economic effects are inaccurate and poorly defined, resulting in highly questionable conclusions." (p. 10 of original comment)

EPA's responses to both issues are provided below.

(1) DEFINITION OF "SMALL BUSINESS"

The commenter states "EPA needs to expand the definition of "Small Business" for Public Power utilities." The commenter argues that instead of using the small government threshold of a population of 50,000 or less, EPA should have used the Small Business Administration threshold for SIC code 4911 of 4 million MWh.

EPA response: EPA notes that its approach of using the population threshold of 50,000 or less for municipalities and political subdivision is consistent with the definition of "small government" specified by the RFA/SBREFA. However, for the final 316(b) Phase II rule, EPA conducted a sensitivity analysis of the entity size determinations for publicly owned power producers (i.e., municipalities and political subdivisions) based on the Small Business Administration threshold for SIC code 4911 of 4 million MWh. Based on this alternative size determination criterion, an additional 14 municipal entities would be considered small (these are considered large based on population). Overall, the number of small governments would increase from 16 to 30; the number of all small entities subject to Phase II regulation would increase from 25 to 39.

EPA believes that this number is still small, both in an absolute sense and compared to the total number of small entities in the industry. EPA also notes that ten of these additional 14 entities have cost-to-revenue ratios of less than 0.5 percent, two have ratios between 0.5 and 1.0 percent, two have ratios between 1.0 and 3.0 percent, and none have ratios of 3.0 percent or greater. Based on the results of this sensitivity analysis, 39 total entities are small, with only one entity expected to incur compliance costs greater than 3.0 percent of revenues. EPA also estimated that the rule will affect only 1.3 percent of the universe of small entities that own electric power generating facilities. This sensitivity analysis shows that EPA's finding of no significant economic impact on a substantial number of small entities is still valid under the alternative definition of a small entity. (See the Appendix to Chapter B4 for the results of this sensitivity analysis; DCN 6-0002.)

In reference to using electricity sales as the appropriate criterion for determining entity size, the commenter states:
"This change will result in an additional approximately 90-100 public power facilities meeting the definition of "small business" in the final Phase III rule." (p. 11 of original comment). EPA notes that this final rule pertains to Phase II facilities and does not address Phase III issues.

(2) EPA'S FINDING OF "NO EFFECT"

The commenter asserts that "EPA has incorrectly analyzed the effects of the regulation on small businesses by neglecting both basic economic theory and EPA's own guidance for determining economic impact." (p. 11 of original comment) The commenter cites several reasons for this claim:

(a) Determination of a "substantial number" of small businesses.

The commenter argues that EPA underestimated the number of small entities because of the criteria used to define small business and because EPA's analysis may not have covered all public power facilities. For a response to the first point, please see the discussion in Section (1) above. EPA disagrees with the claim that its analysis may have excluded some public power facilities. EPA performed a census of all utility power plants, including public power plants, with at least one non-retired steam-electric generator (based on the 1995 Form EIA-860). EPA then applied sample weights to account for non-responses, although it should be noted that the response rate was close to 100 percent. EPA is confident that this approach captured the universe of facilities, as of 1995, that must comply with the Phase II rule. For further details, please see also EPA's response to comment #316bEFR.072.202 in subject matter code 9.0.

The commenter further suggests that "the threshold for a 'substantial number' should be lowered in those instances where region-specific costs are 'substantial.'" EPA notes that the 25 small facilities are located in 16 states, including only one state where more than two facilities are located (four facilities are located in three Michigan counties). Given the broad regional distribution of the small Phase II facilities, EPA judges that affected small entities are not sufficiently concentrated regionally to warrant adjustment to the concept for determining a 'substantial number' of small entities.

(b) The estimated compliance costs would significantly erode the contributions from Public Power systems to municipal governments.

The commenter states that "[t]he estimated compliance costs would significantly erode the contributions from Public Power systems to municipal governments." (page 12 of original comment). EPA refers the reader to the following section for a response concerning the appropriateness of using the sales test method to assess the economic impacts on small entities. For a discussion of the impacts of rule on municipal government entities please see comment #316bEFR.028.008 in subject matter code 22.03.

(c) EPA's methodology used to determine "no significant impact" is inappropriate.

The commenter states that "[a]n effective analysis of the economic impact of compliance on firm/facility viability must examine compliance costs against some form of net revenue [...]" (p. 13 of original comment). EPA disagrees that such an analysis is required for the SBREFA analysis in support of the final Phase II rule. The analysis conducted by EPA is a standard screening mechanism to assess the likelihood of a "significant economic impact on a substantial number of small entities." It is generally accepted that significant economic effects are unlikely below a cost-to-revenue ratio of three percent.

The commenter cites EPA's "1999 Revised Interim Guidance for EPA Rulewriters" (p. 20; DCN 6-4104):

"Conceptually, we believe that a profits test represents the most accurate screening analysis for determining whether a regulation will pose a significant economic burden on small businesses."

However, the commenter omitted the sentence immediately following this text, which states EPA's current preference for use of the sales test.:

"However, because of procedural and operational issues associated with the implementation of a profits test, a sales test remains our preferred quantitative guideline at this time."

The discussion continues, as the commenter's second excerpt from the guidance document indicates (p. 20):

"Our goal is to develop a profits test that may be used in addition to, or in preference to, the sales test when there are sufficient reliable data to support it..."

However, the commenter, again, excluded the last part of this sentence, which reiterates the need to resolve certain issues before adopting the profits test as the preferred approach:

"...and the procedural and operational issues have been resolved"

In addition to these existing concerns over using some measure of net revenue as a basis for measuring the impact of compliance costs on small entities, data are not readily available that would allow a consistent profits test approach to be employed across all entity types. EPA corrects the commenter's following statement:

"Since the Phase II universe of small businesses is exclusively composed of public power systems, the net payments data for the entire small business impact evaluation is available." (page 14 of original comment).

EPA notes that for the proposed rule, the universe of small entities consisted of government entities (i.e. municipalities) as well as cooperatively owned businesses. For the final 316(b) Phase II rule, the sample of small entities analyzed includes two privately owned facilities and six cooperatively owned facilities, in addition to 16 municipalities and one political subdivision. This scenario reflects the concern stated in the 1999 Revised RFA/SBREFA Guidance for EPA Rulewriters (pp. 20-21):

"Because data on profits are limited, especially for small businesses, routine use of a profits test would require us to estimate profits for small businesses where there are currently insufficient data. For example, sufficient data are unlikely to exist across all SIC codes that a regulation affects. This would limit our ability to rely on consistent information to determine the magnitude and scope of economic impacts on small business [...]"

EPA therefore believes that its decision to use the sales test in support of its Phase II SBREFA analysis is appropriate.

Comment ID 316bEFR.028.010

Author Name Teresa Pugh

Organization American Public Power Assoc

Subject Matter Code MISC

Miscellaneous comment

APPA submitted with its comments (OW-2002-0049, 4-1.28 in the docket or 316bEFR.028 in this database): “Shades of green: public power's environmental profile”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.028.011

Author Name Teresa Pugh
Organization American Public Power Assoc

Subject Matter Code NEW
Comment on new (Phase I) facility rule

APPA submitted with its comments (OW-2002-0049, 4-1.28 in the docket or 316bEFR.028 in this database): “Comments of APPA on NFR”

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Elise N. Zoli

On Behalf Of:

Godwin Proctor Counselors at Law obo
Entergy Corporation

Author ID Number:

316bEFR.029

Notes

EPRI (316bEFR.074), UWAG (316bEFR.041)

Comment ID 316bEFR.029.001

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code OPP

General Statement of Opposition

The EPA's proposed Rule seeks to apply § 316(b) to "existing" facilities, effectively compelling the retrofitting of most "base load" and many "peaking" electric-generating stations with extremely costly technologies, such as cooling towers, to offset presumed impingement and entrainment losses due to cooling water intake structures ("CWISs"). To do so, EPA has proposed so-called "performance standards," which compel facility owners to reduce, in a manner commensurate with closed-cycle cooling, impingement mortality by approximately 80-95%, and entrainment mortality by approximately 60-90%, as compared to a "baseline" condition established by EPA.

EPA Response

Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.029.002

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04

EPA's legal authority to:

There are multiple, systemic flaws with the proposed Rule. It ignores the statutory language, which does not support application of § 316(b) to existing, as distinct from new, facilities, particularly in the context of National Pollutant Discharge Elimination System ("NPDES") permits. Even assuming for argument's sake that the Rule is applicable to existing facilities, the Rule's flaws remain significant and pervasive. Among these several flaws, EPA erroneously concludes that existing facilities subject to the Rule, some of which have studied the fisheries communities for three decades, invariably have a demonstrable adverse environmental impact ("AEI") on those communities.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.029.003

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The Rule fails to establish that, even accepting EPA's presumption that individual losses resulting from entrainment and impingement constitute an AEI, such impacts reasonably warrant the installation of costly technologies. This is particularly the case to the extent EPA seeks to require, through poorly veiled "performance standards," cooling-tower retrofits, for which the costs of compliance may be disproportionately greater at nuclear facilities than at fossil-fuel facilities, and which implicate questions of nuclear safety within the sole jurisdiction of the Nuclear Regulatory Commission (the "NRC").

EPA Response

EPA disagrees that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

Comment ID 316bEFR.029.004

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA grossly underestimates the costs of such technology, which, if appropriately estimated, cannot reasonably be compared to the nominal possible benefits to aquatic communities of reducing entrainment and impingement attributable to once-through cooling.

EPA Response

EPA has decided not to base the requirements of the final rule on cooling tower technology.

Comment ID 316bEFR.029.005

Subject Matter Code 10.02

Benefit Estimation Methodology

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

EPA grossly overstates the social and economic benefits of its select technologies and the Rule.

EPA Response

The commenter asserts that EPA's benefits estimates are "grossly overstated". The Agency disagrees. EPA’s approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA’s Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003). In fact, the Agency believes that its analysis provides lower bound estimates of the final rule’s benefits. Please see the final Phase II Regional Studies Document (DCN # 6-0003).

Comment ID 316bEFR.029.006

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA fails to provide a cogent basis in the administrative record for the benefits-costs analysis that is the crux of the Rule.

EPA Response

EPA disagrees that its benefits-costs analysis is poorly documented. The Agency followed standard docket compilation procedures that govern how background and supporting materials should be provided to the public docket. EPA believes that its administrative record provides adequate information.

Comment ID 316bEFR.029.007

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

EPA fails to adequately account for the differential impact on regulated, as distinct from unregulated, facilities, with the result that a superficial consistency produces perhaps unintended, but no less troubling, differential impacts. Indeed, apparently under the mistaken impression that EPA's role is to "correct" the market, EPA creates inequities that have the potential to fundamentally alter the electric-power supply for the nation.

EPA Response

EPA disagrees with this comment. EPA believes that in a deregulated market, the distinction between utilities and nonutilities is no longer relevant. While such a distinction may have been important in the past, when only a few unregulated nonutilities competed with regulated utilities, this is no longer the case. The share of Phase II facilities that are owned by unregulated entities has increased from 2 percent in 1997 to 31 percent in 2001. By the time the final rule will take effect, even more Phase II facilities that currently operate under a rate-based system will be operating in a competitive market. Furthermore, EPA does not believe that nonutilities will be differentially impacted compared to utilities, even in the case that deregulation might not have taken effect in all markets by the time this rule is implemented. Competitive pressures, even in regulated environments, will reduce the ability of utilities to pass on costs to their consumers.

Comment ID 316bEFR.029.008

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 17.0

Other technology-based opt. under consideration

None of these shortcomings, moreover, is addressed by EPA's "alternative" approaches to §316(b) decision making, which purport to allow the Agency flexibility where the costs of meeting the performance standards are "significantly greater" than either the benefits of complying or the average costs that EPA has developed. While Entergy supports the concept of flexibility as essential to the proper implementation of the Rule, it does not support the ambiguous standard EPA has proposed, particularly one that does not establish a clear 1:1 ratio for a sound benefits-costs analysis. Indeed, anything that compels a standard in excess of economic "practicability" contravenes the legislative history for § 316(b) and, therefore, must be rejected.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the preamble for more information.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.029.009

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 21.06.01

Implications for nuclear facilities

Likewise, Entergy cannot support a test, which effectively penalizes nuclear facilities, as may be the case, absent clarification of the Rule’s application.

EPA Response

See response to comment 316b.EFR.029.053.

Comment ID 316bEFR.029.010

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Rather, Entergy supports the concept of site-specific determinations, consistent with nearly three decades of EPA and state practice. This approach is important, in the case of nuclear facilities, to maintain consistency with the NRC's approach in facility relicensing. It is essential as a scientific and, therefore, as a sound policy matter.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

Comment ID 316bEFR.029.011

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04

EPA's legal authority to:

EPA'S PROPOSED RULE FOR EXISTING ELECTRIC-GENERATING STATIONS IS ULTRA VIRES.

The single-sentence mandate of § 316(b) provides in its entirety:

Any standard established pursuant to section or section and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

33 U.S.C. § 1326(b).
In the Rule, EPA sets forth the purported "legal authority" for the Rule, see 67 Fed. Reg. at 17124-25, which it proposes to implement through NPDES permits. See Id. In those few and unconvincing paragraphs, EPA necessarily concedes:

-Section 316(b) does not fall within the legal limits of EPA's (or states') authorization to issue NPDES permits under § 402 of the CWA. See 67 Fed. Reg. at 17125 ("NPDES permits restrict the types and amounts of pollutants, including heat, that may be discharged from various industrial, commercial, and other sources of wastewater.").

-Section 316(b) does not fall within the legal limits of 301 or 306, both of which solely govern discharges. See, e.g., 67 Fed. Reg. at 17125 ("Section 306 of the CWA requires that EPA establish discharge standards for new sources.") (emphasis supplied); id. ("Sections 301, 304, and 306 of the CWA require that EPA develop technology-based effluent limitations guidelines and new source performance standards that are used as the basis for technology-based minimum discharge requirements in wastewater discharge permits.").

Without statutory authority, EPA nonetheless maintains that § 316(b) somehow is "closely linked" to "several of the core elements" of the NPDES permit program and, therefore, that every existing electric-generating station, at each five-year permit-renewal, is subject to §316(b). See 67 Fed. Reg. at 17125.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.029.012

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04

EPA's legal authority to:

Section 316(b) Does Not Apply to Existing Facilities.

EPA's "closely linked" argument is baseless. Section 316(b), by its express terms, is not applicable to facilities with existing CWISs. <FN 3> Rather, as discussed below, § 316(b) mandates a one-time, pre-construction review of the "location, design, construction, and capacity" of a CWIS. See 33 U.S.C. § 1326(b) (emphasis supplied). The plain language of 316(b) confirms as much, by expressly including the term "construction," which simply cannot reasonably apply to facilities with existing CWISs. The plain language emphasizes the point, by linking the operative requirements of § 316(b), i.e., the location, design, construction and capacity, with the conjunction "and." This telling link confirms that all four factors are to be considered simultaneously. Since at least half of these factors could not reasonably apply to a facility with an existing CWIS, i.e., construction or location, it simply cannot be that the § 316(b) factors apply to existing facilities.

That the plain language of § 316(b) does not support its application to facilities with existing CWIS is hardly surprising. Certainly, Congress never contemplated that the "location, design, construction, and capacity" of CWIS for electric-generating stations, infrastructure that may cost tens to hundreds of millions of dollars to locate, design and construct, would be subject to modification at every five-year NPDES-permit-renewal cycle. See 33 U.S.C. § 1326(b) (emphasis supplied). The legislative history for § 316(b) confirms as much in a telling exchange among several then United States Senators. More particularly, in 1971, Senator Charles Mathias asked Senator Edmund Muskie, one of § 316(b)'s proponents, whether, in light of the EPA's attempts to require "new steam electric power plants" to build cooling towers, every power facility "to be built anywhere in the United States in the future would have a cooling tower." 117 Cong. Rec. 38855 (1971) (statement of Senator Mathias) (emphasis supplied). Senator Muskie responded: "In the case of power generating facilities, it is the discharges from the cooling towers, ponds, lakes and so forth, that the committee is concerned with, not the technology." Id.4 Senator Mathias's question demonstrates that Congress understood that, at the time of § 316(b)'s enactment, § 316(b) was limited to new facilities, i.e., those "new" facilities "to be built" sometime "in the future." Id. <FN 4> (emphasis supplied). Senator Mathias, undoubtedly concerned about the impacts of the statute on national power production, simply would not have asked the question as be did, if he believed that the statute applied equally to existing facilities. Likewise, had Senator Mathias's question revealed a fundamental misconception of the scope of § 316(b), Senator Muskie - as a proponent of § 316(b) and fully aware of its breadth—would have corrected Senator Mathias's misconception, clarifying the broader application of § 316(b) to existing facilities. In fact, no such correction occurred. <FN 5> Thus, the exchange provides a contemporaneous memorialization of congressional intent, which is that § 316(b) does not apply to existing facilities.

The legislative history is confirmed by other environmental laws. Indeed, § 316(b) is precisely the sort of pre-construction mandate typified by the National Environmental Policy Act, 42 U.S.C. § 4331, et seq. ("NEPA"), and its various state analogues. See, e.g., 42 U.S.C. §4332 (requiring detailed statement on environmental impact of major federal actions); 40 C.F.R.§ 1508.18 (defining, in NEPA context, major federal action to include “approval of specific projects, such as construction or management activities”); see also State Environmental Quality Review Act (“SEQRA”), N.Y. Envtl. Conserv. Law § 8-0109(2) (requiring environmental impact statement on any action that may have significant effect on environment); 6 N.Y.C.R.R. §617.2(b)(l) (defining action to include “projects or physical activities, such as construction or other activities, that may affect the environment by changing the use, appearance, or condition of a natural resource or structure”). The gravamen of these laws—each similar to § 316(b)—is that they apply to proposed projects or substantial expansions, not to existing facilities.

Footnotes

3 Substantial reconstruction or expansion of a CWIS, including at an existing facility, may trigger reconsideration under § 316(b).

4 The statement expressly provides that Congress’s disproportionate concern is with discharges, not CWIS. Id. EPA’s Rule would fundamentally reject that clear congressional direction.

5 The conclusion that § 316(b) does not apply to existing facilities is strengthened by Congress’s omission of any explicit grandfathering provision. If - as EPA contends - 316(b) were applicable to existing units, such a provision would have been customary. In fact, however, Congress simply never contemplated that such a provision contemporaneous memorialization of congressional intent, which is that § 316(b) does not apply to existing facilities. Was necessary for 316b because it did not - as the above exchange makes clear – understand 316b to apply to existing facilities

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.029.013

Subject Matter Code 2.04

EPA's legal authority to:

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Section 316(b) Cannot Be Implemented in NPDES Permits.

The fact that § 316(b) does not apply to existing facilities is further supported by the absence of any statutory basis for implementing § 316(b) in NPDES permits—the primary mechanism for regulating existing facilities.

NPDES permits address surface water discharges, primarily through § 301 effluent limitations. See 33 U.S.C. § 1342, 1311. Indeed, effluent limitations solely regulate surface water discharges from point sources. See 33 U.S.C. § 1362(11). Section 316(b) is not an effluent limitation, because it does not govern surface water discharges. See Virginia Elec.& Power Co. v. Costle, 566 F.2d 446,449 (4th Cir. 1977) (it is "obvious" that regulations implementing § 316(b) are not effluent limitations); see also 33 U.S.C. § 1311(a) (omitting reference to § 316(b), but not various other standards regulating "discharges," as providing effluent limitations); 33 U.S.C. § 1365(f) (deeming certain standards "effluent limitations" for citizen-suit purposes, but not § 316(b)).

While NPDES permits also implement § 306 "standards of performance," these again may be addressed only as effluent limitations. See 33 U.S.C. § 1342, 1316. Even if one were to assume, as EPA does, see 67 Fed. Reg. at 17125, that § 316(b) is functionally analogous to § 306 "standards of performance," EPA's efforts to implement § 316(b) at existing facilities through NPDES permits must again fail. As EPA recognizes in the Rule, see 67 Fed. Reg. at 17142, §306 "standards of performance" apply solely to new, not to existing, facilities. See 33 U.S.C. § 1316; see also S. Conf. Rep. No. 91-1236, reprinted in 1972 U.S.C.C.A.N. 3776, 3804-05. (rejecting House bill proposal that § 306(a) should apply to modified existing facilities, with the goal that § 306(a) applies "solely to new construction"); 67 Fed. Reg.. at 17125 (acknowledging that § 306 establishes discharge standards for new sources). Indeed, EPA's position that §316(b) is most akin to CWA standards of performance, see 67 Fed. Reg. at 17125, necessarily concedes that § 316(b) is not properly applicable to existing facilities. <FN 6>

Footnotes

6 The truism that § 316(b) cannot be implemented in NPDES permits is not disproved by EPA's past practice of considering § 316(b) in NPDES permit renewals. Although EPA may have used NPDES permits to impose § 316(b) conditions, we are aware of no direct challenge to such practice by regulated entities. Further, there is a basis for concluding that a challenge to the application of § 316(b) in NPDES permits, were it now made, would be successful. See, e.g., Natural Res. Def. Council v. EPA, 859 F.2d 156, 169-70 (D.C. Cir. 1988) (noting, in another context, "[EPA] is powerless to impose permit conditions unrelated to the discharge itself'); cf Consolidated Edison Co. v. N.Y. Dep't of Envt'l Conservation, 726 F. Supp. 1404, 1410 (S.D.N.Y. 1989) (citing the NRDC decision to support the proposition that " case law conflicts over whether intake requirements can be imposed as a condition of a permit"); accord U.S. Steel Corp. v. Train, 556 F.2d 822, 850 (7th Cir. 1977) (Section 402(a)(l) of the CWA "implicitly requires the Administrator to insure compliance with § 316(b) permit conditions"), overruled on other grounds, City of West Chicago v. NRC, 701 F.2d 632, 644 (7th Cir. 1983); Hudson Riverkeeper Fund v. Orange & Rockland Utils.. Inc., 835 F. Supp. 160, 163-64 (S.D.N.Y. 1993) (accepting a NPDES permit condition mirroring § 316(b)); Cronin v. Browner, 895 F. Supp. 1052, 1059 (S.D.N.Y. 1995) (determining, solely for the limited purpose of determining jurisdiction, that "the issuance of a regulation under section 316(b) constitutes the issuance

of an ‘other limitation’ under sections 301 and 306”).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.029.014

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04

EPA's legal authority to:

In short, § 316(b) is inapplicable to existing facilities and cannot be implemented in NPDES permits. As such, Entergy requests that EPA clarify the scope and extent of the Rule, by indicating that it applies only to existing facilities that install new CWISs, or substantially reconstruct or expand existing CWISs.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.029.015

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA MUST DEFINE THE OPERATIVE TERM AEI. <FN 7>

In the Rule, EPA again declines to define the term "adverse environmental impact," despite the fact that the term is the triggering or operative mechanism for application of § 316(b). See 67 Fed. Reg. at 17136-40; proposed 40 C.F.R. §125 and 85 (WHAT SPECIAL DEFINITIONS APPLY TO THIS SUBPART?) (omitting any definition of AEI) and 93 (same). Rather, EPA dodges this threshold issue, by presuming an impact as a result of the entrainment and impingement of early life stages of fish and others aquatic organisms. See 67 Fed. Reg. at 17137 ("EPA believes that many cooling water intake structures clearly have a significant negative impact on aquatic organisms at the individual level.").

As discussed below, EPA's presumption is flawed as a matter of law and science. The plain language of § 316(b) expressly provides that AEI is a threshold issue and, therefore, must be definitively established prior to the application of any BTA analysis. See 33 U.S.C. § 1326; see also In the Matter of Pub. Serv. Co. of N.H., Case No. 76-7, Decision of the EPA Administrator (June 10, 1977), 1977 WL 22370 (E.P.A.),*6 (noting that, consistent with the preamble to the then-existing EPA regulations governing CWISs, at 40 C.F.R. Part 204, "the (determining, solely for the limited purpose of determining jurisdiction, that "the issuance of a regulation under section 316(b) constitutes the issuance of an 'other limitation' under sections 301 and 306").

Agency must identify or predict adverse environmental impacts and then select the most effective means of 'minimizing' ... the adverse effects"); see also 41 Fed. Reg. at 17387, 17388 (Apr. 26, 1976) (same). <FN 8> This is a common-sense approach, since - absent an AEI - there would be no reason for application of any control technology. This is particularly true for existing facilities, where the impacts, if any, of facility operations on the aquatic community are knowable, and may have been tracked over the operational life of the facility? <FN 9>

Further, the definition of AEI must be credible as a matter of science and sound policy. In the Rule, EPA proposes a narrow definition of AEI that is inconsistent with the plain language of §316(b), as well as its use and interpretation in other relevant environmental laws. Further, EPA ignores the weight of scientific evidence, which will not support the self-serving presumption that individual losses attributable to entrainment and impingement necessarily amount to an AEI. In doing so, EPA reveals a marked bias against entrainment and impingement by electric-generating stations, as distinct from severe ecosystem uses, such as surface water discharges and commercial fishing. See 67 Fed. Reg. at 17137 ("EPA notes that the top four leading causes of waterbody impairment (siltation, nutrients, bacteria, and metals) affect the aquatic life uses of a waterbody"). This weakness in EPA's conclusions is confirmed by its efforts to bolster an otherwise tenuous conclusion that impingement and entrainment, of themselves, constitute AEI by alluding to:

-A purported concern for "cumulative overall degradation" of a certain aquatic environment from multiple facilities, despite the fact that EPA acknowledges that such impacts, if any, are "largely unknown." See 67 Fed. Reg. at 17136.

-A purported concern that CWISs represent a "contribut[ing]" additional stress, in conjunction with the known causes of waterbody impairment as a result of discharges, which EPA identifies as siltation, nutrients, bacteria and metals, none of which correlates to electric-generating operations. See 67 Fed. Reg. at 17137.

As discussed below, none of EPA's attempts to narrowly construe the term AEI, including its cumulative and additional-stress arguments, has merit.

Footnotes

7 REMAINING COMMENTS ARE SUBMITTED, ASSUMING FOR ARGUMENT'S SAKE, THAT THE RULE IS NOT, AS IT IS, IN EXCESS OF EPA'S JURISDICTION AND INCONSISTENT WITH THE PLAIN LANGUAGE OF THE CWA.

8 As EPA previously has recognized, the burden of identifying AEI is on the regulator. Cent. Hudson Gas& Elec. Corp., OGC No. 63 (July 29, 2977); see also Administrative Procedures Act ("APA"), 5 U.S.C. §556(d) ("Except as otherwise provided by statute, the proponent of an ... order has the burden of proof") and 551(b) (defining an order to include a permitting or licensing decision).

9 Thus, for example, the owners of Indian Point 2 and 3 have undertaken extensive ongoing monitoring of the Hudson River for decades. Indeed, William Sorbello, Section Head—Biologist 3 Ecology, of the New York State Department of Environmental Conservation, in commenting on EPA's then-proposed Rule for new facilities, characterized the Hudson River aquatic communities data set created by the Hudson River Stations as "probably the best data set on the planet." Comment ID 3 I6bNFR.073.017. As further discussed below, an independent review by three leading national fisheries scientists of this unparalleled database confirms that the operations of Indian Point 2 and 3, as well as other facilities on the Hudson River, have not negatively impacted fish populations or the aquatic community.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule. EPA disagrees with this commenter that the plain language of section 316(b) provides for any threshold test that would require no technology unless an impact is determined to occur on an ecosystem, community or population level and be attributable to a particular cooling water intake structure.

Comment ID 316bEFR.029.016

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA's Interpretation of AEI Contradicts the Plain Statutory Language of §316(b) and Application of Similar Concepts in Other Environmental Laws.

The definition of AEI, to be credible, cannot be triggered by nominal impacts, such as those associated with early life stage entrainment and impingement. <FN 10> To the contrary, numerous environmental statutes, including both federal and state laws, employ and rely on, as a triggering mechanism, the concept of an "adverse environmental impact." See, e.g., NEPA, 42 U.S.C. §4332 (significant effect on the quality of human environment); Endangered Species Act ("ESA"), 16 U.S.C. § 1531 et seq., specifically § 1536(a)(2) (jeopardize continued existence of a species); SEQRA, N.Y. Envtl. Conserv. Law § 8-0109(2) (significant adverse effect on the environment). In each of these environmental statutes, and their accompanying regulations, the touchstone is that the term AEI characterizes the result of a searching inquiry of an array of impacts of a proposed action, including impacts to the human environment, e.g., view-shed or aesthetic concerns.

This fosters a full and fair analysis of potential impacts and their corresponding resolutions, ensuring a reasoned outcome.
Not surprisingly, therefore, none of the several laws employing an AEI-like trigger narrowly construes terms analogous to AEI to address a limited type of impact, such as EPA proposes in the Rule, i.e., by interpreting AEI as relating solely to entrainment and impingement. Indeed, to construe narrowly the term AEI fosters a deliberately bunkered analysis, allowing certain impacts to tip the scales, thereby creating potentially erroneous outcomes and opportunity for unanticipated or unaddressed environmental damage, e.g., electric-system-related impacts or increased emissions of criteria air pollutants.

EPA's proposed approach to AEI in the Rule cannot reasonably be reconciled with twenty-five years of interpretation of § 316(b) and routine permit issuance and re-issuance. See, e.g., Seacoast Anti-Pollution League v. Costle, 597 F.2d 306 (1st Cir. 1979) (upholding EPA's acceptance of once-through cooling, despite entrainment); New Jersey Dep't of Envtl. Prot., NJPDES Permit No. NJ 0005622, Salem Generating Station (June 29, 2001) (SPDES-permit renewal with once-through cooling); Maryland Dep't of Env't, NPDES No. MD0002658B, Chalk Point, Potomac Electric Power Co. (Apr. 29, 2001) (SPDES-permit renewal with once-through cooling). Further, we are aware of no sizeable existing nuclear facility that has been required to retrofit with cooling-tower technology in a NPDES-permit renewal solely on §316(b) grounds." <FN 11> Implicit in each of these permitting decisions is a rejection of a narrow focus on only entrainment and impingement impacts.

Given the plain language of 316(b) and relevant interpretation of other analogous laws, such as NEPA and the ESA, Entergy requests a more credible definition of AEI. First and at very least, AEI should be defined as a demonstrable adverse impact on fish populations or communities and directly attributable to CWIS, as distinct from commercial fishing, i.e., when the losses adversely affect the structure or function of the aquatic community. Again, this is necessary to ensure that § 316(b) is interpreted in a manner consistent with other environmental statutes with similar triggers. <FN 12>

Footnotes

10 Every project, particularly a large-scale project, has some impact on the natural world. Indeed, EPA routinely authorizes activities and projects that have an adverse impact on the environment. Thus, for example, under the CWA, EPA authorizes the discharge of pollutants to water-bodies, although EPA acknowledges in the Rule that such discharges remain the leading causes of water-body impairment, see 67 Fed. Reg. at 17137, which— again as EPA concedes—have a far more damaging impact on fisheries and individual fish. It Nonetheless, EPA routinely promulgates and amends regulations allowing such discharges, despite their significant adverse impacts, rather than implementing essentially a "no-discharge" standard.

11 EPA relies on the construction of cooling towers at Palisades from 1971 to 1974 as an example of open cycle to closed-cycle conversion. See Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rules (DCN: 4-0004) ("Phase II TDD"). The example is inapt. Before the Palisades facility was even constructed in 1971, citizens groups concerned about potential for radioactive discharge had intervened in its licensing proceedings. Id. Rather than delay the U.S. Atomic Energy Commission's decision to authorize an operating license for the facility, Palisades elected to enter into a settlement agreement on March 12, 1971, underwhich it agreed to employ wet-type cooling towers by January 1, 1974. See John Gulvas, Consumer Power's Responses to EPA Questions Regarding the Conversion of Palisades Nuclear Facility from Once-Through Cooling System to Cooling Tower System (2002). Indeed, although EPA maintains that the facility "began operation" in early 1972, engineering and procurement for cooling tower construction had already begun in 1971. Phase II TDD 4-3. Thus, this particular cooling-tower construction, planned for and begun before the facility was fully operational, is not a retrofit as EPA now uses the term and should not be EPA's basis for estimating retrofit costs. Additionally, though EPA reports Palisades's $18.8 million conversion in 2001 dollars, its cost escalation (which appears to track the Building Cost Index or similar, but unidentified, construction-related cost index) does not account for significant increases in nuclear power facility sitting and construction costs, including those resulting from the Three Mile Island incident in 1979.

12 In its request for a more credible definition of AEI, Entergy further relies on the plain language of 316(b). Certainly, had Congress intended that all power plants install cooling-tower equivalent technology, it would have provided as much directly, without requiring an AEI. Indeed, § 316(b) could and would have stated: "EPA shall require that the design of a cooling water intake structure employ the best technology available to eliminate entrainment and impingement of aquatic organisms." However, § 316(b) does not provide as much. Moreover, it is unlikely that EPA would have allowed the construction of perhaps hundreds of power facilities with once through cooling, had it then understood Congress's mandate as it now proposes to interpret it.

EPA Response

Please see the response to comment 316bEFR.029.015 by the same author.

Comment ID 316bEFR.029.017

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Any Determination of AEI Must Properly Be a "Net" AEI Recognizing and Accounting for Mitigation or Restoration Measures.

Consistent with other environmental laws, the definition of AEI must exclude alleged impacts to a fish population or community that are avoided through facility activities, e.g., hatcheries. For example, under NEPA, a finding of "significant impact" to the quality of human environment triggers certain legal requirements. 42 U.S.C. § 4332; see also 40 C.F.R. § 1508.14 (defining "human environment" to include "the natural and physical environment and the relationship of people with that environment); 40 C.F.R. § 1508.08 (defining "effects" to include effects to such things as population density, growth rate, and ecosystems). In that context, courts and agencies have not found a "significant impact" to the environment where the project mitigates potential harm to a population as a whole. See, e.g., Friends of the Payette v. Horseshoe Bend Hydroelectric Co., 988 F.2d 989(9th Cir. 1993) (upholding the Army Corps of Engineers' finding of no significant impact for hydroelectric project that mitigated destruction of wetlands by creating new wetlands, and mitigated power turbine's destruction of individual fish population by enhancing nearby fish habitat). It is, thus, settled that, where a "proposal is modified prior to implementation by adding specific mitigation measures which completely compensate for any adverse environmental impacts stemming from the original proposal, the statutory threshold of significant environmental effects is not crossed." Cabinet Mountains Wilderness v. Peterson, 685 F.2d 678, 682 (D.C. Cir. 1982) (upholding Forest Service's finding of no significant impact ("FONSI") for proposed mineral exploration project that offset potential impacts to grizzly bear through temporal limitations on drilling, reduction and elimination of certain timber sales and seasonal road closures).

Similarly, under the ESA, an offset of potential impacts precludes the finding that a federal project likely will jeopardize an endangered species, avoiding a consultation requirement. See 16 U.S.C. § 1536(a)(2); Greenpeace Action v. Franklin, 14 F.3d 1324, 1335 (9th Cir. 1993) (upholding Secretary's "no jeopardy" determination for NMFS's decision rendering a "total allowable catch" for pollock where harm to endangered sea lion was addressed by proposed "no-trawl zone" around sea lion breeding ground).

Just as, under NEPA and the ESA, an action is avoided when successful mitigation results in a finding of "no significant impact" or "no jeopardy," the BTA requirement under §316(b) should not be triggered where successful mitigation precludes the finding of AEI. This would occur, for instance, where a hatchery produces fish approximately equivalent to a realistic calculation of potential entrainment and impingement losses.

The "net" approach is recognized by leading legal scholars. See, e.g., Thomas Schoenbaum & Richard B. Stewart, The Role of Mitigation and Conservation Measures in Achieving Compliance with Environmental Regulatory statutes: Lessons from Section 316 of the Clean Water Act. 8 N.Y.U. Envtl. L.J. 237 (2000) (Appendix 1). As Professors Schoenbaum and Stewart's analysis confirms, such measures should be and often are taken into account in any assessment of AEI. Id. at 295-327.

Not surprisingly, therefore, permitting agencies, including EPA, frequently have considered and accepted restoration measures. See, e.g., EPA Region IV, Findings and Determinations re: NPDES Permit No. FL0000159, Crystal River at 7-8 (Sept. 1, 1988) (authorizing fish hatchery "in an attempt to replace fish and shellfish eggs, larvae, and juveniles entrained" by facility); EPA, NPDES Permit No. TN00054360, John Sevier (1986) (fish stocking program); Pittsburgh, Ca. RWQCB, NPDES Permit No. CA0004880 (Apr. 18, 1990) (fish stocking program); New Jersey Dep't Envtl. Prot, NJPDES Permit No. NJ0005 622, Salem Generating Station (June 29, 2001) (wetland restoration as condition for § 316(b) compliance); Hudson River Settlement Agreement (1980) (fish hatchery, donation of public park and research funding); Maryland Dep't of Env't, NPDES Permit No. MD0002658B Modified Permit, Chalk Point (Apr. 29, 1991) (financial contribution to state fish hatchery fund); Letter to Ca. RWQCB, Contra Costa (Apr. 13, 1993) (fish stocking program); SONGS, Final Report to the Coastal Comm'n (Aug. 1989) (wetlands restoration and construction of artificial reefs); NYDEC, Bureaus of Fisheries and Envt'l Prot., Region VII Comments on SPDES Permit No. NY0003875, Gondey (Aug. 23, 1983) (wetlands restoration and construction of artificial reefs); NYDEC, SPDES Permit No. NY0003 875, Goudey (Mar. 15, 1983) (development of fishing access at another site); Letter from Massachusetts Dep't of Envtl. Prot. to H.V. Oheim, Boston Edison Co., Oct. 15, 1998 (recommending restoration measures to offset alleged fish stock losses resulting from operation of Pilgrim Station).

While Entergy supports the use of voluntary mitigation or restoration projects, such as hatcheries or wetlands-restoration projects, that are proposed in appropriate circumstances by a regulated entity to offset claims of AEI, it cannot and does not support EPA's efforts to require regulated entities to undertake projects. Restoration cannot be mandated since it is not a technology relating to a CWIS, and the Agency has no authority to compel anything other than CWIS technologies. 33 U.S.C. § 1326(b).

Likewise, Entergy cannot and does not support EPA's efforts to compel projects which produce benefits greater than alleged impacts, i.e., a valuation of such projects at a ratio greater than 1:1. This is because the long-term benefits of some sorts of offset projects, particularly wetlands-restoration or other habitat-enhancement projects, may be perpetual, producing benefits long beyond the life of any station. Thus, restoration projects' future benefits should be recognized appropriately, with a ratio approaching, but not exceeding, 1:1. Similarly, AEI restoration projects, again such as wetlands-restoration or habitat-enhancement efforts, may produce a range of collateral benefits in addition to fish production. Such benefits may include, as EPA has recognized, see 67 Fed. Reg. at 17148, recreational benefits, habitat for aquatic and terrestrial species not impacted by CWIS, and open space, among others. These collateral, but important, benefits likewise support a ratio approaching, but not exceeding, 1:1.

The Agency also cannot equitably compel restoration measures that exceed a realistic calculation of identified impacts. See Exec. Order No. 12866, Regulatory Planning and Review, ("Order 12866") (compelling consideration of the distributional and equity effects of any proposed regulation); see also EPA, Guidelines for Preparing Economic Analyses ("EPA's Guidelines"), EPA 24C-R-00-003, at 5 (Sept. 2000) (recognizing this obligation). <FN 13>

Footnotes

13 As discussed below, to the extent that mitigation projects are employed in lieu of or in addition to technology, EPA should require restoration in lieu of technology at levels consistent with average least-cost compliance among any facilities

with comparable flows installing available technology; i.e., screens and fish returns at fossil-fuel facilities. Likewise, applicable monitoring requirements should remain simple and flexible. Thus, for instance, EPA should accept a project as complete, if it meets the agreed-upon requirements. This is because it may not be possible to monitor a particular wetland for production effectively.

EPA Response

In the final rule, EPA allows use of restoration to minimize or help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316EFR.060.022.

For a discussion of ancillary benefits, see EPA's response to comment 316bEFR.032.011. For a discussion of the permitting authorities role in assessing restoration measures, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.029.018

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

To Be Credible, an AEI Must Be a Demonstrable Community-Level Fisheries Impact, Not Simply Presumed Individual Losses Attributable to Entrainment and Impingement. <FN 14>

As discussed above, the language of § 316(b), read in conjunction with the persuasive example provided by other environmental laws and EPA's past permitting decisions, does not support EPA's effort to equate AEI with entrainment and impingement losses that do not have a demonstrable adverse impact on a fish population or community. Likewise, as a matter of credible science, the loss of a single fish larva or a single egg, or even a large number of them, cannot reasonably be equated with AET. Instead, AEI properly should be construed as occurring when the loss of fish or other organisms is felt at the population or community level; i.e., when the losses are so substantial that they adversely and demonstrably affect the structure or function of the aquatic community. <FN 15>

This is because, as a matter of basic biology, substantial egg and larval losses occur with little or no effect on the vigor of the aquatic populations or community. These losses of eggs and larvae occur from natural causes, as well as human ones. <FN 16> Briefly, recognized and accepted biological concepts of compensation play a significant role in describing the absence of impact on fisheries populations of entrainment and impingement. Compensation also is accepted by those governmental authorities responsible for modem fisheries management, such as the National Research Council. Indeed, fisheries managers routinely consider compensation when establishing harvesting regulations. <FN 17> Given the overwhelming support for populations-level analysis among scientists and the governmental authorities, compensation should be reflected in EPA's effort to establish regulations for managing aquatic organisms susceptible to entrainment and impingement. The UWAG Comments, which address these concepts in detail, are hereby incorporated by reference.
To adequately assess fish populations and aquatic systems requires a discernible benchmark for adverse environmental impacts. Leading fisheries scientists have selected two critical benchmarks for existing activities: (1) relative abundance; and (2) diversity. The first allows a regulator to determine whether there has been a continuing decline, distinguishable from natural variability in abundance over time, as an indicator of impacted populations. The second allows a regulator to determine whether vulnerable species are being particularly or disproportionately impacted, again as an indicator of impacts to an aquatic community.

The importance of population-level analysis, using key indicators, with an understanding of the effects of compensation, is well documented, for example, in the Hudson River, including particularly with respect to the Hudson River's exploding striped-bass population. Three leading fisheries experts, Charles C. Coutant, Ph.D., a Senior Research Ecologist at Oak Ridge National Laboratory, Lawrence W. Bamthouse, Ph.D., the President and Principal Scientist for LWB Environmental Services, Inc., and Webb Van Winkle, Ph.D., an Environmental Consultant at Oak Ridge National Laboratory, have provided a consolidated depiction of the populations of representative indicator species of Hudson River fish, including certain keystone species, that have been the subject of almost thirty years of extensive biological monitoring. See Status and Trends of Hudson River Fish Populations and Communities Since the 1970s: Evaluation of Evidence Concerning Potential Impacts of Cooling

Water Withdrawals (Jan. 2002) ("Status and Trends of Hudson River Fish") (Appendix 3) As this depiction indicates, relative abundance and diversity, the operative measures for evaluating the health of fish populations and the aquatic ecosystem, have remained consistent (or improved) over the period of operation of the Hudson River facilities, including Indian Point 2 and 3. This information, simplified for purposes of this discussion, reveals that no adverse impact has occurred to Hudson River fisheries that is reasonably attributable to operation of electric-generating stations, such as Indian Point 2 and 3.

Status and Trends of Hudson River Fish (Appendix 3) also provides an independent review and evaluation of Hudson River fish population and community trends, which evaluates nearly three decades of Hudson River monitoring data for representative indicator fish populations, focusing on abundance and diversity as key measures of the health of fish populations and the Hudson River aquatic community.

More particularly, Drs. Coutant, Barnthouse and Van Winkle sought answers to two questions, employing the critical benchmarks of abundance and diversity: (1) Have measurable adverse changes to representative Hudson River fish populations occurred since the onset of operation of the Hudson River facilities that are potentially attributable to water withdrawals at Hudson River facilities, including Indian Point 2 and 3; and (2) would reductions in those withdrawals provide measurable benefits to that ecosystem? To evaluate the data, Drs. Coutant, Barnthouse and Van Winkle looked for a continued, long-term decline in susceptible populations that coincided with the approximate start-up of the Hudson River stations; i.e., relative abundance. Drs. Coutant, Barnthouse and Van Winkle also looked for reductions in species richness or diversity, including a changes in predator-prey balances that might be reasonably attributable to Hudson River station operations: What Drs. Coutant, Barnthouse and Van Winkle found, in the outstanding data set that the Hudson River monitoring program has provided, is that the representative indicator fish species for the Hudson River have experienced consistent abundance and diversity during the operations of the Hudson River stations, including Indian Point 2 and 3. Thus, the answer to question 1 is a resounding "no."

Drs. Coutant, Barnthouse and Van Winkle also evaluated whether a halt to once-through cooling would result in measurable improvements to the Hudson River fisheries. As they concluded, in clear and concise terms, the ecological benefits of mitigation proposals intended to reduce cooling-water withdrawals would be negligible. See Status and Trends of Hudson River Fish at 10 (Appendix 3). These leading national fisheries scientists reasoned: "If measurable changes attributable to cooling water withdrawals have not occurred over the past 25 years of operation of Bowline Point, Indian Point, and Roseton, then reductions in those withdrawals would be unlikely to result in measurable improvements such as increase in populations abundance abundance or species richness." Id. Thus, the answer to question 2 likewise is a resounding "no."

Drs. Coutant, Barnthouse and Van Winkle specifically addressed the circumstances of striped bass, a keystone species, because it is a pelagic spawner whose early life stages are abundant in the vicinity of the Hudson River stations, as well as a top predator and, therefore, vulnerable to the impacts of prey depletion. What they found, using four independent data sets, including a New York State Department of Environmental Conservation ("NYSDEC") data set, i.e., the NYSDEC's juvenile beach seine survey, is that there is no trend in striped-bass recruitment during the period of operation of the Hudson River stations. Since station operations only impact early life stages, this evidence confirms the effects of compensation and a corresponding absence of AEI, as it relates to the striped-bass population in the Hudson River. Importantly, Drs. Coutant, Bamthouse and Van Winkle noted, in reaching their conclusion, that the comprehensive independent metrics and data sets often and twenty-five years in duration were "unique" in their collective experience, and exhibited a noteworthy consistency, underscoring the validity of their conclusions." <FN 18> See id.

In short, density-dependence and compensation help to explain what thirty years of Hudson River monitoring confirms, namely that station operations on the Hudson River have not had a demonstrable adverse impact on fish populations or aquatic communities. On the Hudson River, therefore, power-facility-related entrainment may not be "adverse" to the aquatic ecosystem or fisheries community. This conclusion applies with considerable force to the striped-bass population, which has thrived during the period of power-facility operations on the Hudson, increasing ten-fold from 1982 to 1996, see id. at 9, and has reached its saturation point, insomuch as it has begun and will continue to impact other species by its predation. Thus, EPA's efforts to address alleged AEIs, including possibly by requiring the installation of hundreds of millions of dollars of cooling-tower technology at Indian Point 2 and 3, cannot reasonably be expected to benefit fish populations. <FN 19>

The same conclusion that no AEI has occurred applies to Pilgrim Station, which—under the continued oversight of a technical advisory committee consisting primarily of federal and state regulators—has monitored alleged entrainment and impingement impacts, again, for nearly three decades. This monitoring cultivated in ENSR's 316 Demonstration Report for Pilgrim Nuclear Power Station (Mar. 2000) (Appendix 4). In conjunction with a recent supplemental fish larvae study, ENSR demonstrates that Pilgrim Station's operations have had no demonstrable adverse environmental impacts on representative indicator species in proximity to Pilgrim Station. Indeed, using a highly conservative calculation not accounting for critical biological factors, including compensation or survivability, ENSR estimated conditional entrainment mortality for winter flounder, a representative indicator species, and concluded that theoretical impacts are less than 0.20% to 5.0% of the local winter-flounder population, itself only a portion of the actual relevant spawning population. Id. As ENSR concluded, "impingement and entrainment have caused no adverse impact to any [representative indicator species] population, or to the integrity of the aquatic ecosystem of Cape Cod Bay." <FN 20> Id. at 7-1.

In short, continuous ongoing monitoring during the operations at Indian Point 2, Indian Point 3 and Pilgrim support the conclusion that entrainment and impingement by those stations do not constitute an AEI. The same conclusion should apply to other facilities that have shown, as the Hudson River and Pilgrim facilities have, <FN 21> that entrainment and impingement do not adversely impact fisheries populations or communities. Again, a lack of AEI is confirmed where continued station operations have not shown a change in relative species abundance or diversity over time. Such circumstances are met, where: (i) a fish or aquatic community has been shown to have experienced population stability or growth over decades, despite entrainment and impingement (e.g., striped bass in the Hudson); or (ii) any decline in species is reasonably attributable to non-facility conditions or circumstances (e.g., commercial-fishing pressures, altered water quality, whether through reduced wastewater discharges or otherwise; and explosions of non-native or exotic species or loss of habitat).

Footnotes

14 EPA's calculation of entrainment and impingement losses is seriously flawed, as is EPA's national extrapolation. Entergy refers EPA to and hereby incorporates the UWAG Comments outlining its criticism of EPA's entrainment and impingement calculations. For a specific criticism of EPA's approach in the Pilgrim Case Study, Entergy refers EPA to the ENSR report

discussed below. See ENSR Imitational, Comments on Propped EPA 316(b) Regulations for Existing Facilities (Aug. 2, 2002) ("ENSR Comments") (Appendix 2).

15 Of course, absent a direct effect, EPA's litany of indirect effects, e.g., to birds as a result of fish losses, is unsupported. See Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities ("Case Studies"), Ch. A4. EPA concedes as much, noting "EPA's review of these studies did not reveal any documented linkages between I&E and effects on bird populations ... ." See Case Study at A4-8. Despite the absence of any scientific support for the proposition, and in the face of an overwhelming weight of evidence to the contrary, EPA nonetheless holds to its highly speculative position that collateral impacts to bird populations somehow do exist. Id. Entergy suggests a view better grounded in sound science. More particularly, Entergy requests that EPA not recognize in its impact analysis highly speculative indirect effects.

16 At the ecosystem level, significant losses of adults, e.g., as a result of commercial fishing, may have an effect on the aquatic community. This is a premise of the Magnusen-Stevens Fisheries Conservation and Management Act, 16 U.S.C. § 1801 et seq. ("MSA"), and its associated regulations, which focus on "maximum sustainable yields" on a continuing basis.

17 Fisheries management rests on the premise that significant anthropogenic mortality (i.e., fishing harvests) can be imposed on fish populations without causing long-term harm to the populations. A recognized limit exists, however, beyond which additional mortality could jeopardize the ability of a fish population to maintain itself at desirable levels. The theory of compensation plays a central role in defining such limits (also referred to as biological reference points). Fisheries managers routinely evaluate whether an assumed future fishing mortality rate would result in declines in abundance, employing models that estimate stock biomass under specified conditions and relating them to biological reference points. See Nat'l Res. Council, Commission on Fish Stock Assessment Methods, Improving Fish Stock Assessments at 188 (1998). These methods can also be used to determine the impact of another source of early life stage mortality-such as an electric-generating facility-on fisheries stocks, and whether that impact jeopardizes a stock's ability to replace itself.

18 This is in direct contradiction to the indefensible statement in EPA's Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (the "Phase II Eco/Ben Analysis"), in which EPA somehow presumes an impact to fish populations, including striped-bass populations, as a result of its calculation of worst-case theoretical entrainment and impingement predictions that were never intended to be used as the Agency proposes. See Phase II Eco/Ben Analysis at A2-8. Indeed, EPA's statement not only reveals the pitfalls of superficiality, but also offers a perfect illustration of the dangers of uninformed data extrapolation. For instance, rejecting almost fifteen years of subsequent monitoring, EPA targets the 1988 theoretical projection of entrainment mortality, selects the worst-case projections of 79% for striped bass and relies on this as an example of impacts. See 67 Fed. Reg. at 17138. Of course, were these projections even remotely defensible, the population of striped bass certainly would have experienced a demonstrable, if not acute, decline, not a population explosion. See Status and Trends of Hudson River Fish (Appendix 3). Thus, it is irrefutable that other factors are at work and that the projections cannot and should not, as a matter of sound science, be so employed. Of course, had the Agency sought Entergy's assistance in interpreting data relating to the Hudson River stations, a flawed conclusion could have been avoided.

19 What it will do, however, is foreclose continued operations of those Stations, with major adverse environmental results, including substantially increased emissions of criteria air pollutants and profoundly decreased reliability for the metropolitan New York electric system, which are discussed below.

20 As problematic is EPA's inexplicable failure to even mention, let alone account for, Pilgrim's winter flounder hatchery, despite the noteworthy fact that Entergy has tracked those successful releases through monitoring.

21 This is an equitable outcome, since the annual costs of such monitoring and analysis supporting the absence of an AEI is considerable. Indeed, under the 1981 Hudson River Settlement Agreement, the Hudson River facilities agreed to an annual collective investment in monitoring of approximately $2.0 million. These expenditures no doubt meet or exceed the annualized costs of certain equipment, such as Gunderbooms, that could be installed to meet EPA's performance standards at comparable fossil-fuel facilities.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.029.019

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

In Calculating AEI, EPA's Rejection of Survivability Is Unfounded.

In determining whether an AEI exists, EPA rejects, as it did in its 1977 Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment:

Section 316(b), P.L. 92-500, the scientific principle of survivability. <FN 22> See Case Studies at A7-1. Indeed, EPA maintains that survival rates of greater than zero should be viewed with "skepticism." Id. § A7-1.1.

EPA's conclusion contradicts sound science. ASA Analysis & Communication, Inc. ("ASA") concludes that EPA's assumption of one hundred percent mortality is not warranted. ASA, Comments on EPA Positions on Entrainment Survival as Described in Chapter A7 of the Case Studies Document (Aug. 2002) ("Entrainment Survival Report") (Appendix 5). Further, ASA concludes that a realistic assessment of survivability is possible and, therefore, should be examined in a careful A.EI assessment. Id.

These conclusions are confirmed in the survivability studies conducted at the Hudson River facilities, which EPA concedes are "the most comprehensive" of such studies that they evaluated. See Case Studies at A7-8. The Indian Point survivability studies included initial and latent survivability rates for striped bass, bay anchovy, white perch, Atlantic tomcod and herring, i.e., the majority of the representative indicator species subject to entrainment and impingement by the Hudson River stations. <FN 23> Indeed, survivability of striped bass-eggs, evaluated several times from 1979 to 1988, ranged from a low of 44% (96-hour latent intake survival) and 33% (discharge survival), to 82% (96-hour latent intake survival) and 47% (discharge survival). A subsequent sampling of striped-bass larvae revealed a total entrainment survival for PYSL striped bass of 76%. In other words, at Indian Point 2 and 5, many striped-bass eggs and most striped-bass larvae survive the entrainment process.

While EPA dismisses this study, see Case Studies at A7-8, it offers no scientific basis for doing so. EPA simply alludes to several, undiscussed "inadequacies" which, according to the Agency, warrant rejecting the studies in their entirety. Of course, it is implausible that, despite its wide scientific acceptance, no study of entrainment survivability will pass EPA's muster. Rather, it is more likely that EPA simply prefers its assumption of 100% mortality, despite the fact that such numbers are obviously over-conservative and contradicted by sound science.

Even if EPA's concern is that different study methodologies make a national conclusion difficult, as ASA Report and the Hudson River survivability studies demonstrate, there is simply no basis for rejecting the application of this obviously relevant information, where supported, in individual § 316(b) determinations.

Footnotes

22 EPA’s so-called guidance, as a draft, is entitled to no weight. See S. Utah Wilderness Alliance v. Dabney. 222 F.3d 819, 829(10th Cir. 2000) (holding that agency policies still in draft are not entitled to Chevron deference); South Camden Citizens in Action v. N.J. Dep’t of Envt’l Protection, 145 F. Supp. 2d 446, 476 (D.N.J. 2001) (recognizing that EPA guidance is not binding on a court but only relevant as evidence of EPA’s evolving policy), rev’d on other grounds, 274 F.3d 771 (3d Cir. 2002). Certainly, had EPA valued the so-called guidance, it would have made it final. Of course, given its scope, had it been finalized, it would have been subject to challenge as rulemaking in the guise of guidance.

23 As EPA has identified these studies in the Rule, they are part of the administrative record and, for this reason, are not attached as Appendices. The same applies to similar documents employed by EPA in its rulemaking and to published public documents.

EPA Response

Please see response to comment 306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.029.020

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

AEI Should Not Include Mortality Attributable to Independent Causes.

Insomuch as the Rule is not clear, Entergy requests that exclusions from the concept of adverse environmental impact be provided for entrainment or impingement that is not within the control of a facility, such as impingement attributable to fish lethargy or mortality experienced during changes in ambient water temperature.

Such circumstances occur, for example, at Entergy-owned Arkansas Nuclear One ("ANO"), which uses Lake Dardanelle, a cooling-tower-related, constructed pond of approximately 14,600 ha (36,000 acres). At Lake Dardanelle the most frequently impinged fish are gizzard shad (Dorosoma cepedianum) and threadfin shad (D. petenense), which represent 99.25% of the total number of fish impinged and 95.34% of the total weight of fish impinged.

However, impingement is not attributable to ANO's operations. Rather, impingement occurs primarily during late fall, winter, and early spring, i.e., October through March, when shad become thermally stressed, as they do at temperatures less than 16° C (60° F). Temperature data collected at the ANO intake indicates that the water temperature is typically below 5° C (41° F) during January and February. Studies further concluded that shad impinged at the ANO intake during periods with cold water temperatures were dead or cold-stressed. In short, impingement at ANO is not properly attributable to ANO. In fact, impingement of these fish is attributable to their inability to withstand thermal stress during winter months.

EPA should account for this and analogous circumstances in the Rule, by providing that impacts, if any, must be attributable to facility operations.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule. Also please see response to comment 316bEFR.029.015 by the same author. The temperature effects described by the author of this comment should be investigated as part of a section 316(a) demonstration and not section 316(b) as they are temperature related effects which may be attributable to the thermal discharge of this facility.

Comment ID 316bEFR.029.021

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

EPA's "Cumulative" and "Additional-Stressor" Theories Are Not Grounded in the Statutory Language.

Apparently straining to support its conclusion that individual entrainment and impingement losses of early life stages alone somehow can be construed as a demonstrable AEI, EPA raises, without support, two concepts: "Cumulative" and "additional-stressor" theories. Both seek to exaggerate the impacts of entrainment and impingement.

Relative to the cumulative effects theory, EPA speculates "EPA is concerned about the cumulative overall degradation as a consequence of multiple intake structures operating in the same watershed or nearby reaches ...," then provides, " historically, impacts related to [CWIS] have been evaluated on a facility-by-facility basis." See 67 Fed. Reg. at 17136. As EPA is aware, the Hudson River stations have been involved in a cumulative analysis since 1981, i.e., for three decades. This unparalleled data set, as discussed above, refutes EPA's unsupported hypothesis that cumulative impacts are a factor.

Likewise unsupported, and simply inequitable, is EPA's "Additional-stressor" theory. Nothing in §316(b) compels electric-generating facilities to compensate for environmental damage created by other, and different, entities, particularly where those entities are also regulated by EPA.

In short, both theories should be eliminated from the Rule.

EPA Response

EPA disagrees with this commenter and continues to be concerned about the potential cumulative impact of multiple intake structures operating in the same watershed and intakes within or adjacent to impaired waterbodies. Please see section IV of the preamble to today's final rule for the discussion of the recent Final Environmental Impact Statement by NYSDEC regarding the cumulative impact of the cooling water intakes on the Hudson River. EPA agrees that nothing in section 316(b) compels facilities with cooling water intake structures to compensate for environmental damage caused by other factors; however, it does require that these facilities minimize the adverse environmental impact of the cooling water intake structure. This will aid in relieving the stress on nearby fisheries. See also the response to comment 316bEFR.025.018.

Comment ID 316bEFR.029.022

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

In conclusion, to abide relevant interpretations of AEI in other environmental laws, EPA's nearly thirty years of implementing § 316(b), and the weight of scientific evidence, an AEI must rise to the level of a demonstrable impact on the fish populations or communities. To that end, Entergy supports the following definition of AEI, consistent with what has been proposed by UWAG: "Adverse environmental impact means a reduction in one or more representative indicator species that: (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function; and (2) is attributable to the operation of the cooling water intake structure." Key measures of an adverse environmental impact are declines in relative abundance and changes in species diversity where reasonably and actually attributable to cooling water intake structures.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.029.023

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 6.01

Overview of I & E effects on organisms

Further, facilities should be allowed to demonstrate whether or not they are causing AEI through the use of a risk-assessment approach, similar to that of EPA's 1998 Ecological Risk Assessment Guidelines. Absent a verifiable demonstration of community-level impacts, EPA's effort to require installation of costly technology is, as it appears in the Rule, see Fed. Reg. at 17140ff, simple regulatory overreach, i.e., a poorly-veiled effort to implicate itself in the market economics of electric-generation, an area in which the Agency has neither expertise, nor jurisdiction.

Facilities that have demonstrated in the past or can demonstrate, through an entrainment and impingement study, that facility operations do not create on AEI should not be required to go through the rigorous BTA process prescribed in the Rule. This result eliminates the undue burden not only on the facilities, but also on regulators.

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion on the environmental impacts associated with cooling water intake structures. Also, please see the response to comment 316bEFR.010.041 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule. See the preamble to today's rule for a discussion regarding the availability of site-specific compliance alternatives.

Comment ID 316bEFR.029.024

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA'S EFFORTS TO EQUATE BTA AND COOLING TOWERS IS SERIOUSLY FLAWED.

To our knowledge, in the approximately three decades since the passage of § 316(b), and throughout EPA's continuing site-specific implementation of the statutory language, EPA never has required an existing facility to be retrofitted with cooling towers solely to address perceived entrainment or impingement impacts. <FN 24> See footnote 11, supra.

Despite this long and settled history, EPA now proposes a very different tack, with a Rule so grounded in cooling-tower technology that it requires existing facilities to meet cooling-tower-equivalent performance standards. See 67 Fed. Reg. at 17140, 17221; see also proposed 40 C.F.R. § 125.94(b)(1) ("You must reduce your intake capacity to a level commensurate with a closed-cycle, recirculating cooling system ..."). As discussed below, a Rule grounded in cooling-tower technology is ultra vires, since § 316(b) does not authorize consideration of facility technology or operations, other than those reasonably construed as CWIS. For this reason, EPA lacks the authority to compel cooling towers, and, necessarily, to develop cooling-tower-based performance standards.

As importantly, EPA's assessment of cooling-tower costs, as it relates to existing facilities, is seriously flawed and, therefore, cannot support EPA's conclusions in the proposed Rule. To the contrary, as discussed below, there is strong evidence that, for many facilities, particularly nuclear facilities, retrofitting an existing station with cooling towers is too untried and too costly to be considered the "best technology available" to minimize perceived impacts resulting from station operations. See 33 U.S.C. § 1326(b) (emphasis supplied). As discussed below, this is certainly the case for the Entergy-owned stations that EPA impliedly criticizes in its Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (DCN: 4-0004) ("Phase II TDD").

Footnotes

24 EPA's premise appears to be that entrainment is correlated with CWIS intake flow capacity, and thereby proposes to establish performance standards to limit CWIS intake flow. See 67 Fed. Reg. at 17136-40. This oversimplification fails to account for site differences, e.g., differences among aquatic organisms at the site, including the swimming speed of fish and the ability of these fish to perceive the intake; whether the eggs present sink, float or adhere to available vegetation or surfaces; shape of the shoreline; and the character of river, estuarine, ocean or lake flow. See UWAG Comments at 14-15.

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.029.025

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA Lacks Authority to Require Cooling Towers.

Even if cooling-tower costs were much lower, and their benefits much higher, EPA could not, as a legal matter, require closed-cycle cooling under § 316(b). By its express terms, §316(b) addresses cooling water "intake structures," not cooling systems and not cooling water flow. 33 U.S.C. § 1326(b). Likewise, §316(b) allows EPA to consider technology, but not operations.

Because EPA cannot, by means of §316(b), require cooling towers, the Rule is infirm to the extent it seeks to implement a cooling-tower-based program. That is clearly what has occurred here. In the Rule, EPA states:

Under proposed § 125.94(b), any owner or operator able to demonstrate that a facility employs technology that reduces intake capacity to a level commensurate with the use of a closed-cycle, recirculating system would meet the performance requirements proposed in today's Rule.

67 Fed. Reg. at 17140; see also proposed 40 C.F.R. § 125.94(b) ("You must reduce your intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system… <FN 25>

As this language demonstrates, the Rule implements a cooling-tower-based technology requirement. Indeed, its standards are specifically grounded in cooling-towers' water-reduction capabilities, as EPA estimates them. As such, the Rule exceeds EPA's statutory authority.

In further support of this position, Entergy incorporates by reference UWAG's comments and Appendices, dated November 9, 2000, as submitted on the then-proposed § 316(b) Rule for new facilities.

Footnotes

25 Several paragraphs later, EPA equivocates: "Therefore, although closed-cycle, recirculating cooling is not one of the technologies on which presumptive standards are based, use of a closed-cycle, recirculating system would achieve the presumptive standards." 67 Fed. Reg. at 17142. If, as EPA maintains, the performance standards are not cooling-tower-based, EPA has offered no credible alternative explanation for those standards and, on that basis, the Rule is likewise infirm.

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.029.026

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA's Reliance upon Its Prior Rulemaking Effort Is Inappropriate.

EPA's analysis of retrofit costs improperly relies on information developed for the § 316(b) Rule for new ("Greenfield") facilities published in 66 Fed. Reg. 65255 (Dec. 18, 2001) (the "Phase I Rule"). See Phase II TDD at B1-4 (referencing Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities (EPA821-R01-036) ("Phase I TDD")).

By relying on costs supporting the Phase I Rule, now in its final form, EPA has created a significant, if not insurmountable, hurdle to its serious reconsideration and modification of those costs. Indeed, any comment suggesting an alternate cost methodology necessarily would call into question the final Phase I Rule. It is, therefore, unlikely that specific comment on Greenfields costs will be appropriately considered or addressed. This approach contravenes the spirit of the APA and frustrates effective public involvement, not to mention informed agency action. See 5 U.S.C. § 553(e) (requiring EPA in rulemaking to solicit public comment, and consider all relevant matters so presented).

Nor is the Greenfields data obviously applicable. EPA assumes that the same cooling tower package, i.e., equipment, used for a Greenfields site would apply equally well to existing facilities. See Phase II TDD at 2-29. This is not the case. At very least, significant study is required to ensure proper design and installation to coordinate older existing technology with new cooling systems. See Daniel E. Yasi, & Thomas A. Adams, Stone & Webster, Inc., Engineering Cost Estimate for Retrofitting Closed-Cycle Cooling Systems at Existing Facilities at 5 (July 3, 2002) ("Retrofitting Cost Estimate"), UWAG Comments; see also NEI Comments. Among other things, such studies are necessary to allow a facility to determine whether parts of the existing cooling system can be re-used and, therefore, whether the condenser must be redesigned, as well as the extent to which existing components may be accessed for re-use and redesign, or must be removed. For example, where existing piping is embedded in concrete, UWAG Comments, Retrofitting Cost Estimate at 6, even re-use may require significant, additional expense. Finally, such studies will also determine the extent of any necessary excavation of existing facility materials. None of these factors are applicable to new facilities where integration is contemplated from the beginning of the design process.

EPA Response

See response to 316bEFR.029.024. With regard to costs, EPA has adjusted and revised cost estimates for cooling towers and other technologies throughout this rulemaking. These revisions and the applications of these cost estimates are discussed in the preamble to the final rule and in the supporting technical development documents and other documents in the record to the final rule. Finally, UWAG comments are addressed individually throughout the response to comment database/ document.

Comment ID 316bEFR.029.027

Subject Matter Code 21.06.01

Implications for nuclear facilities

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

EPA's Phase I cost estimates are particularly inapplicable to nuclear stations, since EPA utilized only capital costs for cooling towers from fossil-fuel electric-generating stations in determining those costs. See Phase I TDD at 1-3. As EPA no doubt is aware from its coordination with NRC staff, see 67 Fed. Reg. at 17127, and as discussed below, water use at nuclear facilities represents a special concern, involving a more difficult sitting, design and construction process. See NEI Comments. Further, construction in and around nuclear facilities is highly regulated and complex, adding significant costs to and extending deadlines in what EPA mistakenly assumes is a simple process. Id <FN 26>. In particular, EPA's cost for retrofitting a nuclear power facility with fine-mesh traveling screens and fish-return system is approximately one-third of the actual cost, based on the separate retrofits of Indian Point 2 and 3. <FN 27> In short, EPA's attempts to apply non-nuclear station Greenfields costs to nuclear stations, without reason or justification, is indefensible.

Footnotes

26 EPA cannot simply escalate costs for nuclear facilities and maintain consistency. Rather, the Agency must provide an alternative approach for nuclear facilities, as discussed below.

27 EPA estimates that installation of fine mesh traveling screens, described on page 2-4 of the Phase II TDD, and a fish return system costs $8.1 million at a nuclear power facility with a once-through cooling system, a design intake flow of 870,000 gpm, and located in a freshwater stream. Phase II TDD at A-13 (Plant Code 325). Indian Point 2 and 3 each has substantially the same characteristics except each is located in an estuary. Indian Point 2 was retrofitted in 1991 with Ristroph screens, at a cost of $15.9 million in 1991 dollars. Indian Point 2 was retrofitted in 1997 with a fish return system at a cost of $4.7 million in 1997 dollars. The Building Cost Index ("BCI")-adjusted costs are $25.7 million in 2001 dollars. Indian Point 3 was retrofitted in 1994 with Ristroph screens and a fish-return system, at a cost of $20.5 million in 1994 dollars. The BCI-adjusted cost is $23.5 million in 2001 dollars.

EPA Response

First, EPA did not apply non-nuclear station greenfields costs to nuclear stations for the NODA and final rule. The Agency dramatically revised costs of retrofitting cooling water intake structure technologies (i.e., non-cooling tower technologies) for the NODA. As such, the assertion of the commenter that the Agency has underestimated fine-mesh screen costs is not applicable for the NODA or final rule. The Agency has developed special costs for the construction, installation, and operation and maintenance of intake retrofits for nuclear stations for the final rule that suitably exceed those for other fossil fuel plants (by 1.8 times for capital costs and by approximately 1.3 times for annual O&M costs). As such, the commenter's assertions regarding screening systems are not correct. See the Technical Development Document for more information on the nuclear facility cooling water intake structure retrofit costs considered for the final rule.

The final rule is not based on cooling tower retrofit technologies. See response to comment 316b.029.029.

Comment ID 316bEFR.029.028

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA’s Estimate of Cooling-Tower Retrofit Costs Is Too Low.

In any event, EPA’s estimate of the costs of retrofitting certain existing facilities, including as they impliedly relate to Entergy-owned units, is grossly inadequate.

For existing facilities, EPA used its new facility estimates of the capital costs of installing cooling towers. See Phase II TDD at 2-17. <FN 28> These estimates were based on a number of factors, including an assumed design approach for cooling-towers of 10 degrees F, which EPA determined was appropriate for newer facilities constructed between 1997-2000, as distinct from existing facilities. <FN 29> See Phase II TDD at 2-22 (referencing Attachment C to Chapter 5 of the Phase II TDD). These estimates were than multiplied by a dubious “state-specific capital cost factor.” <FN 30> See Phase II TDD at 2-28 to 2-29. That result also was multiplied by a “retrofit” factor of 1.2, for which EPA again provides no foundation or explanation. See Phase II TDD at 2-29 to 2-30. According to the Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (‘Phase II Eco/Ben Analysis”) at B1-4, EPA then applied a 10% contingency factor to this result. <FN 31> Again, however, no mention of such a factor, nor any explanation of its derivation, appears in the Phase II TDD.

The many flaws in EPA’s approach are discussed below. It bears mention that these fundamental flaws in the cost component of the cost-benefit analysis of the Rule have two potential effects:

-EPA’s methodology is skewed in favor of lower costs, as it wrongly assumes certain cost-saving measures, e.g., re-use of various structures and limited need for additional pumps and piping. This has the effect of tipping the scales in favor of benefits, against costs, as improperly calculated by EPA, and, therefore, installation of technology.

-EPA’s limited view of costs may cause regulators implementing the Rule to reject these critical additional and legitimate costs. This would be damaging in the calculation of whether costs are “significantly greater” than those considered by EPA, and may mean that legitimate costs are not factored into the assessment. This is particularly problematic for nuclear facilities, where such costs are likely to be significantly altered by site-specific requirements.

Footnotes

28 Nor do we understand it to be appropriate to rely on “the literature,” Phase II TDD at 2-20, where such “literature” is fundamentally the work of a single person, including any communications. Nor is this infirmity resolved by phone calls with two marketers of cooling tower producers, id. who stand to gain from work requiring cooling towers to be installed at existing plants.

29 EPA essentially concedes that its reliance on the new facilities design approach is inappropriate. Indeed, in assessing its national estimates, EPA states that it compared those estimates to the actual retrofit costs incurred by three existing facilities, and concluded that it compared favorably (within 25% or less), except that the design approach for new facilities is different from 10 degrees F. Phase II TDD at 2-22.

30 Apparently, the state-specific capital cost factor for 40 of the 45 listed states and the District of Columbia drove the “national average” capital costs down anywhere from 0.03% to 25%. See Phase II TDD at 2-28 to 2-29. Obviously, this means that EPA’s average is too low. Oddly, EPA also chose not to identify five states, i.e., Alaska, Alabama, Nebraska, North Carolina and North Dakota. See id.

31 The explanations of EPA’s cost methodology in the Phase II TDD and the Phase II Eco/Ben Analysis provide somewhat contradictory descriptions of the order in which these factors were applied. Compare Phase II Eco/Ben at B1-4 with Phase II TDD at 2-28, 2-29, 2-32, 2-33. Obviously, if EPA scaled its retrofit factor up or down by applying the state-specific cost factor to it, it reflects the assumption that these “retrofit” costs also will vary regionally. Until EPA explains how it derived its retrofit factor, however, Entergy cannot assess this assumption.

EPA Response

The state-specific capital cost factor has been replaced by much more specific (zip-code based) factors, as described in the Technical Development Document. See response to comment 316b.EFR.010.066.

Even though the commenter only addresses the Agency’s analysis of wet cooling tower costs (a technology not required by the final rule), the Agency takes exception to the commenters assertion of “EPA’s limited view of costs” as it generally pertains to a few costing principles. The Agency believes that its approach to areas specific capital cost factors and contingency is valid for the analysis of the final rule. In addition, the Agency has addressed nuclear facility cost factors in the final analysis and accounts for the possibility for site-specific factors related to construction at their sites. Therefore, the Agency believes that the commenter’s assertion that “legitimate costs are not factored” into the cost tests to not be invalid as it applies to the technologies considered under the requirements of the final rule.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA's Key Assumptions Are Not Supportable.

For its cost assumptions relating to the retrofitting of nuclear facilities with cooling towers, EPA offers a single and questionable example, the location, configuration and circumstances of which make extrapolation inappropriate. This limited available database is itself telling: EPA must rely on the Palisades example, because there is no other example available. We are aware of no circumstances in which a single example is statistically valid for extrapolation. Certainly, such a sample is inconsistent with sound principles of extrapolation and Executive Order 12866, § 1(b)(7) ("Each agency shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information concerning the need for, and consequences of an intended regulation."). <FN 32>

Moreover, scrutiny of the Palisades' circumstances confirms that it is not the example EPA believes it to be. Palisades understood, from its initial construction, that cooling-towers were in its immediate future. Indeed, well before the station was operating at full power, Palisades already had agreed to install cooling-towers. Further, the station never operated at full power until the towers were installed and operational. For those reasons, the example is not a "retrofit" as EPA now uses the word.

In any event, the Palisades example is hardly the "poster child" EPA is seeking. Despite effectively coincident facility and cooling-tower construction, the interconnection took approximately ten (10) months to complete. By contrast, EPA contends that interconnections could be handled within the period of scheduled outages, which currently are targeted for thirty (30) days. Likewise, the period from tower construction to operation was three years, again on a relatively small facility that had planned for the effort.

Other assumptions are equally problematic. For instance, EPA justifies its central assumption (i.e., that new facility capital costs are adequate surrogates for existing facility costs) based on certain additional assumptions, or "principles," see Phase II TDD at 2-17, as the Agency inappropriately characterizes them, including:

-Existing condensers can be used and operated successfully under a variety of conditions, with most of the existing condenser-conduit systems used for the cooling-tower systems. As a corollary, EPA maintains that existing CWIS can be used for supplying make-up water to the recirculating towers, and that existing piping runs can be used to reduce the amount of new circulating piping installed;

-tower structures can be constructed on-site before connection to the existing conduit system; and

-modification and branching of circulating piping is necessary for connecting the recirculating system to the existing conduits and for providing make-up water to the towers.

These assumptions noted above are not well-founded, and fail to account for site-specific conditions likely to be relevant, a fatal flaw in EPA's analysis. Each is discussed below.

First, EPA incorrectly states that recirculating systems can be connected to the existing condensers, likely using existing condenser conduit piping. In fact, existing condensers may not be used. Rather, due to condenser thermal design or efficiency limitations, a single-pass condenser may need to be reconfigured to a two-pass design, requiring extensive cooling-water conduit and piping modifications. See UWAG Comments, Retrofitting Cost Estimate at 7. Such modifications can pose significant safety and logistical problems, as they may require temporary bracing or demolition of piping and components. See id. at 6. Notably, such retrofits may also require extensive re-piping and an extended outage. See id. at 7. Further, because demolition of piping and components may be necessary, depending on the site-specific design of the facility, such piping and components also may not be available for re-use for the cooling tower system. EPA's failure to include the potential for these additional costs casts doubt on the validity of EPA's analysis.

Second, the Rule improperly assumes all facilities subject to the Rule have no land constraints preventing cooling towers from being constructed on-site before connection. On this basis, EPA does not include costs incurred to acquire additional, adjacent land at fair market value. In fact, facilities may face just such concerns. Further, in states that have experienced utility deregulation, generating companies' powers of condemnation do not continue, complicating the acquisition process and likely increasing costs. EPA also fails to account for the many other factors that may force a regulated entity to look off-site. For instance, a major natural gas pipeline runs through the Indian Point 2 and 3 sites. Construction would, of course, need to account for this fact, which undoubtedly will operate as a significant sitting constraint and substantially increase costs.

Therefore, the extent to which existing circulating piping may be modified and re-used is not clear, as existing circulating water systems are, at some stations, embedded in or supported by reinforced concrete foundations. See UWAG Comments, Retrofitting Cost Estimate at 6. Any re-use or installation of piping running to the cooling towers would not be as simple as EPA seems to believe, as it may require removal of existing facility equipment to gain access and extreme difficulty in moving or modifying existing concrete pipes, especially where embedded in a foundation. See id.

Footnotes

32 Thus for instance, EPA easily could have sought information on estimated cooling-tower retrofit costs from facility owners that have undertaken these analyses. This data would, of course, reflect important site-specific factors. EPA then could have extrapolated from this more relevant, more recent information, reaching a sound conclusion.

EPA Response

The comment raises reasonable questions regarding the assumptions EPA used in analyzing cooling tower retrofit costs. The Agency disagrees with the commenter's conclusion that because the Palisades plant did not operate at full capacity prior to re-constructing its cooling system that the post-operational retrofit of the cooling system from once-through to recirculating was not a "retrofit." This assertion is not based in sound technical principles, as the key elements of a retrofit project involve the key construction activities, all of which were conducted at Palisades.

The Agency notes that in seeking data on existing cooling system retrofits, as was its obligation, it attempted to learn of all examples of the technology application. As such, the Agency reported the facts that it learned and interpreted them through the proposal and NODA. The assertion by the commenter that EPA sought a "poster child" example of a cooling tower retrofit is repeated elsewhere in his comments with accusations of bias on the part of the Agency. These assertions are not borne out by the proposal, NODA, and final rule records which explore a variety of technologies and their costs of implementation for fish protection.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.0

Costs

EPA Ignores Significant Additional Costs for Retrofitting a Nuclear Facility.

As discussed below and also addressed in UWAG's and NEI's Comments, EPA's cost assumptions are especially inappropriate as applied to nuclear facilities. Nuclear stations' service-water systems are safety-related. Thus, where service and cooling water employ a single intake structure, as is commonplace, these facilities likely would have to construct an entirely new intake structure to meet NRC's safety criteria, e.g., to ensure that intake flow is not compromised at any point. This construction will add significant additional costs and create significant additional environmental impacts, none of which EPA has accounted for in the Rule.

EPA's assumption that there will be re-use of "significant portions of conduit systems," presumably while the facility remains in operation, is likewise inconsistent with typical nuclear operations and licensing requirements. Anything that would alter or affect the flow of safety-related service water at a nuclear unit ordinarily requires an outage and might have to be completed during a refueling outage. Unit outages are mostly scheduled on an 18-month or 24-month frequency; extending these scheduled timelines would have serious financial impacts, a fact which EPA has not accounted for in its analysis. Indeed, Entergy's scheduled refueling outages at its nuclear facilities currently average less than thirty (30) days. This is consistent with information obtained from NEI, which indicates that the median duration of nuclear refueling outages in 2000 was 35 days. See NEI, Fuel/Refueling Outages (2002) at http//www.nei.org/doc.asp?catnum=3&catid=43.

As importantly, EPA fails to account for the complexity and duration of tie-in of the new and old systems. The UWAG Comments note that cooling system engineers estimate this would take up to six months to complete, see UWAG Comments at 32, and therefore would cause a considerable loss of generation, in routine retrofits. For nuclear facilities, the time periods are expected to be substantially longer. Indeed, the sole example of a nuclear tie-in in the rule, i.e.. at Palisades, took approximately ten months, even though the installation was effectively coincident with construction and anticipated prior to full scale operation.

Moreover, a retrofit could be complicated by the physical layout of the facility, the modifications required to the low water pressure system at the existing facility, and the lack of space for towers near the facility. It also should be noted that large construction projects at operating nuclear facilities such as constructing cooling towers, are obviously to be avoided. Costs skyrocketed in the 1980s and 1990s, including as a result of the Three-Mile Island incident, e.g., Indian Point 2 and 3 cost $500 million to construct in 1970s, while Nine Mile cost approximately $5 billion. Post-September 11th security measures require further access constraints, again increasing costs.

EPA Response

EPA notes that the comment specifically addresses cooling tower costs and the technology's feasibility. EPA is not basing the requirements of the final rule on this technology. The technical feasibility concerns raised by the commenter was one factor in this decision.

Comment ID 316bEFR.029.031

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.0

Costs

EPA Ignores Relevant Costs.

Inexplicably, EPA also ignores obviously relevant factors and costs. <FN 33> For instance, EPA uses cost figures for mechanical towers, purportedly because capital costs for mechanical towers were the "median cost" choice. See Phase II Eco/Ben Analysis at B1-4. Such towers may not be appropriate in many circumstances. In particular, natural-cooling towers are more appropriate at some stations, especially at baseload facilities in northern locations, like Indian Point 2 and 3, Fitzpatrick Station and Pilgrim Station, due to reductions in long-term maintenance costs and improved reliability. See UWAG Comments, Retrofitting Cost Estimate at 4. Those alternative systems will have significantly different associated costs - costs which EPA has not accounted for to the obvious detriment of the regulated community.

Nor does EPA take into account significant additional costs at locations where blasting to remove rock or de-watering is required. See id. at 7. Even EPA concedes that its capital cost estimate does not account for costs for blasting, excavation, backfill, and other civil engineering costs from intake piping modification, which could be siginificant, except by use of an unjustified, across the board retrofit factor of 20%. Phase II TDD at 2-29. As discussed above, blasting at a nuclear facility is a major complication, which may require NRC approval and extensive safety analysis as well as extensive safeguards and an outage, all of which increase project costs. Blasting in or adjacent to a nuclear power facility would require significant safety analysis, and may not be permitted by the NRC. Further, per NEI, two prolonged outages are required to retrofit a unit: one to allow for blasting necessary to construct cooling tower foundations, a second for tie-in following construction.

Footnotes

33 EPA is not permitted to pick and choose among costs to its liking. Instead, EPA is required to consider "all costs." See Order 12866 (requiring all federal agencies to "assess all costs and benefits of available regulatory alternatives, including the alternative of not regulatory").

EPA Response

EPA recognizes that its cost estimates for cooling tower retrofits may have been underestimated in part because these cost estimates did not account for all of the costs relating to overcoming technical infeasibility problems. For this and other reasons, EPA is not basing today's rule on cooling towers.

Comment ID 316bEFR.029.032

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.0

Costs

EPA also fails to include the significant energy penalty due to the shutdown of units during installation. The impact is particularly significant and in some cases compromising of the local electric system's reliability, if facilities shut down permanently because conversion is not economically feasible. EPA also fails to account for turbine back-pressure, which EPA concedes could significantly affect net facility capacity, see Phase II TDD Ch. 5.3, by assuming that turbine backpressure for a retrofitted facility would be the same as for a new facility with cooling towers. Impacts to system reliability and energy pricing is expected to be severe, as discussed below. Certainly, EPA's conclusion that impacts are nominal is patently erroneous, as applied to Entergy stations. See National Economic Research Associates ("NERA"), Electricity System Impacts of Nuclear Shutdown Alternatives, dated March 2002 (Appendix 6). Department of Energy (DOE), and others, concur. See Phase II TDD at 5-31 to 5-34.

By way of example, in the important peak summer period, Vermont Yankee Nuclear Power Facility sacrifices 9 megawatts to operate the cooling towers and an additional 20 megawatts due to increased condenser back pressure as a result of higher condensate temperatures. These megawatts represent 5.3% of Vermont Yankee Nuclear Station's available power. Further, this power generation represents the major source (i.e., 78%) of electric power in Vermont, with the result that impacts of any reduction would be severe for Vermont's electricity consumers.

EPA Response

EPA has considered the energy penalty issue raised by the commenter and it was one of the factors influencing EPA's decision to not base the requirements of the final rule on this technology.

Comment ID 316bEFR.029.033

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.0

Costs

EPA's Retrofit Cost Estimates Fail to Include Social Costs Attributable to Cooling Towers.

EPA also does not take into account the significant social costs attributable to requiring cooling-tower retrofits. See Phase II TDD Ch. 6. This is surprising because EPA evaluates all conceivable costs of entrainment and impingement (i.e., the so-called benefits of the Rule). In many cases EPA's assessment apparently led it to conclude that the likely effects, including effects from increases in air emissions, water consumption, increased impingement mortality, plume and salt drift, noise, avian and wetlands impacts, would be minimal. These conclusions are flawed.

EPA Response

EPA considered these factors when deciding to not base the requirements of the final rule on cooling towers.

Comment ID 316bEFR.029.034

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 6.08

Non-aquatic impacts

EPA Should Properly Account for Adverse Air Impacts.

EPA ignores the fact that the Rule may result in unit shutdown, particularly for nuclear units where the costs of cooling-tower installations are grossly in excess of the costs for fossil-fuel units, and viable alternative technologies, such as the Gunderboom, are not available, in part because nuclear units rely on water for safety-related purposes. <FN 34> In such circumstances, power generated by nuclear units, constituting almost 20% of the nation's power, will need to be supplied by fossil-fuel units, reflecting the existing power profile.

The effects on air quality of shutdown of even some of these units is profound. Indeed, NEI has calculated the annual emissions of criteria air pollutants saved by nuclear operations and the benefits to energy consumers of those savings. See Nuclear Energy Inst., Meeting Our Clean Air Needs with Emission-Free Generation (Appendix 7). Operation of nuclear units nationally reduced emissions of carbon dioxide by 155 million tons, of NOx by 2.4 million tons, and of SO2 by 5.1 million tons. The estimated value of such savings, based solely on new nuclear generators between 1990 and 1995, are approximately $50 million in offsets annually, based on the publicly traded value of SO2 allowances in 1995 for the Acid Rain Program. See id. at 8.

This serious national impact is exacerbated in the high-demand, southern New York load pocket, where Indian Point 2 and 3 currently represent approximately 20% of the Consolidated Edison Company of New York, Inc.'s peak demand. Indeed, as set forth in the Emissions Avoidance Study prepared by TRC Environmental Corporation (August 2002) ("Emissions Avoidance Study") (Appendix 8), Indian Point 2 and 3 supply approximately 10% of New York State's total generation, assuming a 90% annual capacity factor. As TRC has identified, expected emissions increases (in percentages) as a result of taking Indian Point 2 and 3 off-line, using the existing fuel mix from the current New York State Energy Plan, dated December 2001, represent an approximately 70% increase of VOCs, a 42% increase of CO, a 29% increase of PM-10, a 20% increase of CO2 and a 19% increase of NOx, as compared to statewide electricity production. Localized impacts are even more severe, representing annual increases of approximately 147% for VOCs, 147% for CO, 145% for PM-1O, 123% for CO2, 119% for SO2, 112% for NOx, 59% for NOx in the Ozone Season, and 58% for mercury.

These increases impact an area already in severe non-attainment for certain pollutants, with the result that air-quality impacts in southern New York will be particularly acute. TRC has characterized the likely impacts in clear social and environmental terms. As TRC has identified, replacing Indian Point 2 and 3 will result in increased acidification of lakes (due to atmospheric deposition of SO2 and PM-b); accelerated building and structure decay (again, from SO2), soil degradation (again, froth SO2 and PM-10); visibility impairment, whether haze or smog (from SO2, NOx, VOCs or PM-10); reductions in crop yields, forest and facility damage; and increased impacts to susceptible groups, particularly children, the elderly, asthmatics and persons with heart disease, lung disease or influenza. See Emissions Avoidance Study, passim (Appendix 8).

None of these serious adverse impacts has been accounted for or evaluated by EPA in the Rule. Rather, EPA has relied upon a bunkered, superficial analysis that national impacts will be nominal, based upon an equably blinkered cost analysis in which the Agency compares grossly underestimated cooling-tower costs to the irrelevant gross revenues of each facility.

Of course, the Agency is incorrect. To that end, Entergy requests an appropriate accounting of the adverse environmental impacts of EPA's Rule, reflecting the possible shutdown of a reasonable percentage of affected nuclear units.

Footnotes

34 In fact, EPA's failure to differentiate between certain types of power-producers belies an overall weakness in the Rule and, perhaps, a bias against nuclear energy.

EPA Response

EPA notes that the commenter's assertion that the aquatic filter barrier technology (Gunderboom) is not feasible for nuclear units is not supported by the commenter's claims that the technology would interfere with safety-related water supply. The aquatic filter barrier technology has limited applications for extremely large intake flows, in cases where waterbody navigation is critical, when wave action is significant, or when potential excessive debris or ice could interfere. However, the Gunderboom technology's shortcomings do not relate to reliability of water supply when applied with consideration for its limitations.

Comment ID 316bEFR.029.035

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

EPA's Energy-Impacts Analysis Is Superficial, and, Therefore, Fails to Properly Account for the Adverse Effect of the Rule.

In response to serous concerns about meeting electric demand, President George W. Bush issued an Executive Order Governing Actions that Significantly Affect Energy Supply, Distribution and Use (May 18, 2001) (the "Energy Executive Order"). In conjunction with Order 12866, the Energy Executive Order compels a "detailed" analysis of energy impacts for the Rule. Id.

Despite these Executive Orders, EPA also has failed to adequately address the direct electric-system impacts of the Rule, both as a result of cooling-tower use or in the event that the costs compel shut-down of nuclear units, such as Indian Point 2 and 3 in the southern New York high-demand, low-capacity "load pocket." By failing to consider such circumstances, EPA has proposed a Rule which fundamentally misconstrues the important environmental impacts of requiring installation of cooling towers at Indian Point 2 and 3, and other nuclear units.

More particularly, of the impacts to electric-system reliability and electric pricing in southern New York without operations of Indian Point 2 and 3, as well as six other New York nuclear units, using the "GE-MAPs" methodology customarily implemented by New York regulatory authorities, as well as a volatility analysis performed by NERA to account for market pricing impacts. Electricity System Impacts (Appendix 6). As NERA demonstrates, the impacts on the New York electric system of the loss of Indian Point 2 and 3 are substantial.

First, reliability plummets. The New York State Reliability Council has set a target reserve margin of 18% as necessary for proper system function; i.e., as the percentage decreases, system reliability decreases. Without Indian Point 2 and 3, that target reserve margin cannot be met. In practical terms, the calculated number of days where emergency measures would be taken to prevent blackouts, etc., would rise by 800%.

Likewise, pricing substantially increases at peak demand periods. <FN 35> As NERA concluded, if the six units are retrofitted with cooling towers in 2007, the downstate New York peak price for power in 2008 would increase by 38%. <FN 36> Permanent shutdown of six units further increases adverse the effects: i.e., the price of power would more than double (increase by 130%) in 2008, and the days in which emergency measures would be taken would increase to 55 days per year (an increase of 5500%). Yet, EPA has not recognized, nor accounted for, these substantial impacts in its analysis. <FN 37>

Finally, the loss of nuclear units also ensures a less functional market. It is well-recognized that nuclear units, through their contribution to profile diversity and their bidding behavior, stabilize deregulated markets. EPA has not recognized, nor accounted for, these factors in its analysis.

Footnotes

35 Modeling was done for July only, and assumed that each of the six units were shutdown for conversion that month.

36 NERA analyzed the increases in the downstate service territories for Central Hudson Gas & Electric, Consolidated Edison Company of New York Inc./New York Power Authority, and Orange and Rockland Utilities, Inc. The numbers in text were obtained by averaging these three territories.

37 Of course, indirect impacts, if considered, would further increase social costs.

EPA Response

EPA disagrees with the comment that it failed to adequately consider the broader energy market and reliability implications of the 316(b) regulation. EPA performed energy market model analyses of the preferred option and other compliance alternatives using the IPM, a peer-reviewed, OMB-approved model. While EPA did not perform an energy market model analysis using specifications that completely matched the preferred option at the time of proposal, this analysis was performed both for the Notice of Data Availability (see results at DCN 5-3002 and 5-3100) and the final Phase II rule (see results in EBA chapter B3, DCN 6-0002).

EPA notes that the final Phase II rule does not require installation of cooling towers. Based on EPA's analyses, the final rule also contains no requirements that are costly enough to "compel shut-down of nuclear units." EPA appreciates the information and analysis on potential consequences "to electric-system reliability and electric pricing in southern New York without operations of Indian Point 2 and 3." However, EPA notes that this is a hypothetical analysis that is in no way linked to the requirements of the final Phase II rule and therefore requires no changes to this rulemaking.

Comment ID 316bEFR.029.036

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 6.08

Non-aquatic impacts

Other Significant Impacts That Must Be Considered by EPA.

EPA fails to address the effects on the source waterbody due to evaporative losses from cooling towers. It has been estimated that evaporation causes a water loss of 0.5% to 1.5% of recirculating water. See UWAG Comments on the Phase I Rule at 183; see also William H. Desvousges at al, Triangle Econ. Res. Draft, The Role of Benefit-Cost Analysis in 316(b) Rulemaking at 11 (Feb. 28, 2002), UWAG Comments ("Role of Benefit-Cost Analysis"). Where the flow conditions and size of the waterbody are vulnerable to such losses, aquatic habitat may be affected. See UWAG Comments on the Phase I Rule at 183. Thus, for example, rivers increasingly affected by climatic changes may be particularly vulnerable. Further, because the water is not returned to the source waterbody, the percentage of organisms that die due to entrainment, across species, increases to virtually 100%. Id.

Nor does EPA properly consider aesthetic and safety impacts. Aesthetic impacts can be severe, impacting scenic overlooks and views of historic sites. See UWAG Comments on the Phase I Rule at 180; see also UWAG Comments, Role of Benefit-Cost Analysis, at 11. Salt drift, which occurs when cooling towers are used for an electric-generating station using brackish or saltwater, may spread sodium, calcium, chloride and sulfate ions along prevailing winds to soil, vegetation and other water bodies: This may damage vegetation, including crops, by accumulating on plants or soil. See UWAG Comments on the Phase I Rule at 182. Vapor rise from cooling towers and drift may cause hazardous conditions, including reduced visibility and icing, and harm vegetation.

Nor does EPA properly evaluate the significant noise impacts that may occur to neighboring uses. Cooling towers may cause 70-75 dB(A) at a distance of 100 feet from the towers – a potentially significant annoyance to nearby institutions, residential or commercial users. Id. at 183; see also UWAG Comments, Role of Benefit-Cost Analysis at 11.

Furthermore, EPA fails to consider displacement of wetlands <FN 38> that may occur where available land for cooling towers is wetlands. EPA likewise ignores increases in discharge temperature. UWAG Comments, Role of Benefit-Cost Analysis at 11. <FN 39>

In addition, avian mortality due to man-made structures such as cooling towers maybe of concern, particularly if a local population of any bird species is threatened or if the reduction in the numbers within any bird population significantly impairs its function within the local ecosystem. See Nuclear Regulatory Comm'n, NUREG 1437, Section 4.3.5.2.1.

These significant and serious failures by EPA are inconsistent with its mission and its stated goals: to minimize adverse environmental impact.

Footnotes

38 Wetlands are protected by federal, state and local law. Where cooling-towers may not be sited, based upon the existence of protected wetlands, increased costs may be incurred, including due to the distance of the cooling-tower from the facility and the potential need to buy land. Given that affected facilities are water-dependent uses, these impacts are expected to be

significant. EPA nonetheless has not considered this.

39 Based on Supplement 1 to Regulatory Guide 4.2 issued on September 2000 (specifically Section 4.1), water use conflicts at nuclear plants with cooling ponds or cooling towers using makeup water from a small river with low flow has been a concern in regard to impacts on instream and riparian communities. Specifically, 10 C.F.R. § 51.53(c)(3)(ii)(A) as it relates to license renewal requires, in part: “If the applicant’s facility utilizes cooling towers or cooling ponds and withdraws makeup water from a river whose annual flow rate is less than 3.15 x 1012 ft3/year (9 x 1010 m3 /year), an assessment of the impact of the proposed action on the flow of the river and related impacts on instream and riparian ecological communities must be provided. Cooling water for Entergy owned Arkansas Nuclear One, Units 1 and 2 (“ANO”) is supplied by Lake Dardanelle, which is served by the Arkansas River. The Arkansas River is classified as a small river according to the criteria established by the NRC and will have to be evaluated during the ANO Unit 2 license-renewal process since this unit has a cooling tower. Therefore, if the NRC assumes some potential impact to the instream and riparian ecological communities as a result of cooling tower withdrawal from a small river, then it appears that installing an additional cooling tower for Unit I at ANO would potentially increase the probability of an impact on instream and riparian ecological communities.

EPA Response

EPA has not based today's rule on closed-circuit cooling towers. Therefore, the commenter's concerns have been addressed.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 23.02

TDD related comments

EPA's Sole Specific Application and Critique of Cost Estimates Prepared by a Facility Is Inaccurate and Cannot Be Substantiated.

EPA criticizes the cost estimate for the cooling-tower retrofit prepared for Bowline Station and included in the Draft Environmental Impact Statement ("DEIS") submitted in the pending SPDES-permit renewal proceeding before the NYSDEC for, among others, Indian Point 2 and 3, concluding cooling-tower retrofit costs for Bowline Station were overstated (by 42%). See Phase II TDD at C-4.

EPA's analysis and its conclusion are incorrect. <FN 40> The Agency's analysis is also expressly contradicted by the informed assessment of the NYSDEC, through its consultant, which concluded during its review that "the analysis presented by, the owners of the Hudson River Facilities <FN 41> appears to be both reasonable and complete." See D.B. Grogan Assoc., Hudson River Power Plants Cooling Water System Design Assessment (Oct. 20, 2000) (Appendix 9). If NYSDEC's consultant had any criticism, it was that the cost estimates understated likely retrofit costs. Id.

EPA's and NYSDEC's conclusions are irreconcilable, due to the multiple errors in EPA's analysis. First, EPA merely compares a 1993 cost estimate to a 1999 cost estimate, both of which were obtained on behalf of the Hudson River Stations. <FN 42> Based on our review of EPA's supporting documentation (DCN 4-2537), EPA based its "low" estimate on the average price of three vendor quotations received by the four Hudson River Facilities in 1993. However, EPA provides no rationale as to why the 1993 cost estimate is more appropriate than the more recent estimate which frames the basis for the Hudson River analysis, and wholly ignores the obvious fact that the market price for construction and related services are ordinarily best determined by a recent, as opposed to an outdated, bid.

Similarly incomprehensible is EPA's other criticism of the 1999 DEIS. Based on site-specific concerns, including community concerns, the DEIS selects mechanical wet/dry cooling as the appropriate technology to minimize the water-vapor plume. EPA concludes that plume effects would be an "insignificant concern," and therefore "the mechanical wet (only) cooling towers [are] a viable option." See Phase II TDD at C-2. The DEIS recognizes that mechanical wet cooling towers may be a viable option, if justifiable based on a cost-benefit analysis, and weighs their benefits and costs against those of a mechanical wet/dry cooling tower. Cognizant of the significant community interest and the legal requirement under New York law relating to certain construction and likely applicable to minimize significant adverse environmental impacts, the DEIS selects the appropriate option for the four stations. EPA apparently disagrees. However, what may appear to be a rational choice to EPA is not appropriate at all sites, and EPA's criticism belies not a measured challenge to a methodology, but bias.

Footnotes

40 EPA states that its goal is to examine the "overall veracity" of the estimates prepared by Power Tech Associates. Whatever EPA's goal, its use of the term "veracity" is profoundly inappropriate.

41 The DEIS was prepared by the then owners of the Hudson River facilities: Bowline Point 1 and 2 was then owned by Central Hudson Gas & Electric Corp., and is now owned by Mirant Bowline LLC; Roseton 1 and was then owned by Southern Entergy New York and is now owned by Dynegy Roseton LLC; Indian Point 2 was then owned by Consolidated Edison of New York, Inc. and is now owned by Entergy Indian Point 2, LLC; and Indian Point 3 was then owned by New York Power Authority and is now owned by Entergy Indian Point 3, LLC.

42 In preparation of its 1999 DEIS, the Hudson River facility owners explain that the "current effort included: detailed review of prior studies; revision of designs including different cooling-tower types: new cost estimates and new performance and economic analyses to reflect conditions of 1999." Power Tech Assoc. Economic and Environmental Review of Closed Cooling Water Systems for the Hudson River Power Plants (Nov. 1999) (attachment to the DEIS) at 1 (Appendix 10).

EPA Response

EPA notes that should the proposal and NODA analyses of cooling tower retrofit costs be underestimated, as asserted by the comment, then the outcome would serve to reinforce and support the Agency's decision to not base the requirements of the final rule on this technology.

EPA believes that the commenters assertions of bias are not appropriate or supported. On the matter of plume abatement at Bowline Point, the Agency examined the record of the 1999 DEIS and historical information related to Bowline Point and nearby power plants. The Agency concluded, as did the consultant to the NYSDEC that mechanical draft towers would be a desirable economic alternative for the plant. Further, the Agency learned that the decision to adopt plume abatement may have been based on a historical analysis that examined only natural draft cooling towers, which would give an overstated aesthetic and drift analysis. As such, the Agency contests the commenter's assertions of bias.

Comment ID 316bEFR.029.038

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 17.06

Option: Site-specific determination of BTA

In short, as discussed above, EPA has not supported its efforts to offset alleged AEIs with cooling towers as an appropriate legal, scientific or economic response. Accordingly, Entergy requests that EPA reconsider its analysis, abiding the following suggestions. First, facilities and regulators should have flexibility to evaluate all available technologies and select those that comply in a cost-effective manner. This underscores the importance of a site-specific approach, as it is not appropriate to assume that a single technology that works at one facility will work at another. On the contrary, many factors play into whether a technology will be effective and facilities should be able to take them all into consideration. This flexibility will foster an environment of innovation and allow state agencies the flexibility to decide what will work best in their state.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.029.039

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.1

General: cost tests

Second, since cost tests will consume substantial time and resources, if required for each possible technology, Entergy requests that, if a technology can be proven "infeasible" through engineering analysis, no cost test should not be necessary. This approach will aid in streamlining an otherwise cumbersome process.

EPA Response

In the final rule, the cost-test will not require comparison of every possible technology for a particular site. Rather, the cost-test will function such that the facility determines the best technology for their site to meet the applicable requirements and then compare a single or limited set of costs to those considered by the Agency. Therefore, the commenter's concerns have been met. See section IX.H of the preamble to the final rule.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 7.02

Performance standards

As a corollary, and third, many of the technologies in the Rule have not been extensively used, with the result that there is a potential for them to not produce the required percentage of reductions. If a technology is installed, maintained and monitored properly, and does not produce the percentage of reductions originally expected or required, a facility should not be considered to be out of compliance. Therefore, compliance measurement should be based upon factors that can be monitored and controlled: installation and maintenance. If a technology does not produce the percentage of reductions required, the facility should be permitted an appropriate amount of time to determine where the problem lies and propose a solution.

EPA Response

EPA believes that many technologies have proven performance records documented by almost three decades of study. For discussion of many of these technologies, see Chapter 3 of the Technology Development Document.

However, as the commenter notes, there are occasions where the performance standards cannot be consistently attained (e.g. because of biological variability considerations). For this reason, EPA has authorized the use of a Technology Installation and Operation Plan with the approval of the Director as a mechanism for determining compliance. Among other things, the Technology Installation and Operation Plan requirements incorporate principles of adaptive management, as this commenter suggests. See the preamble of the final rule for a more detailed discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.029.041

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Finally, once a facility has achieved the required percentage of reductions, they should not have to repeat the entire process at every permit renewal. A re-evaluation should be based upon significant changes in the waterbody or facility operations, as identified through periodic monitoring.

EPA Response

EPA agrees that a comprehensive demonstration study may not be required at every permit renewal. Under 125.95(a)(3) of today's final rule, a facility may apply for reduced application requirements if conditions at the facility remain substantially unchanged from the previous permit issuance. Please see response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.029.042

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA'S BENEFITS ANALYSIS IS FLAWED.

According to the proposed Rule, a reduction in impingement and entrainment will result in so-called "use benefits," such as an increase in recreational and commercial catch, as well as so-called "nonuse benefits," such as preservation of fish for future generations. See 67 Fed. Reg. at l7189. EPA employed case studies that were source-waterbody specific, then extrapolated nationwide benefits based upon those case studies. Both the case studies and the extrapolation methodology substantially overstate the benefits associated with the proposed Rule.

The case study methodology proceeds in several distinct steps. First, EPA utilizes facility-specific measurements of impingement and entrainment, measured in terms of individual organisms and categorized according to species. Second, EPA normalizes these measurements by calculating the number of equivalent 1-year old fish impinged or entrained. A critique of these steps is presented in UWAG Comments, Review and Methodology Used by EPA to Evaluate Impacts of Entrainment and Impingement Losses on Commercial and Recreational Harvests ("Review and Methodology").

To determine both use and non-use benefits, EPA argues that preventing the loss of the calculated number of age-1 equivalent fish would result in benefits to the commercial and recreational fishery, as well as to non-use notions of benefits (such as bequest and existence value). As discussed herein, the methodology for each measure of benefits is flawed and, in many cases, defies common-sense application of well-known and well-understood biological and economic principles.

One fundamental error in the benefits analysis is that EPA assumes that impingement and entrainment will be completely eliminated by the Rule. Of course, based upon the standards set forth in the Rule, EPA requires reductions of 60-90% for entrainment and 80-95% for impingement. Thus, the calculated benefits should be discounted accordingly.

Moreover, EPA assumes that all affected facilities currently operate under "baseline" conditions and, therefore, that changes in conditions from today's operations to those under the Rule would actually achieve a new benefit in accordance with the performance standards. In fact, many facilities already have installed technologies aimed at reducing impingement and entrainment, with the result that EPA's assumption is incorrect and overstates benefits. For example, if a facility already has installed technologies that reduce entrainment by 50% from baseline figures, the actual benefits of the Rule for that facility will be a net reduction of entrainment by 10-40%, rather than the 60-90% assumed by EPA.

EPA Response

The comment states that EPA's benefit analysis overstates benefits.

The comment criticizes EPA's I&E calculations. EPA used facility-derived data and standard methods to calculate age 1 equivalents, as described in Chapter A5 of Part A of the Phase II Regional Study Document. Therefore, EPA sees no basis for the commenter's criticism of EPA's age 1 equivalent calculations.

The commenter is wrong to state that "EPA assumes that impingement and entrainment will be completely eliminated by the Rule." In fact, EPA's benefits analysis takes into consideration EPA's estimated percent reductions in I&E resulting from the rule.

The commenter is also wrong to state that EPA did not account for technologies that may have been installed to reduce I&E after the time that I&E data were collected. In fact, EPA made considerable effort to adjust I&E rates as appropriate based on such considerations.

EPA disagrees that its methodology for estimating each benefit category is flawed.

For EPA's responses to comments on specific benefit categories please see the following comments. For EPA's response to comments on the commercial fishery method, please see comment # 316bEFR.323.016. For EPA responses to comments on the recreational fishery methods used at proposal, please see responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values for this rule, including meta-analysis and the benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.029.043

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.02

Commercial Fishing Benefits

The Pilgrim Case Study Overstates Benefits to Commercial Fisheries.

In the following paragraphs, Entergy outlines the multiple, significant errors in EPA's benefits analysis, as applied in its case studies to an Entergy-owned facility, Pilgrim Station. See Case Study, Part G: Seabrook and Pilgrim.

The first step in EPA's commercial-fisheries benefits-analysis involves the translation of impingement and entrainment numbers into changes in the number of pounds of a commercial species sold at dockside. See Case Studies Ch. A9. A critique of this translation is presented in UWAG Comments, Review and Methodology. As EPA acknowledges, its approach assumes a linear relationship between changes in fishery stock and changes in landings, i.e., bringing fish to market. See Case Studies at A-9. In other words, EPA assumes that a reduction in overall stock size automatically results in a proportionate reduction in commercial landings. This assumption skews the analysis by linking it to the highest possible measure of commercial benefit, and ignores the fundamental economic principles of supply and demand that regulate the size of the markets for individual fish species.

1. EPA Assumes, Without Justification, That the Markets for All Fish Species Are Supply Limited.

EPA's approach assumes that commercial landings of all species are limited by supply rather than demand. This assumption leads to EPA's conclusion that each theoretical fish lost to the commercial fishery due to impingement or entrainment results in one fewer fish of that species coming to market (i.e., there would have been a demand for the fish had it been supplied to the market). EPA must justify this assumption. Otherwise, it leads to the maximum possible market impact due to entrainment and impingement. <FN 43>

EPA's approach also fails to recognize that demand may be driving the size of the market in a given fish species. If the market is regulated by demand, then the effects of impingement and entrainment are significantly smaller than EPA's projections and may approach zero. For example, assume a demand for one (1) million pounds of a given species of fish. If the sustainable yield of the fish species is five (5) million pounds annually, a small reduction in the number of adults due to impingement and entrainment has very little effect on the ability of the supply to meet the demand and, therefore, has little effect on market price. Indeed, if the gap between demand and sustainable yield is large enough, there would be no effect on market price. In these instances, a reduction in impingement and entrainment would provide no economic benefit. Nonetheless, EPA chooses to forgo any analysis of the fundamental characteristics (i.e., supply and demand) of the fisheries markets. <FN 44>

As an example, a comparison of the pounds of winter flounder theoretically lost to the total commercial harvest is instructive. According to EPA's exaggerated calculations, as set out in the Pilgrim Case Study, impingement and entrainment results in the loss of 19,819 pounds of winter flounder to the commercial fishery, as compared to regional commercial landings of 11,294,198 pounds (or 0.18%). Thus, if the market for winter flounder is not limited by supply, the fisherman likely to and would catch the additional 19,819 pounds of winter flounder and suffer very little or no increase in cost (particularly if this is spread over the fishing season). If this is the case, the appropriate economic impact at the dockside is not the market value of the theoretically missing fish (because demand has been satisfied), but the marginal cost to the fisherman of catching the additional 19,819 pounds, if any. <FN 45> Nat'l Marine Fisheries Serv., Annual Commercial Landing Statistics, at http://www.st.nmfs.gov/st1/ commerciallandings/annual_landings.html (last visited Aug. 5, 2002) (2000 commercial landings for winter flounder in New England).

2. EPA Assumes, Without Justification, that Demand Is Inelastic.

Assuming a modest increase in the marginal cost to the fisherman, there are two probable outcomes for the marketplace as a whole: (1) a nominal increase in the dockside price of winter flounder, to recover the increase in marginal cost; or (2) the sale of fish at the same market price, with the nominal additional costs absorbed. Under scenario (1), the fisherman recovers his or her costs, because they are passed through to the consumer. Since each subsequent market participant (wholesalers, etc.) obtains the equivalent number of fish, they experience no economic impact other than the increase in dockside price and, therefore, the total impact remains the increase in the marginal cost to catch the 19,819 pounds of fish rather than overall market value (including any post-dockside value added) of the theoretically missing fish.

Under scenario (2), the fisherman is forced to sell at the same price, because demand is elastic (i.e., there are substitutes in the market that satisfy subsequent producers and the ultimate consumer). If substitutes exist within a given market, there is no post-dockside impact resulting from impingement and entrainment in the first instance. Just as with scenario (1), the net economic impact is the cost to the fisherman which, again, is the marginal cost to catch the additional fish, rather than the market value of the additional fish. Thus, EPA must consider the elasticity of demand for each commercial species when it analyzes economic impacts, because failing to do so results in substantially overstated economic benefits. <FN 46>

Footnotes

43 For example, there is no a limit on the quantity of winter flounder harvested by commercial fisherman. See Massachusetts Division of Maine Fisheries website (http://www.state.ma.us/dfwele/dmflCommercialFishing/com_index.htm). Thus, the market for winter flounder is not regulated by supply. Even if there were a catch limit, that limit does not necessarily mean that impingement and entrainment losses affect commercial or recreational catches.

44 This market phenomenon is confirmed by a review of NMFS's data on the relationship between commercial harvest and market price for winter flounder. Since 1995, the market price for winter flounder has steadily declined despite year-to-year fluctuation in commercial landings. Thus, supply is not driving market prices. See B. Pollard Rountree et at, Fishery Economic Trends tbl.l at http://www.nefsc.rimfs.gov/sos/econ/ (last revised Apr. 2001) ("Fishery Economic Trends").

45 It may be that supply is so available that there are no marginal increased costs.

46 Again, the steady decline in the dock-side price for winter flounder, despite fluctuations in supply, suggests among other things that, from the perspective of the consumer, winter flounder are fungible commodities.

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

Valuation of commercial fishing impacts is based on 0% to 40% of estimated gross revenue changes under the final rule. To recognize uncertainty about assumptions regarding changes in supply under regulated and unregulated fisheries, EPA assumes no market price changes and no change in consumer surplus under the final rule (see Section XII.D of the preamble for the final rule).

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.03.06.01

Pilgrim

The Pilgrim Case Study Overstates Benefits to Recreational Fisheries.

EPA did not conduct a study of the recreational fishery in the Pilgrim area. See Pilgrim Case Study at G4-7. Instead, EPA used data from a 1994 data set reported in Hicks, et. al (1999) from the Mid-Atlantic coast. The Hicks study attempted to determine a recreational angler's willingness to pay for an increase in catch rate of one (1) fish of a particular fish species for every fishing trip. For obvious reasons, the data is irrelevant to the question that EPA is trying to answer in the Pilgrim Case Study. Namely, what is the willingness of recreational fishermen to pay for the increase in catch rates that would be experienced based upon theoretical reductions in impingement and entrainment at Pilgrim. A proper study is important not only for the accuracy of the Pilgrim Case Study but, because the Pilgrim Case Study is used to extrapolate benefits nationally, the accuracy of national benefits. Moreover, and as explained below, EPA's inappropriate use of the so-called "50% Rule," to determine the value of non-use benefits, compounds the errors inherent in the calculation of benefits to the recreational fishery.

Beyond the substantial concerns over appropriate data, the methodology applying that data overstates benefits substantially. According to EPA's exaggerated calculations of entrainment and impingement losses, as set out in the Pilgrim Case Study, 13,731 winter flounder are lost to the recreational fishery due to entrainment. See Pilgrim Case Study at G4-8. The analysis resulting in that estimate is critiqued in UWAG Comments, Review and Methodology. EPA then applies modified values from the Hicks study, which apparently suggest a willingness to pay between $4.80 and $5.49 to catch one additional winter flounder per fishing trip. EPA multiplies the number of theoretical fish lost by the willingness to pay figures, and arrives at a total impact to the recreational fishery.

The simple flaw in this approach is that it fails to calculate the expected increase in catch rate that would be experienced for winter flounder, based upon even the optimistic benefits of the Rule. EPA has not compared the expected increase in recreational catch rates to the one (1) fish/trip assumption used by Hicks. For example, if the expected increase in recreational catch rate for a given species is less than one (1) fish/trip (say, 0.10 fish/trip), then the Hicks data is entirely useless. The actual question asked in the willingness-to-pay context should be: What is a recreational angler willing to pay to increase catch rates by 0.10 fish/trip? The answer almost certainly is far less than the $4.80 used by EPA.

Again, EPA must correct this significant error, as it leads to a benefit estimate that is substantially overstated.

EPA Response

In the cost-benefit analysis for the final 316(b) Phase II rule, EPA did not use benefits transfer methods to value losses to recreational fishing in the North Atlantic. Instead, EPA used a transfer of benefit function. For all other regions EPA estimated a random utility model (RUM). Please refer to Chapter A11: Estimating Benefits with a Random Utility Model (RUM) of the Regional Analysis Document for the final rule (Docket #6-0003).

In the cost-benefit analyses for the final rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. See response to comment 316bEFR.005.034

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.03.06

Pilgrim and Seabrook

The Impacts to Forage Species Are Overstated, Since Impinged and Entrained Organisms Remain in the Food Chain.

EPA utilized two approaches to analyze the benefits associated with reduction in entrainment and impingement of forage species. EPA first relies on the production-forgone method, which assumes that the impinged and entrained organisms are unavailable to the food chain. EPA then estimates the impacts of this loss of food source on higher trophic levels within the food chain.

EPA's assumptions are suspect, if not incorrect. Biomass is not removed from the system by impingement and entrainment, even if one assumes that all impinged and entrained organisms die. The biomass passes through the CWIS and remains available to predator species. In addition, this method assumes that the prey species are food resource limited (i.e., but for a limited food supply, there would be more members of the population). EPA does not substantiate that assumption for the forage species of interest. If a species is food limited, then non-entrained and non-impinged members of the population achieve a competitive advantage due to the reduction in the number of individuals competing for the limiting resource. For these and other reasons, the production forgone figures are overestimates.

EPA also utilizes the replacement cost method by analyzing the costs of operating a hatchery to produce the numbers of fish eggs/larvae entrained or impinged by the Station. Since the site (and cost) of any hatchery must be matched to a proper measure of impact, these costs are vastly overstated.

EPA Response

EPA disagrees with the commentary's assertion that the biomass of I&E fish discharged back to the water body return to the ecosystem and serve as food for predatory species. Although it is possible that dead biomass discharged from facilities might be directly consumed by some predatory species, EPA does not accept that this would be a common occurrence because most predatory species will prey preferentially on live, swimming prey items. Insofar as any discharged biomass is consumed by fishes, EPA maintains that it is far more likely that they will be consumed by scavenger species that are themselves not frequent targets of fisheries. EPA maintains that the mostly likely fate of discharged biomass is slow decomposition and eventual consumption by invertebrate species and microbes. In either case, this represents a major step downward in a food web, so the residual value of the biomass as a harvestable foodstuff is negligible because of inefficiencies in trophic transfer within a food chain that spans from detritus and small detritivores to top predators.

EPA did not use habitat-based replacement costs or hatchery replacement costs in its final Phase II benefits analysis. For additional information, please see the document entitled "Habitat-based Replacement Cost Method" (DCN 6-1003) and EPA's response to Comment #316bEFR.005.035.

Comment ID 316bEFR.029.046

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA's Approach to Valuation of Non-use Benefits Is Based upon Dated Material and Is Entirely Inappropriate.

EPA relies exclusively on Fisher and Raucher (1984) to value the non-use benefits of the proposed Rule at 50% of the benefits to the recreational fishery. According to EPA's analysis, non-use benefits account for approximately 28% of total benefits. See Pilgrim Case Study tbl. G4-24. Thus, non-use values contribute substantially to EPA's overall estimate of benefits. <FN 47>

EPA's approach is arbitrary. EPA has selected an 18-year-old study to support its adoption of the 50% Rule. Even by EPA's own admission, the Fisher and Raucher study is dated. See Case Studies at A9-10. Moreover, the Fisher and Raucher study examined the issue of non-use benefits associated with improvements in water quality rather than the more narrow issue of reductions in impingement and entrainment. The distinction is important, since the theoretical benefits of improved water quality sweep even more broadly (to include public health, habitat viability, etc.) than the theoretical benefits of a reduction in impingement and entrainment. The proposed Rule is not targeted at improving overall water quality.

The literature reflects substantial disagreement over the application of non-use values in cost benefit analyses. Economists have outlined difficulties defining critical terms such as existence value. See Bruce Madariaga & Kenneth E. McConnell Exploring Existing Value, 23 Water Resources Res. 936 (1987) (Appendix 11); V. Kerry Smith, Uncertainty, Benefit-Cost Analysis, and the Treatment of Option Value, 14 J. Envtl. Econ & Mgmt. 283 (1987) (Appendix 12). Those difficulties have not been overcome. See Jonathan Aldred, Existence Value, Welfare and Altruism, 3 Envtl. Values 381 (1994) (Appendix 13). More recent studies suggest that the concept of existence value is inconsistent with fundamental principles of economics and, in fact, does not exist. See Hans-Peter Weikard, The Existence Value Does Not Exist and Non-Use Values Are Useless, prepared for the European Public Choice Society (2002) (Appendix 14). EPA should undertake an appropriate review of the literature before deciding whether, and how, to value non-use benefits under the proposed Rule.

EPA's arbitrary selection of a single study from the literature also conveniently sidesteps the difficulties of preparing a survey or other measurement tool to accurately quantify non-use benefits, if they exist at all. For example, Professors Diamond and Hausmann conclude that contingent valuation surveys (the predominant means of quantifying non-use benefits) do not measure the economic preferences they attempt to measure. Peter A. Diamond & Jerry A. Hausmann, Contingent Valuation: Is Some Number Better Than No Number?, J. Econ. Perspectives, Fall 1994, at 45 (Appendix 15). It appears that most economists agree that it is very difficult, if not impossible, to craft a survey to measure the non-use value at issue. Diamond and Hausmann recount the substantial concern over the effect of question order, and the impacts of respondents who may not care about the resource but do care about the activity causing a harm to a resource. In the latter instances, the surveys tend to measure overall concern over certain industrial activities rather than a valuation of the resource. These and other well-documented shortcomings of non-use benefits analysis are simply ignored by

EPA.

Even if concepts such as existence value exist, and assuming they can be measured accurately, there is experimental evidence that EPA’s application of existence value under the proposed Rule is misguided. For example, Professor Fredman studied existence value as applied to the health of a population of wildlife. In that study, Fredman discovered that even if a person’s willingness to pay for the continued existence of an endangered species is positive, that same person’s willingness to pay for an increase in population density of a non-threatened species is zero. Peter Fredman, The Existence of Existence Value - A Study of the Economic Benefits of an Endangered Species, 1 J. Forest Econ. 307 (1995) (Appendix 16). The Fredman study applies directly to the Pilgrim Case Study, since none of the species impinged or entrained at Pilgrim is threatened with extinction. Consequently, the willingness to pay for an increase in the population density of species impinged or entrained at Pilgrim may well be zero. <FN 48>

EPA’s approach to non-use benefits is outcome determinative and shows a tremendous reluctance to engage in any serious analysis of the issues. Until EPA tackles the substantial problems inherent in its arbitrary approach, it should eliminate non-use benefits from the analysis.

Footnotes

47 As mentioned above, the “50% Rule” compounds errors inherent in the analysis of benefits to the recreational fishery.

48 It also stands to reason that an individual fish has no existence value, since it would die of natural causes many times over before the next generation could enjoy it. As has been pointed out by Messrs. Barnthouse, Coutani and Van Winkle, Status and Trends of Hudson River Fish (Appendix 3) and others, populations rather than individuals persist through time. Thus, any existence value would and should be tied to the viability of a population rather than an individual or group of individuals. This is supported by the Fredman study.

EPA Response

For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

As noted by the commenter, there is debated in the economics profession and other related professions about the challenges of measuring non-use values. For details on EPA's non-use analyses please see Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003). Please also see Chapter D1 of the final Phase II EBA document regarding break-even analysis (DCN #6-0002).

For a discussion on the feasibility and challenges of doing original state preference research please see EPA's response to comment #316bEFR.316.105.

Comment ID 316bEFR.029.047

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.03.06

Pilgrim and Seabrook

Ultimately, EPA Could Achieve the Same Ecological Benefit Using More Cost-effective Strategies.

As a point of reference for the benefits analysis, it is useful to note that the reduction in the loss of fish eggs and larvae to the levels demanded by the Rule could also be achieved by a reduction in either commercial or recreational landings. For example, according to the Pilgrim Case Study, the mean annual entrainment of winter flounder at Pilgrim Nuclear Power Station is approximately 31 million organisms. According to the life history data provided by EPA, a female winter flounder produces between 500,000 and 1.5 million eggs annually. Assuming mean of 1 million eggs annually, a reduction in the commercial or recreations catch of 31 female winter flounder achieves the same ecological benefit as eliminating entrainment of winter flounder at Pilgrim. Assuming an adult, female winter flounder weights approximately 2 pounds, and using the 1999 dockside price/pound of Trends, the market price for those 31 fish is approximately $78.74

Thus, the impacts targeted by the Rule, which proposes the expenditure of tens of millions of dollars for each existing facility, could be achieved by the payment of costs several orders of magnitude lower than that proposed by the Rule. EPA should consider alternative solutions to capturing the ecological benefits it seeks in the proposed Rule, before imposing the enormous cost of compliance on each existing facility.

EPA Response

EPA notes that the commenter has not provided an alternative strategy that could achieve the same ecological benefit as today's final rule using more cost-effective strategies. If the commenter is suggesting that EPA reduce commercial or recreational landings, these issues are beyond the scope of 316(b). For explanation for the basis of today's final rule, please see the final rule preamble.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's HRC Methodology is Fatally Flawed

In the Rule, EPA proposes to employ the so-called Habitat-Based Replacement Cost ("HRC") methodology to calculate the proposed benefits of the Rule, stating that the HRC method provides "a more comprehensive indication of the benefits of reducing entrainment and impingement on all species, including forage species." See 67 Red. Reg. at 17193. In two case studies (including one for Pilgrim Station), EPA applies the HRC methodology, deriving what the Agency contends are benefits-transfer values. See 67 Fed. Reg. at 17199. While conceding that the HRC analysis represents an "upper bound," EPA nonetheless applies the methodology to Pilgrim Station, producing a theoretical estimated benefit of eliminated entrainment and impingement in excess of $9.0 million in 2001 dollars. Id.

EPA's use of the HRC methodology is irremediably inappropriate. Even if the methodology were not, as it is, wholly at odds with settled economics (as a mechanism for evaluating the purported benefits of reduced entrainment and impingement), the Agency's application of the HRC in the Pilgrim Station Case Study reveals numerous fundamental, if not misleading, assumptions, which compel the irrefutable conclusion that EPA's approach is irrevocably biased.

NERA evaluates EPA's effort to employ the HRC methodology. NERA, Economic Evaluation of the Habitat Replacement Cost Methodology in the U.S. Environmental Protection Agency's 316(b) Benefits Case Study for Pilgrim Station (Aug. 2002) ("HRC Evaluation") (Appendix 17). As NERA notes, EPA's use of the HRC is inconsistent with basic economic principles and therefore fundamentally and conceptually flawed, insomuch as the HRC only can be appropriately employed in conjunction with an assessment of costs, not of benefits as EPA proposes to do in the Rule. See id. Indeed, NERA concludes that EPA's reliance on the HRC methodology, as undertaken in the Rule and Case Study, is so erroneous as to be misleading. See id.; see also UWAG Comments.

NERA also evaluated EPA's application of the HRC methodology to Pilgrim Station, on the assumption that doing so could provide some insight into how EPA intended the methodology to be employed. As NERA concludes, EPA's application of the HRC is as flawed as the methodology and, again, biased toward increasing the purported benefits of the Rule. See HRC Evaluation (Appendix 17). As NERA concludes, based upon its economic expertise EPA's use of the HRC is "fundamentally misleading," in part because it: (1) has cobbled together the model as a substitute for a thoughtful and credible commercial and recreational fisheries assessment; and (2) has created results which exaggerate benefits by at least twenty fold, as calculated by NERA revealing either the wholesale misconception of the benefits analysis and the HRC methodology, or a deliberate bias. See id. Indeed, NERA characterizes as among the HRC's "arbitrary assumptions:" EPA's unexplained and unsupported "preferred habitat" selection process; its improper use of species abundance as a measure of production; its blind failure to accurately identify, explain and correct obvious sampling limitations; and its inexplicable insistence on a one-to-one replacement, even for large projects. See Id.

Again assuming that the HRC were, as it is not, valid, Entergy also retained ENSR to evaluate the biological assumptions in EPA's application of the HRC in the Pilgrim Case Study. See ENSR Comments (Appendix 2). As ENSR's analysis concludes, "[t]he application of the HRC method to [Pilgrim Station] includes several inaccurate and/or inappropriate assumptions as well as a miscalculation of site-specific conditions." See Id. at 6. Among these several errors are the following: (1) EPA's HRC analysis includes costs for species addressed in the commercial/recreation fisheries analyses; (2) EPA's unexplained use of annualized, as distinct from present-value, costs; (3) EPA's use of abundance data as a surrogate for productivity, with the result that EPA has grossly overestimated needed restoration; (4) the absence of site-specific information; (5) the failure to consider relevant, and less costly, mitigation measures, such as fish hatcheries and stocking; (6) the inappropriate use of flawed "baseline" conditions; (7) reliance on inappropriate restoration-cost data from non-analogous circumstances; and (8) unreasonable monitoring costs. See Id. at 6-11.

Each of these is detailed in the ENSR Comments (Appendix 2), the contents of which are not repeated here, except with respect to EPA's use of abundance data as a surrogate for productivity data. More particularly, in the HRC methodology EPA would apply, it expects regulated entities to implement restoration measures adequate to replace perceived entrainment or impingement impacts. <FN 49> In conducting its analysis of Pilgrim Station, for instance, EPA determines the required tidal wetlands acreage necessary to off-set presumed winter flounder impacts in terms of age-1 winter flounder. This approach necessarily underestimates the real contribution of such wetlands, which - among numerous other benefits - operate as a spawning habitat for individuals that migrate beyond its boundaries and go on to produce young elsewhere. Indeed, ENSR concluded that "the majority of eggs, larvae, juveniles, and adult fish produced may not be retained in or use the tidal wetland as a long-term habitat, but will likely enter the larger marine ecosystem." See Id. at 7. As such, EPA's failure to consider this additional production therefore materially understates the benefits of the wetlands in question, creating a false conclusion to a muddled analysis.

In short, there is simply no reasonable basis for employing the HRC analysis, which should be eliminated from the Rule.

Footnotes

49 EPA's calculations of impacts is likewise flawed, as discussed at length by the ENSR Comments (Appendix 2), insomuch as it seriously overestimates impacts. For these reasons, EPA's application of the HRC methodology is doubly flawed.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see EPA's response to comment #316bEFR.005.035 and the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method.

Please also see EPA's response to comments on HRC production estimates, comment #316bEFR.029.113.

With respect to comments on the annualized vs. present value costs - when EPA was examining the HRC in the context of specific case studies, it needed to convert present value costs into their annualized equivalent in order to facilitate a suitable comparison to other parts of the economic analysis, because all the other aspects of the analysis were developed in an annualized form (such as annualized compliance costs or annualized benefits).

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 3.03

Definition: Waters of the U.S.

EPA SHOULD EXCLUDE OPERATIONAL WATERS FROM THE RULE.

Reservoirs constructed as cooling ponds for a specific facility are not properly subject to the Rule. See, e.g., Solid Waste Agency v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001) (clarifying the definition of waters of the United States to exclude certain isolated water bodies). These bodies of water are extensions of facility operations, not naturally occurring waterbodies. For this reason, treatment of them as waters of the United States is inappropriate. Id. As such, these reservoirs and cooling ponds should already be considered closed-systems and, therefore, exempt from § 316(b).

EPA Response

See response to 316bEFR.006.001.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.1

General: cost tests

EPA'S BENEFITS-COST DISCUSSION FOR THE RULE IS WOEFULLY INADEQUATE.

The United States Office of Management and Budget ("OMB") issued guidelines to assist agencies, such as EPA, in their efforts to estimate the benefits and costs of proposed regulations, such as the Rule. See OMB, Economic Analysis of Federal Regulations under Executive Order 12866 (Jan. 11, 1996). OMB's guidelines compel EPA to assess the relative advantages and disadvantages of alternatives in support of regulatory decisions which will have a significant effect on an industry, as the Rule will, pursuant to Order 12866. See Order 12866. EPA's own guidelines, likewise compel a searching benefits-costs assessment. See EPA, Guidelines for Preparing Economic Analysis, Report No. 240-R-00-003 (Sept. 2000).

The Rule does not meet the letter or spirit of the requirements of Order 12866, OMB's guidelines or EPA's own mandates. Nowhere in the Rule or the administrative record, including in EPA's Eco/Ben Analysis, is the benefits-costs analysis EPA has employed to evaluate its proposed decision making adequately or appropriately set forth. Thus, for instance, EPA does no identify or outline the methodology for evaluating or performing its benefits-costs analysis. Likewise, the underlying technical documents, which should contain the information on which EPA must rely, amount to nothing more than a series of superficial spreadsheets outlining the most perfunctory information about power plants, frequently divided among North American Electric Reliability Council ("NERC") regions, e.g., the percentage of fossil-fuel units, without identifying why the NERC delineation or the information itself is relevant or how it is applied in the benefits-costs analysis.

Further, where EPA does undertake any analysis, its approach is invariably inadequate. Particularly infirm, for example, are EPA's efforts to compare technology costs to gross revenues, and its corresponding conclusion that, based upon this flawed comparison, technology costs are acceptable. See Phase II Eco/Ben Analysis at B2-2 to B203; UWAG Comments, Role of Benefit-Cost Analysis. Indeed, in its Report, TER states that EPA's comparison of compliance costs to revenues, among other financial tests: (1) "have no conceptual basis in economic theory or policy science;" (2) have "no connection" with "accepted economic efficiency or even equity measures;" and (3) "fail to account either for economic benefits provided by CWIS investments or their environmental costs." UWAG Comments, Role of Benefit-Cost Analysis (emphasis supplied).

Likewise, EPA's proposal for uniform "performance standards" ignores the variability in the costs and benefits of any specific location, effectively undermining the stated purpose of the Rule, i.e., appropriate application of § 316(b) in a manner that correlates to measurable benefits. As TER concludes, "BTA cannot be identified on an industry, regional, facility-type or waterbody-type basis, except when a group of sites is truly comparable, both in physical and environmental effects and the value of associated environmental services." Id. at 10.

By way of example, EPA fails to provide sufficient rationale for its decision to distinguish its proposed performance standards by waterbody type. Though EPA purports to recognize that “different waterbody types have different potential for adverse impacts,” 67 Fed. Reg. at 17140, its meager exploration of those differences includes only a theory that estuaries and tidal rivers have a “higher potential for adverse impact because they contain essential habitat and nursery areas” for many commercial and recreational important fish, and thus warrant the highest entrainment measures that have been proven to sustain populations of estuarine fish species in the face of environmental stressors, including impingement and entrainment. See UWAG Comments, Role of Benefit-Cost Analyses. <FN 50>

Likewise, EPA’s failure to distinguish between regulated and unregulated facilities renders the proposed Rule infirm. To survive challenge, in the Rule, EPA must account for the significant relevant distinctions between regulated and unregulated entities. See, e.g., Appalachian Power Co. v. EPA, 249 F.3d 1032, 1061-63 (D.C. Cir. 2001). In Appalachian Power, non-electric generating units (among other entities) challenged EPA’s final rule on NOx emissions, which held cogenerators to the same high (and costly) emissions standard as utilities. Id. In its rulemaking, EPA reasoned that deregulation had a dramatic impact on the industry, obviating the distinction between utilities and non-utilities. Id. at 1062. <FN 51> The D.C. Circuit remanded EPA’s classification of cogenerators as electric generating units (instead of non-electric generating units), on the grounds that EPA’s failure to explain its classification did not allow the Court to adequately assess EPA’s decision making. Id. at 1063. Explicit in the Court’s decision is the noteworthy fact that EPA had failed to demonstrate that cogenerators would be able to achieve the requisite NOx emission reductions at the same costs as other (utility-owned) electric generating units. Id. Implicit in the decision is the importance in such an analysis of how costs may impact different, i.e., regulated versus non-regulated, entities. Id. Indeed, EPA conceded as much by its supplemental rulemaking. Id. at 1062.

The failure to account for the important distinction between how regulated and non-regulated entities experience costs is particularly glaring in the proposed Rule, since EPA, in its Eco/Ben Analysis, maintains “[t]he conceptual basis of... section 316(b) regulation in particular is the need to correct imperfections in the markets that arise from uncompensated environmental externalities.” Phase II Eco/Ben Analysis at A2-8. Even if EPA were, in fact, charged with market correction, which it is not, its efforts to undertake a correction are improper, because of the Agency’s failure to account for the differences between regulated and unregulated entities. In addition, the EPA should consider the distinction between peaking and baseload units, as well as nuclear and fossil-fuel electric-generating stations. In each case, the distinction impacts the costs likely to be incurred as a consequence of the Rule, as well as certain alleged benefits which EPA maintains may result from the Rule.

Footnotes

50 Even if EPA’s proffered rationale for imposing the highest performance standard on estuaries is valid, it fails to explain its decision to hold oceans and the Great Lakes to the same high standards. This failure results in a particularly unreasonable result as the Rule is applied to facilities located on the Great Lakes. There, such factors as the introduction of exotic species (sea lamprey and zebra mussels), resource management programs including restocking, eutrophication, overfishing, pollution, shoreline development, and water level changes control the relative viability of fish fauna of the various lakes. Due to these stresses and manipulations of the Great Lakes ecosystems, heroic efforts to reduce entrainment and impingement losses are unlikely to translate into noticeable improvements in the fish community. Thus, as applied to facilities on the Great Lakes, EPA’s proposed performance standard is meaningless and arbitrary. This particular flaw in the Rule is demonstrative of the disastrous effect of EPA’s overall failure to consider and discuss its distinctions among various types of waterbodies in setting performance standards.

51 Obviously and appropriately unconvinced by its own argument, EPA issued a supplemental notice of proposed rulemaking for the proposition that “there is no relevant physical or technologica1 difference between utilities and other power generators.” Id (quoting 63 Fed. Reg. at 25923). EPA should abide its past practice and do the same here, thereby

ensuring appropriate opportunity for public comment.

EPA Response

The Agency in fact did provide a benefits-cost analysis of the regulatory alternatives in the Section X of NODA (68 FR 13521-13587). See response to comment 316b.EFR.206.047 for further response to comments asserting EPA's benefits analysis was incomplete.

Regarding cost to revenue comparisons, the Agency utilized these comparisons in addition to a much more rigorous approach for analyzing benefits for the NODA and final rule. See the final EBA.

Regarding performance standards, the Agency first notes that the commenter is incorrect in stating that the Agency's proposed standards were "uniform" or that the proposal "ignores the variability in the costs and benefits of any specific location." The Agency first points out that it proposed a range of performance standards, thereby contradicting the commenter's assertion that the standards were "uniform". Next the Agency notes that it published revised cost estimates for the NODA that take into account the variability in costs and performance of a wide range of technologies based and applied these technologies based on site-specific data. The costs adopted by the Agency for the final rule reflect the variability in costs between locations, based on the physical characteristics and the environment of the site. Finally, today's rule authorizes a number of compliance alternatives, including the use of TIOP with the Director's approval, to account for variability and site-specific factors.

The Agency disagrees with the commenter's assertion that the Agency has not provided sufficient rationale to distinguish performance requirements between waterbody types.

Regarding the commenter's assertion that the Agency has failed to distinguish between regulated and unregulated facilities, see 060.060. In addition EPA did examine varying cost between peaking vs. baseload and nuclear vs. non-nuclear.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 17.06

Option: Site-specific determination of BTA

IMPLEMENTING THE RULE, EPA SHOULD ADOPT A DEFENSIBLE AND EQUITABLE BENEFIT-COST ANALYSIS.

As discussed below, the Rule adopts a novel approach to § 316(b) decision making, rejecting three decades of practice for generic national standards. This approach is not appropriate.

Rather, EPA should select an appropriate mechanism for making site-specific determinations. As discussed below, such an approach should involve a site-specific benefits-cost analysis, not the use of national performance standards which, perhaps inadvertently, foster inequity. To that end, Entergy supports a benefit-cost analysis as the framework for evaluating and comparing costs and benefits of technologies, if any, available for minimizing AEI, if any. More particularly relative to the benefit-cost analysis, Entergy has reviewed and supports EPA's use of the TER's analysis. See UWAG Comments, Role of Benefit-Cost Analyses, see also NERA, Economic Evaluation of EPA's Proposed Rule For Cooling Water Intake Structures for New Facilities, (Nov. 2000), UWAG Comments. Both identify a reasoned framework for an appropriate benefit-cost analysis in the context of the Rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 17.06

Option: Site-specific determination of BTA

EPA Should Adopt a Clear Site-Specific Approach, Instead of the Performance Standards in the Rule.

For several decades, EPA has approached § 316(b) determinations in a site-specific manner. The Agency's early guidance (still in draft form after a quarter century) and even its original, now-suspended § 316(b) regulations contemplated site-specific BTA determinations. EPA's and virtually every state's practice is site-specific yet, without explanation, EPA now proposes a very different approach, that of generic national performance standards.

EPA's new approach is not sound environmental policy and fosters inequity. Indeed, a generic approach creates dissonance with other regulators, in contravention of Executive Order 12866 ("Each agency shall avoid regulations that are inconsistent, incompatible ... with its other regulations or those of other Federal agencies."). More particularly, the NRC, in NUREG-1437, identifies generic categories of environmental issues to be considered in the context of relicensing of nuclear facilities. Many are designated as site-specific issues, i.e., Category 2 issues. Among the enumerated site-specific issues are "Entrainment of Fish and Shellfish" and "Impingement of Fish and Shellfish." Thus, the NRC has concluded, based upon available information, that entrainment and impingement are appropriately addressed as site-specific issues in the context of its nuclear re-licensing proceedings.

Likewise, EPA's efforts to avoid a site-specific approach contravene the very nature of the analysis that § 316(b) requires. The reasons are simple. First, assessing and "minimizing" adverse environmental impacts is an inherently site-specific process. The scope, degree and effects of entrainment and impingement necessarily depends on site-specific factors, e.g., the waterbody, the shape of the shoreline, the location and configuration of the intake, the species present at the site, and other factors. Likewise, the feasibility, effectiveness, environmental impacts and cost of technologies to reduce CWIS impacts vary tremendously from site to site. As discussed throughout those comments, certain technologies (barrier nets, for example) cannot be used at nuclear facilities. Further, even available intake technologies have impacts on navigation or on ecosystems which should be considered in making § 316(b) decisions. For such facilities, a generic approach achieves little, at a high cost. Accordingly, EPA should revise the Rule to focus on assessing site-specific factors that determine the impact of entrainment and impingement. <FN 52>

At the heart of EPA's policy reversal are two implicit motivations, neither of which will support so radical a policy change: (1) the Agency's frustration regarding the theoretical impacts of entrainment and impingement; and (2) purported regulatory ease. EPA's frustration is misplaced. As discussed above, sound science supports the conclusion that CWISs may not create adverse environmental impacts. Likewise, regulatory streamlining, is not apt to result from a generic approach. Rather, facilities that suffer from the inequities of the generalized standards of performance in the Rule will be inclined to take action, including through litigation, a more costly and time-consuming result for regulators and regulated entities. In short, while Entergy appreciates EPA's efforts to achieve consistency, those efforts should be directed to creating a process for consistent implementation, not to creating generic, and therefore necessarily arbitrary, standards of performance.

Footnotes

52 Although Entergy recognizes that EPA's Rule is "site-specific" in some respects, the "significantly greater" test is not enough to respond to the flaws in a generic approach.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

The rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.1

General: cost tests

EPA's Approach Fosters Inequity.

Further, EPA's flawed reliance on superficially similar performance standards, including the supposed safeguard of alternative decision making (through the "significantly greater" test), masks important differential impacts on different categories of facilities, e.g., nuclear as compared to fossil-fuel facilities. Careful review reveals what may be serious inequities in the application of the Rule, particularly relative to nuclear facilities, absent clarification from the Agency.

In particular, the Rule allows site-specific decision making in lieu of compliance with applicable "performance standards," an approach Entergy supports subject to its above concerns, as follows:

[Y]ou must demonstrate to the Director that your costs of compliance with the applicable performance standards ... would be significantly greater than the costs considered by the Administrator when establishing performance standards, or that your cost would be significantly greater than the benefits of complying with such performance standards.

67 Fed. Reg. at 17321; proposed 40 C.F.R. § 125.94(c)(1).

The Rule continues by indicating that, where costs are dispositive, EPA will make its BTA determination based upon "less costly design and construction technologies, operational measures, and/or restoration measures to the extent justified by the significantly greater cost." 67 Fed. Reg. at 17321; proposed 40 C.F.R. § 125.94(c)(2). In other words, a facility able to demonstrate that certain technologies are too expensive (as defined by EPA) can undertake alternative measures up to the mysterious baseline created by the "significantly greater" test. <FN 53> Where only a single, but too costly, technology is available to meet EPA's performance standards, as is likely the case for nuclear facilities, voluntary restoration or operational measures become the presumptive "alternative measure."

To answer the question, "What costs must be expended to satisfy, in EPA's estimation, §316(b)," however, EPA provides only an ambiguous measure, namely the costs considered by the Agency when establishing its performance standards. To redress this confusion, Entergy requests that EPA clarify what we understand to be the Agency's position, namely that the appropriate comparison is whether a particular facility's estimated costs of compliance exceed EPA's reasoned estimate of the average costs of compliance for the least-cost alternative actually implemented at facilities with comparable flow, recognizing that the comparable facilities for nuclear facilities generally, if not invariably, will be fossil-fuel facilities. <FN 54> Thus, restoration measurements would need to be comparable to the costs estimated by EPA in Chapter 2 of the TDD, Appendix A, for screening devices. Because the Rule is unclear, Entergy would appreciate the Agency's confirmation that these costs redress entrainment and impingement impacts.

EPA should clarify its intent. Entergy further suggests that EPA do so by defining "significantly greater costs” to be “those costs that exceed, by a significant margin, identified as those costs equal to or excess of 25%, the average costs of least-cost technology actually installed at an existing facility of comparable flow to assure compliance with the Rule. For nuclear facilities, a facility with comparable flows may include fossil-fuel facilities.” Further, because the Rule is unclear, we would appreciate the Agency’s confirmation that these costs redress entrainment and impingement impacts.

Footnotes

53 By way of further detail, there may be no reasonable alternative technologies for certain nuclear facilities. For instance, the Gunderboom and other barrier systems are highly unlikely to be “available” technologies for facilities with existing waterbodies that function as the “ultimate heat sink” or serve a nuclear-safety purpose. Given these factors, nuclear facilities may be particularly apt to use restoration measures.

54 Furthermore, in determining the appropriate level of restoration measures, EPA should recognize and take into account costs of technology previously installed in response to § 316(b) concerns.

EPA Response

See section IX.H of the preamble to the final rule for a discussion of the cost-cost test.

For discussion of the definition of "significantly greater costs", see response to comment 316b.EFR.006.003. The Agency did not accept the recommendation of the commenter regarding the definition of significantly greater.

Regarding the concern of the commenter regarding nuclear facilities and the cost to cost test, the Agency notes that a facility compares its costs to those estimated by the commenter for that facility. Therefore, for a nuclear plant, the costs of comparison are for the costs of that particular nuclear plant, with the option to correct the costs based on particular site- verified factors. This is an equitable basis of a cost to cost test for different types of facilities, as the costs would be reflective of the site-specific costs of the facility to comply with the rule requirements and no inequities would arise.

Comment ID 316bEFR.029.054

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 21.06.01

Implications for nuclear facilities

ENTERGY SUPPORTS EPA'S DEFERENCE TO NRC, BUT EPA MUST CONSIDER ECONOMIC IMPACTS.

In the Rule, EPA indicates that it will defer to NRC regarding matters of nuclear safety. This is appropriate as a matter of federal preemption and, therefore, supported by Entergy.

Even if federal preemption did not guide EPA's conclusion, as it does, EPA's deference to NRC is otherwise warranted by the correlation between nuclear safety and water-supply at many, if not most, nuclear facilities, including the Entergy-owned stations. In particular, water systems represent the "ultimate heat sink," or source of water supply necessary to safely operate, shut down and cool down a facility, for nuclear operations. See Ultimate Heat Sink for Nuclear Power Plants, REG GUIDE 1.27 (Jan. 1, 1976) ("Ultimate Heat Sink Guidance") (defining "ultimate heat sink"). To that end, a nuclear-powered electric-generating station's water supply is carefully regulated by NRC, particularly with respect to the adequacy and suitability of existing and proposed water systems to meet applicable NRC criteria to ensure that its safety objectives can be accomplished. See, e.g., 10 C.F.R. Part 50, App. A, "Licensing of Production and Utilization Facilities," General Design Criteria 44 and 2; see also Ultimate Heat Sink Guidance (discussing General Design Criteria 44 and 2).

As the NRC makes clear in its regulatory guidance on such matters, its approach to confirming the availability, under worst-case scenario conditions, of each facility's ultimate heat sink is highly conservative. See Ultimate Heat Sink Guidance at 3 ("Because of the importance of the sink to safety, these functions [must] be ensured during and following the most severe natural phenomena postulated for the site (e.g., the Safe Shutdown Earthquake, design basis tornado, hurricane, flood, or drought."). Thus, for instance, NRC requires a "high level of assurance" that the water sources of the sink will be available, when needed. See id. at 3.

To meet this standard, the NRC ordinarily requires redundancy in these critical systems, achieved by requiring two water sources, each capable of performing an independent safety function. See id. Further, the systems must be effective for an extended, i.e., thirty-day, period, during which safety-related water must be available, obviously requiring a substantial available water resource. See id. at 2.

Because of the need for independence, in conjunction with the amount of water required, NRC's preferred mechanisms for meeting these requirements are "a large river," "an ocean," and other similar resources. See id. at 4. While NRC will accept cooling towers for this purpose, there must ordinarily be redundancy, either through natural or additional man-made water sources. See id. Thus, for instance, the NRC will accept a "mechanical cooling tower with a basin" (capable of meeting NRC's Seismic Category I standard), only in conjunction with another such tower, a river or a lake. See id. Further, these multiple water sources, including their associated retaining structures, canals, conduits and piping, must be separate, so that failure of one will not alter another's capabilities to function as the ultimate heat sink. See id.

By way of example, if an existing facility that relies on a large river as its ultimate heat sink proposes to install cooling towers, NRC likely would require that both the cooling towers and the river act as ultimate heat sinks. As a result, absent its ability to demonstrate an "extremely low probability" of failure in a single source, the facility would have to construct independent piping between the Station and both the river and the cooling towers, both of which would have to meet NRC's stringent standards. <FN 55>

In short, as is evident from the applicable NRC requirements, the NRC, thus, will carefully scrutinize, and must approve, any reconfiguration or alteration of water sources that meet the ultimate heat sink. Clearly, cooling tower retrofits are more likely than not to alter the existing approved ultimate heat sink for nuclear facilities. As such, any implementation of §316(b) must account for NRC's involvement and its dispositive authority with respect to matters of nuclear safety.

Footnotes

55 As discussed above (in Section III.C), EPA has not accounted for these costs in the Rule, as it relates to nuclear facilities, an omission which renders the Rule's estimated costs of cooling-tower installation grossly inadequate as applied to nuclear facilities.

EPA Response

Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

Comment ID 316bEFR.029.101

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Overestimate of Benefits of Regulation

ENSR is concerned that EPA may have overestimated the stated benefits of the regulation. One of the assumptions used in the benefits analysis is 100% mortality for all entrained organisms. Several studies (discussed in more detail in EPRI/UWAG comments on the proposed regulation) have shown that for many species there is significant survivability associated with entrainment. For example, a survival study of winter flounder eggs at Pilgrim Nuclear Power Station (PNPS) showed a survivability of 73%. In addition, the information presented by EPA in Chapter A7-3 of the Case Study Analysis indicates that previous studies have shown survivability of winter flounder larvae of 36% at Brayton Point Station, 65% at Port Jefferson Generating Station, and 10% - 90% at Oyster Creek Nuclear Generating Station. ENSR believes that these data indicate a level of consistency that clearly shows a significant level of entrainment survivability that should considered in both the development and implementation of the regulation. EPA's discussion on the Brayton Point, Port Jefferson, and Oyster Creek studies points out study limitations and concerns about the resulting data. However, similar limitations and data concerns exist for some of the environmental studies used by EPA for developing the draft regulation.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule for more information.

Comment ID 316bEFR.029.102

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.01.02.02

Fish Population Modeling

EPA has also assumed that there is no compensation for entrainment losses of eggs and larvae. Studies have shown (again, discussed in more detail in EPRI/UWAG comments) that natural systems compensate for such losses in order to maintain an adult population that is in dynamic equilibrium. An excellent example of compensation in a natural system is provided by blue mussel at PNPS and Seabrook Station. Blue mussel were sampled in the PNPS entrainment monitoring program during the early 1970's (Table G3-14) and in the Seabrook monitoring program during the 1990's (Table G3-6). Large numbers of blue mussels were entrained by the two facilities (2 trillion to 19 trillion at PNPS and 122 billion to 17 trillion at Seabrook) during these monitoring programs. The entrainment monitoring data indicate variability that is typical of biological systems, however the values in the 1970s at PNPS and the 1990s at Seabrook are generally comparable. The consistently high entrainment rate is indicative of a biological system that is able to compensate for the entrainment losses as well as all of the other stressors in the Gulf of Maine/Cape Cod Bay system. In fact, EPA essentially acknowledges that the benefit analysis method used in the draft regulation does not provide reasonable, realistic values for blue mussel by not including blue mussel in the benefit analysis (Chapter G4-3). EPA states (box on page G4-10) that the reason that blue mussel was not included in the analysis is because it is a nuisance species. The reason that blue mussel is a nuisance species is because it colonizes the intake structures in large numbers. Blue mussel's ability colonize in large numbers is largely due to its high productivity and ability to compensate for entrainment and other losses.

ENSR believes that adequate data currently exists to make reasonable estimates of the level of entrainment survivability and compensation for the benefits analysis in the regulation. Without the inclusion of such estimates, the benefits in EPA's analysis are overstated. In addition, as discussed below, errors in the values used by EPA overstate impingement and entrainment at PNPS, and correspondingly, the benefits of the regulation.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation. The high numbers of blue mussel do not necessarily imply a compensatory response to I&E. Colonization and high productivity could account for the high numbers without needing to invoke compensation as an explanation.

Comment ID 316bEFR.029.103

Subject Matter Code 10.03.06.01

Pilgrim

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Errors and Inconsistencies in Benefit Analysis.

It should also be noted that there are several apparent errors and inconsistencies in the benefit analysis. For example, as discussed in the comment below, the number of fish and the number, of age 1 equivalent fish impinged at PNPS are overestimated by EPA. In addition, even within the EPA analysis the values reported are inconsistent. Specifically, the value for the number of age 1 equivalent fish impinged at PNPS used by EPA for the benefit analysis was 52,800/year, as shown in Figure G6-5. However, this value is variously reported at other locations in the draft regulation and supporting documentation as 1.8 million/year (Exhibit 21), 52,700/year (Table C2-7), and 52,700 million/year (Table C2-7). Other errors and inconsistencies noted in the benefit analysis for PNPS are discussed below.

EPA Response

This comment refers to several documents prepared for proposal. Figure G6-5 of the Case Study Document (DCN # 4-0003) reports that total impingement losses at Pilgrim are 52,800 age 1 equivalents. Table C2-7 of the EBA (Docket #4-0002) reports that total impingement losses at one in-scope facility (Pilgrim) are greater than 52,700. This discrepancy is just a rounding issue. In Figure G6-5 EPA rounded the value to 52,800. In Table C2-7, EPA reported the value as greater than 52,700. Both are correct and the discrepancy is small.

Comment ID 316bEFR.029.104

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 4.01.03

Information provided to EPA by stakeholders

Errors in Reported Impingement Rate.

In Chapter G3, EPA evaluated the impingement impacts to aquatic organisms resulting from the PNPS CWIS. Data used for this evaluation were reportedly obtained from the estimates reported by PNPS. These estimates were based on impingement monitoring studies conducted weekly and extrapolated to obtain annual impingement numbers. However, review of the values in Chapter 03 (Table G3-10) revealed that a portion of the raw annual impingement values “as estimated by the facility” are not identical to and are generally much higher than those reported by PNPS, as illustrated in the following Table A.

Table A: A comparison of annual impingement rate values for selected species as presented in Chapter G3, Table G3-10 versus the values presented in the PNPS 1998 Semi-annual report

[see hard copy for table]

EPA Response

It is incorrect for the commenter to say that the data presented by EPA are "errors." In fact, as indicated in the footnote on page G3-14, in cases where the facility did not identify impinged organisms at the species level, or life history data were not available for species in the same family, EPA grouped the losses together under a single species.

In the case of Atlantic cod and windowpane flounder, certain species within the same family were grouped together due to a lack of detailed life history parameters.

The discrepancies for Atlantic mackerel and Atlantic herring losses are due to discrepancies within the various facility reports. The annual estimate of 12 for Atlantic mackerel losses in 1994 came from Table 5 in Section III.D of the following reference:

Boston Edison Company. 1995. Marine Ecology Studies Related to Operation of Pilgrim Station. Semi-Annual Report Number 45, January 1994-December 1994. April 30.

The annual estimate of 41,419 for Atlantic herring losses in 1991 came from Table 6 in Section III.D of the following reference:

Boston Edison Company. 1994. Marine Ecology Studies Related to Operation of Pilgrim Station. Semi-Annual Report Number 43, January 1993-December 1993. April 30.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Overestimate of Impinged Age-1 Equivalents and Lost Fisheries.

Age-1 equivalents impinged were estimated from impingement losses following the method discussed in Chapter G3 and further detailed in Chapter A5. These values are larger than raw impingement numbers because EPA assumed that the age of impinged individuals was distributed between Age-1 through Age-2 and then losses were normalized back to Age-1 equivalents by accounting for mortality during that period. In general fish typically impinged at PNPS are juveniles of larger fish species and juveniles and adults of smaller fish species. Assuming that the age of impingement is equally distributed across the beginning of Year 1 to the beginning of Year 2 likely overestimates the Age-1 equivalents impinged of larger fish species since larger fish species impinged are usually juveniles.

EPA then extrapolated impinged age-1 equivalents to lost fisheries in pounds as discussed in Chapter G4 and further detailed in Chapter A5. This method to estimate forgone production conservatively assumes that impingement at the PNPS results in 100% mortality. Continuous washings of screens has been implemented at the plant following a study that revealed noticeably higher survival rates, including 50% or greater for the four most dominant species impinged during 1998.

EPA Response

EPA's final analysis does not assume that all impinged fish are age 1. Unfortunately, few facility studies provide information on the age distribution of impinged fish, so the Agency could not provide the public with this information. In EPA's original case studies, EPA assumed that all impinged fish were age 1. Based on comments on this assumption and a review of available information on the ages of impinged fish (e.g., EPRI 1999, DCN #4-4002B) final analysis for the 316(b) Phase II rule assumed that impinged fish range in age from juvenile to age 5 and that the age distribution of impinged fish is species specific and follows a fixed distribution as indicated by the set of stage-specific survival rates for each species. In all cases, this method leads to an assumed age distribution that is dominated by juvenile stages, followed by age 1-age 5 fish, each in decreasing relative abundance. EPA did not assume 100% mortality of impinged fish if data were available to demonstrate otherwise.

In the case of the Pilgrim facility, facility studies only examined survival at 1 hour post-impingement. EPA concluded that this is not a sufficient period of time for determining survival following impingement. Therefore, in this case, 100% impingement mortality was assumed.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.03.06.01

Pilgrim

Errors in Entrainment Rate.

EPA evaluated the entrainment impacts to aquatic organisms resulting from the PNPS CWIS in Chapter G3 using entrainment monitoring study data reported by the facility. Review of Table G3-14 indicated that some of the raw annual entrainment values “as estimated by the facility” are not identical to those reported by PNPS. An example is provided in the following Table B.

Table B: A comparison of annual entrainment rates for fourbeard rockling as presented in Chapter G3, Table G3-10 versus the values presented in the PNPS 2000 316 Demonstration

Year	Fourbeard rockling	
	Case Study<1>	PNPS Report<2>
1990	161,001,461	87,189,946
1991	141,180,985	36,386,498
1992	126,361,457	59,249,285
1993	60,326,651	48,285,771
1994	60,933,441	42,364,073
1995	33,524,219	66,734,393
1996	29,396,000	27,287,342
1997	95,461,605	48,893,342
1998	140,083,704	81,559,688

<1> Case study indicates values used in EPA case study Chapter 03, Table 03-14
<2> PNPS Report refers to those values reported in the PNPS 1990-1998 Semi-annual Reports

In addition, mean annual entrainment values for PNPS estimated by EPA from data collected 1974 to 1999 overstate recent and current entrainment rates. Because of the decline in commercial fisheries between 1974 and 1990 due to numerous factors (dominated by overfishing and habitat loss), entrainment rates for commercial fish species during the 1990s and currently are generally lower than those from the pre-1990 period. For example, average annual entrainment values for pollock as estimated by PNPS and used in the EPA case study were only obtained from 1974 through 1976. Estimated values were 104,972,000 (1974), 2,144,710 (1975), and 21,137,710 (1976) (Table G3-14). Current annual entrainment values estimated by PNPS, but not included in the EPA Case Study evaluation did not exceed 260,000 between 1989 and 1998 (Table 5.4-1 2000 316 Demonstration Report). Therefore, the reported mean annual entrainment rate of 42,751,473 in Table G3-14 of Chapter G3 significantly overestimates and does not reflect the current entrainment rate.

Similarly, average annual entrainment values for rainbow smelt used in the EPA case study were only obtained from monitoring years 1974 through 1976. Estimated values were 30,105,000 (1974), 145,400 (1975), and 87,242 (1976) with a mean of 10,112,547. Current annual entrainment values (1989-1998) estimated by PNPS (but not included in the EPA case study) included three years in which no early life stages of rainbow smelt were observed and averaged 126,000/year (Table 5.3-8 2000 316 Demonstration Report). Therefore, the mean annual entrainment rate of 10,112,547 reported in Chapter G3, Table G3-14, significantly overestimates and does not reflect current entrainment values.

EPA Response

It is incorrect for the commenter to say that the data presented by EPA are "errors." In fact, the data were taken from facility reports (see DCN #4-2049). The 2000 report referred to by the commenter apparently includes corrections the facility made to its own estimates, not EPA's. EPA was unaware of these revised estimates at the time of its analysis. EPA wishes to note that not all of the data from the semi-annual reports used by EPA are an overestimate when compared with the revised estimates in the facility's 2000 report. EPA also notes that the 2000 report only contains annualized data by life stage for 4 species (winter flounder, rainbow smelt, cunner, & Atlantic mackerel). Therefore, the report is insufficient, in and of itself, for estimating total entrainment at the Pilgrim facility expressed as age 1 equivalents, foregone fishery yield, and production foregone, the metrics used in EPA's analysis.

Comment ID 316bEFR.029.107

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.03.06

Pilgrim and Seabrook

Comparison of Entrainment Data between PNPS and Seabrook.

Other analyses are also questionable and may lead to erroneous conclusions. For example, EPA concludes that entrainment sampling at Seabrook and PNPS indicates that entrainment is lower at Seabrook than PNPS. This is presumed by EPA to be because of Seabrook's offshore intake structure compared to PNPS's shoreline intake structure. However, evaluation of the data indicates that the difference may be attributable to uncertainties associated with the sampling and data analysis, not the location of the intake structures. On Page 52 of Chapter G3, EPA correctly states that entrainment sampling at Seabrook Station only during daylight periods may have led to an underestimate of entrained organisms, while day and night sampling at PNPS likely provides a more realistic entrainment value. However, EPA incorrectly concludes that an underestimate of entrainment at Seabrook would result in an underestimate of the difference in entrainment between the two stations. In reality, this would lead to an overestimate of the difference in entrainment between the stations. This overestimate, plus the overestimate caused by the differences between the two stations in using actual versus full-load flow rates in calculating entrainment (as described on Pages 51-52 of Chapter G3), potentially accounts for the differences in entrainment rate.

In addition to the different methodologies used to derive estimated annual entrainment rates that likely overestimate the differences, mean annual entrainment values for PNPS were estimated from data collected 1974 to 1999. As discussed above, the entrainment rate values EPA used for PNPS are overstated because of the inclusion of data during the 1970s and 1980s. On the other hand, entrainment rates for Seabrook were estimated with data collected from 1990 to 1998 after the decline in commercial fishery stocks, resulting in lower mean annual entrainment rates.

In conclusion, the discussion in Chapter G3 could lead to the conclusion that PNPS's shoreline intake has a higher entrainment rate than Seabrook's submerged offshore intake and that offshore submerged intake structures are generally preferable to shoreline structures. However, assessment of the sampling methods between PNPS and Seabrook indicates that there is likely not any difference in the entrainment rate between the two stations. Also, the type of CWIS (shoreline or offshore submerged) that results in the lowest level of impact may vary and should be determined by site-specific considerations.

EPA Response

EPA stands by its conclusion that the available data indicate that I&E losses at Seabrook are less than those at Pilgrim. The commenter is also referred to a peer reviewed publication that reaches the same conclusion by Saila et al., 1997, "Equivalent adult estimates for losses of fish eggs, larvae, and juveniles at Seabrook Station with use of fuzzy logic to represent parametric uncertainty," North American Journal of Fisheries Management 17:811-825 (DCN #4-1969).

Comment ID 316bEFR.029.108

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Equivalent Adult Model Estimates.

EPA used an Equivalent Adult Model (EAM) for expressing I&E losses as, an equivalent number of individuals at some other life stage (discussed in Chapter G3 and detailed in Chapter A5). ENSR was unable to replicate the age-1 equivalent values following the method described in Chapter A5 of the Case study. For example, in a comparison between the estimated age-1 adult equivalent Atlantic mackerel derived from entrainment data, values presented by MRI (1999) between 1980 and 1997 were approximately 50% lower than the Age-1 adult equivalent Atlantic mackerel presented in Chapter G3, Table G3-15.

EPA Response

The commenter does not provide information on exactly where they had difficulties, so it is unclear from this comment why the commenter was unable to replicate EPA's results. EPA believes the Agency provided sufficient data to replicate the results presented at proposal. However, the Agency reviewed all chapters of the final Regional Analysis Document (DCN #6-0003) to make sure that the discussions were as clear as possible.

Comment ID 316bEFR.029.109

Subject Matter Code 10.03.06.01

Pilgrim

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Benefit Transfer Analysis.

As discussed above, the PNPS I&E values used in the EPA analysis is overestimated. As a result, the forgone production lost that is based on these numbers is also overestimated. This effect of this overestimate in the benefits transfer analysis is problematic. For example, as discussed above the rainbow smelt losses due to entrainment were substantially overestimated in the EPA analysis and these same losses are the basis for a significant portion of the forgone recreational value (22-36%; as estimated by the EPA in Chapter G4, Table G4-10).

EPA Response

EPA disagrees that its I&E estimates for the Pilgrim facility are incorrect. Please see responses to related comments on the Pilgrim analysis: 316bEFR.029.104 and 316bEFR.029.106. Regarding EPA's production foregone calculation, please see response to Comment 316bEFR.305.003.

□□□□□□□□

Comment ID 316bEFR.029.110

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Also, the economic valuation to determine the forgone benefit to society may be artificially inflated as it stands based on potential losses to commercial fisheries since the non-use or passive values are only applied as a cost to the forgone production side of the analysis. Environmental costs stemming from habitat destruction and loss of non-targeted fish species inadvertently collected (bycatch) are not currently reflected into the commercial fishery market.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has explored several methods that indicate the potential for significant non-use values. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003).

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

For EPA's response to comments about benefits of nontarget (e.g., forage) fish species, see response to comment 316bEFR.075.502.

Comment ID 316bEFR.029.111

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

HRC Method

ENSR is concerned with EPA's conceptualization and application of the HRC method as documented in Chapter G5 of the Case Study Analysis. The application of the HRC method to PNPS includes several inaccurate and/or inappropriate assumptions as well as a misapplication of site-specific conditions. We are concerned that this regulation could set a precedent for the use of the HRC method including the same or similar inappropriate assumptions, and that the specific results of the problematic PNPS analysis could be used as the basis for inappropriate restoration measures for the PNPS. Detailed comments on the HRC application to PNPS are provided below.

Value of the HRC Method versus Recreational/Commercial Value Assessment. EPA, in Chapter G5-9, states that the costs associated with the I&E losses for PNPS are $9.2 million annually using the HRC method as compared to a much lower estimated benefits using the recreational/commercial value method. EPA attributes the difference in these estimates to limitations in the recreational/commercial value methods ". . .because they include only a small subset of species, life stages, and human use services..." while "...the HRC valuation is capable of valuing many more and, in some cases, all species and life stages...". Despite this goal, the actual application of the HRC method ultimately focuses on a single species for each of the restoration measures. For the application to PNPS, nearly all the $9.2 million cost estimate for the HRC method is attributable to restoration measures for two species (tidal wetlands restoration for winter flounder and reef development for cunner). Both of these species are considered in the recreational/commercial valuation. In fact, the recreational valuation considers 14 species (Tables (G4-9 and G4-10), and the commercial valuation considers 18 species (Tables G4-1 3 and (G4-14). In addition a valuation of forage species was performed considering 8 species (Table G4-20). In contrast, the HRC method is limited in the species considered as well as the application method, as outlined in the comments below.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

With respect to annualized versus present value costs, when EPA was examining the HRC in the context of specific case studies, it needed to convert present value costs into their annualized equivalent in order to facilitate a suitable comparison to other parts of the economic analysis, because all the other aspects of the analysis were developed in an annualized form (such as annualized compliance costs or annualized benefits).

Comment ID 316bEFR.029.112

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Use of Present Value versus Annualized Costs.

Chapter A11 provides a discussion of the evaluation method used by EPA for the HRC analysis. Chapters A11-2.7 and A11-2.8 state that the final step in the analysis is to develop a present value cost estimate for each restoration alternative. As EPA states in Chapter A11-2.7, present value costs are generally appropriate for such analyses because, present value costs “simplify addressing costs that may be incurred over a number of years”. However, in the application of the HRC method for the PNPS, annualized costs, at 7% for 20 years, were developed in Chapter G5-8. Present value costs were not developed. EPA does not explain the rationale for using annualized rather than present value costs in the PNPS analysis in contradiction to the statements and approach presented in Chapters A11-2.7 and A11-2.8.

EPA Response

The Agency is no longer using the HRC method in its assessment of the benefits and costs of the 316b rule. Additional discussion of HRC issues is provided in response to comment 316bEFR.005.035.

With respect to the specific question raised in this comment, when EPA was examining the HRC in the context of specific case studies, it needed to convert present value costs into their annualized equivalent in order to facilitate a suitable comparison to other parts of the economic analysis, because all the other aspects of the analysis were developed in an annualized form (such as annualized compliance costs or annualized benefits).

Comment ID 316bEFR.029.113

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Development of Estimated Increase in Species Production.

For each of the alternatives considered in the PNPS HRC analysis, including SAV restoration, tidal wetland restoration, artificial reef development, and installed fish passageways, the increase in species production was developed using estimates of abundance not production (Chapter G5-5). For example, in Chapter G5-5.2, the required area of tidal wetlands to be restored was determined primarily by the equivalent number of age 1 winter flounder entrained by PNPS and the density of winter flounder in tidal wetlands reported in previous studies. However, tidal wetlands, though of value as a habitat for age 1 fish, are of even greater value as a spawning and nursery area to produce additional eggs, larvae, juveniles, and adult fish. The majority of the eggs, larvae, juveniles, and adult fish produced may not be retained in or use the tidal wetland as a long-term habitat, but will likely enter the larger marine ecosystem. This is particularly true for marine species such as winter flounder. Therefore, it is inappropriate to determine the necessary size of a restoration (or created) habitat area for a specific species without consideration of any additional production of that species in the restored (or created) habitat.

EPA states that the reason that abundance rather than production data are used for these estimates is that production data are not, while abundance data are, available. First, it is not appropriate to use incorrect data simply because they are available. Second, we believe that existing data are available to make reasonable estimates of production rates. If such data are not available - given the importance of this analysis - studies should be performed to obtain the necessary data before applying the HRC method.

Further, ENSR believes that the use of the appropriate production data, rather than abundance data, would result in a much smaller area required for tidal wetland restoration for PNPS, and therefore much lower associated costs. At the very least, EPA should note that for this application the HRC method has resulted in conservatively high cost estimates.

EPA Response

First, EPA notes that it did not use the Habitat-based Replacement Cost (HRC) method to estimate benefits for the final Section 316(b) Phase II rule. For additional information on the HRC and its uses, please refer to the document entitled “Habitat-based Replacement Cost Method” (Docket #6-1003).

Secondly, EPA notes that species abundance is a reasonable proxy for secondary productivity under the following conditions assumed by EPA in its HRC analyses: the production to biomass ratio is 1; all of the annual production occurs during the time of sampling; and there is no turnover. EPA notes that for scaling purposes it is important to use the same method to convert abundance to productivity in both the loss (I&E) and gain (habitat production) calculations. EPA's HRC analyses converted fish numbers to age 1 equivalents for this purpose.

Comment ID 316bEFR.029.114

Subject Matter Code 4.01
Source data used by EPA

Author Name Elise N. Zoli
Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Use of Site-Specific/Local Data.

To the extent possible, site-specific data should be used for biological analyses. This approach has been advocated by EPA Region 1 in past PNPS study discussions in which EPA staff indicated concern over the use of Rhode Island data for fish population modeling. In the HRC analysis, biological data for the tidal wetland restoration alternative (Chapter G5-5.2) was derived only from sites in Rhode Island. Rhode Island data was also used (along with Massachusetts data) for each of the other restoration alternatives (Chapters G5-5.1, G5-5.3 and G5-5.4). This approach is inconsistent with the EPA Region 1 position and is inappropriate for the HRC analysis.

EPA Response

There is nothing inconsistent about EPA's approach to data selection for the purpose of developing HRC case studies for the national rulemaking and the approach that the commenter states has been advocated in the past by Region 1 in discussions regarding the development of fish population modeling studies for the Pilgrim station. Depending on the specific issues involved in the modeling issues being addressed by Region 1, the use of "off-site" data might pose different problems and it might (or might not) be advisable to require the collection of additional, more site-specific data.

However, EPA notes that site specific data are not always available. Nonetheless, EPA made a good faith effort to obtain the best biological data available for its HRC analyses, with an emphasis on local data to the extent possible. The analyses also included consultations with local expert panels. For additional discussion of the HRC method, which EPA did not use for the final rule analysis, please see the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

Comment ID 316bEFR.029.115

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 11.0

Role of Restoration

Restoration Alternatives Considered.

The restoration alternatives considered in the PNPS HRC analysis include SAV restoration, tidal wetland restoration, artificial reef development, and installed fish passageways. Another alternative that should be considered, particularly when the restoration requirements and costs are determined by a single species, is stocking.

Several hatchery-reared stock enhancement programs have been successful for many freshwater fisheries. Marine stocking programs have also been successful but are not as easily monitored to assess success given technological and financial constraints for open coastal systems. However, studies of anadromous fish enhancement efforts have indicated that hatchery-reared stocking programs can be successful in marine systems as well. For example, a study initiated in 1985 to investigate the contribution of hatchery-reared fish to wild stocks (e.g. Chesapeake Bay striped bass stocking program). Between 1985 and 1999 more than 9 million tagged hatchery-reared striped bass fingerlings were released into the Chesapeake Bay System. This study revealed that the hatchery fish accounted for close to half the striped bass in some rivers and eventually contributed to the coastal population as evidenced by tagged individuals captured as far north as Canada. As anticipated the hatchery fish alleviated the pressure on local stocks temporarily and wild fish far outnumber hatchery fish in the Chesapeake Bay (USFWS, 2001).

Recently, stock enhancement of hatchery-reared young-of-the-year winter flounder (Pseudopleuroriectes americanus) was implemented in Plymouth Harbor and Duxbury Bay to assess the feasibility of contributing to the local winter flounder stock and mitigating the potential entrainment impacts from Entergy's Pilgrim Nuclear Power Station (PNPS) (MRI, 2001). Approximately 15,300 and 13,950 hatchery-reared, young-of-the-year P. americanus were marked and released during the summer of 2000 and 2001 respectively. Pen studies conducted in combination with recapture surveys following the 2001 release, revealed that hatchery-reared P. americanus do survive, grow, and successfully convert to wild food sources (MRI, 2001).

MRI, 2001. Hatchery Production Study Young-of-Year Winter Flounder Post-Release Collections, July-November 2000, June-September 2001.

U.S. FWS, 2001. Striped Bass (Rockfish) Morone saxatilis online: http://marylandfisheries.fws.gov/stripedbass.htm

EPA Response

Facilities wishing to implement any restoration measure for purposes of compliance with the final rule must first demonstrate to the Director that the measure meets the requirements described in the final rule, including those in sections 125.94 and 125.95.

Comment ID 316bEFR.029.116

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 7.02

Performance standards

Use of an Appropriate Baseline Condition.

The costs associated with the artificial reef development alternative are determined primarily by the entrainment losses for cunner and data on the abundance of cunner in reefs. While ENSR has concerns associated with the use of abundance data rather than production data (discussed above); there are additional concerns for this alternative associated with the use of an appropriate baseline condition and lack of consideration of the site-specific reasons for the relatively high entrainment rate for cunner. Construction of the intake at PNPS involved construction of an adjacent breakwater that provides an ideal artificial reef habitat that has been successfully colonized by cunner. The habitat provided by the breakwater adjacent to the station intake has resulted in an artificially high population of cunner in the vicinity of PNPS and consequently an artificially high cunner entrainment rate. Overall, the cunner population of the coastal system near PNPS is greater because of construction of the breakwater and the station. In general, the baseline condition that should be used for such applications should be the pre-station condition without mitigating influences, such as the breakwater. In such an application, the extent of restoration required would consider the mitigation already provided by the site-specific existing condition. In the PNPS situation, the existing breakwater provides mitigation for cunner such that further restoration needs are likely nominal at best.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.029.117

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Development of Reasonable, Site-Specific Cost Estimates.

The cost estimates for each of the restoration measures (Chapter G5-7.1 for SAV restoration, Chapter (G5-7.2 for tidal wetland restoration, Chapter G5-7.3 for artificial reef development, and Chapter (G5-7.4 for installed fish passageways) are based on previous restoration efforts. If done correctly and the restoration efforts are analogous, this should provide a reasonable cost estimate. However, in some cases this method may result in cost estimates that are considerably in error. For example, the unit costs for tidal wetland restoration were developed based on a range of projects involving construction and elimination of tidal restrictions. Because of the range of site-specific considerations and requirements for these restoration projects, the unit costs ($/acre restored) for the projects range over 5 orders of magnitude (Table G5-35). From these data, EPA developed a frequency distribution of the unit costs and median value for the projects that was used as the basis for the tidal wetland restoration cost estimate. Because of the extremely large range in costs, the potential error associated with the median value is considerable. As a result, EPA's cost estimate for the tidal wetland restoration alternative is likely incorrect, perhaps by as much as several orders of magnitude when applied to a specific facility. Further the analysis did not, but should have, evaluated whether there are any existing potential tidal wetland sites in the vicinity of the power plant. In order to develop a reasonable cost estimate, it would be necessary to evaluate site-specific conditions including the availability of potential restoration sites and restoration measures (e g culvert or tidal gate construction) that would be required for the project. This procedure would eliminate the potential errors associated with EPA's method for developing costs.

EPA Response

First, EPA notes that it did not use the Habitat-based Replacement Cost (HRC) method to estimate benefits for the final Section 316(b) Phase II rule. For further detail, please refer the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

Secondly, with regard to the site-specificity of restoration cost estimates, for the HRC analyses presented at proposal EPA met with and received information from local experts with experience in the types of restoration under consideration. EPA believes that the information it provided was sufficiently site-specific and sufficiently reviewed by local experts to prevent any systematic bias of unit costs.

EPA also notes that the HRC analyses presented at proposal served two primary goals: 1) to calculate realistic but hypothetical cost estimates to allow cost comparisons between technology and restoration; and 2) to determine the general types and amounts of restoration that would be needed to offset I&E that will remain with any given technology. However, the HRC analyses do not attempt to provide detailed implementation plans for executing actual restoration projects.

Comment ID 316bEFR.029.118

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Practicality of Restoration Alternatives.

As indicated above, it is not apparent that construction of the tidal wetlands alternative developed by EPA is practical. Analysis of the artificial reef alternative indicates that it is not practical. The unit costing analysis for this alternative in Chapter G5-7.3 was based on six reefs with a total surface area of 1,024 m2, or 171 m2 per reef. For the reef alternative developed for PNPS (requiring 176,145 m2of reef area; Table G5-42), a total of 1033 of the same size reefs would be required. If instead a single reef that was 5 meters high and 5 meters wide were used in a linear configuration, the reef would need to be 7.3 miles in length. Clearly, both configurations are impractical.

EPA Response

EPA disagrees that reef construction is impractical or that the configurations described by the commenter would necessarily be required. For the Pilgrim HRC referred to by the commenter, EPA met with local experts with experience relevant to I&E species and the restorations likely to increase their numbers. EPA notes that the HRC analyses serve two primary goals: 1) to calculate realistic but hypothetical cost estimates to allow cost comparisons between technology and restoration; and 2) to determine the general types and amounts of restoration that would be needed to offset I&E that will remain with any given technology. However, the HRC analyses do not attempt to provide detailed implementation plans for executing actual restoration projects.

EPA believes that the HRC analyses conducted for proposal were relevant and practical for determining likely costs and scales of necessary restorations to offset I&E, and that details such as exact configurations of individual reefs (or other details for other restoration projects) were unnecessary for the intended level of analyses.

Finally, EPA notes that it did not use the HRC method to estimate benefits for the final 316b Phase 2 rule. For additional information on the method and its uses, please see the document entitled "Habitat-based Replacement Cost Method" (DCN # 6-1003).

Comment ID 316bEFR.029.119

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 21.03

Monitoring requirements

Unreasonable Monitoring Cost Estimates.

Monitoring costs (Chapter G5-7) included in the total annualized cost estimates appear to be unreasonable for several alternatives. For example, the annualized unit cost used for monitoring of the artificial reefs was $19.36/m2 (Chapter G5-7.3.2). This value is nearly 80% of the total unit cost value of $24.85 (Chapter G5-7.3.3). Application of EPA's unit monitoring cost for the PNPS artificial reef alternative (with 176,145 m2 of reef area; Table G5-42) results in an annual monitoring cost of $3.4 million. The basis of EPA's unit cost value, as stated in Chapter G5-7.3.2, is a reef monitoring program with a much more reasonable cost of $28,000/year. Clearly, the scaling used to extrapolate this cost to the monitoring of a larger reef has resulted in an unrealistic cost value for the PNPS assessment.

Similarly, as described in Chapter G5-7.2.2, EPA's tidal wetlands monitoring costs are based on a field team of three staff working for five days per year for an estimated annual cost of $1600 for monitoring tidal wetlands of various sizes. From this value, EPA developed a unit annualized cost of $1146/acre. Application of this unit cost for the tidal wetland area (2,429,812 m2 Table G5-42) developed by EPA for PNPS results in an estimated annualized monitoring cost of approximately $680,000. A similar scaling of the staffing requirements would indicate that 1275 workers would be needed for a five day monitoring effort of the PNPS tidal wetland area (using the initial estimate that monitoring of a tidal wetland would be performed in a five day period). Again, clearly the EPA analysis has resulted in an unrealistic estimate.

EPA Response

First, EPA notes that HRC results were not used in its benefits analysis for the final rule. The document entitled "Habitat-based Replacement Cost Method" provides details on the method and its uses.

Secondly, EPA notes that the magnitude of habitat restoration costs for any specific project are sensitive to a number of factors, particularly estimates of species productivity in restored habitats, which are often difficult to obtain and subject to substantial uncertainty, the scaling rule used, and location specific features. Variables such as these will influence both implementation and monitoring costs.

In the case of the Pilgrim HRC, unit costs were developed and scaled linearly to the scale of implementation needed to offset the I&E losses for all species for which a habitat restoration action could be identified and data were available. Note that the scale of restoration required can be quite high when losses are high and productivity in the restored habitats is comparatively low.

Although adjustments to the scaling rule such as allowing "fish trading" can reduce the scale of implementation, the ultimate impact on any costs associated with a specific project will vary depending on site specific factors.

In the HRC analyses presented at proposal, annualized monitoring costs were developed for units of habitat based on available data and then extrapolated linearly to the scale of restoration required to offset total I&E losses. The habitat required to offset the loss is high both because losses are high and productivity in the restored habitats is comparatively low.

For artificial reefs, the commenter finds cause for alarm with the artificial reef monitoring costs representing 80% of the annualized unit cost, but finds the estimate of $28,000 per year in monitoring costs reasonable. Given that the annualized monitoring cost is mathematically equivalent to the yearly monitoring costs when the scale of the project is accounted for there should be no cause for alarm. Monitoring organism production over 10 years on an artificial reef where the use of scuba divers is required becomes relatively expensive compared to installation of the reef when all the costs are annualized.

Reef monitoring costs would be less if the required scale of implementation were smaller or an alternative sampling design were developed that could reduce costs. These opportunities will be very site-specific and sensitive to the required scale of implementation. Based on the information available, linear scaling of costs was used in the Pilgrim HRC analysis.

Similarly, the monitoring costs for tidal wetlands will, in practice, be sensitive to how the scale of restoration is achieved. As with artificial reefs, there may be opportunities to reduce these costs in an actual restoration project depending on the project design (i.e., how the acres are located). However, it can also be argued that the costs associated with the current wetlands monitoring program are conservative.

Although the labor and equipment specifications come from a collaborative document proposing regional standards for tidal wetland monitoring (Neckles and Dionne, 1999, DCN # 4-1808), the protocol focused solely on the field staff, equipment, and desired frequency of sampling. Omitted from this protocol is a discussion of the associated labor and equipment requirements for processing and analyzing the collected data. Incorporating these costs would increase monitoring costs.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Use of the HRC Method for 316(b) Evaluations.

In Chapter A11-3 it is stated that the HRC method is currently being applied to PNPS as well as several other power stations. As discussed in the detailed comments above, the application to PNPS is founded on several inappropriate and inaccurate assumptions and has resulted in unrealistic and unreasonable conclusions. Therefore, as presently formulated and used, ENSR concludes that the HRC method is problematic and not applicable to 316(b) evaluations.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.029.121

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 9.0

Costs

Estimated Cost of Compliance

ENSR is concerned that EPA's cost estimate for compliance with the proposed regulation underestimates the potential compliance costs. We believe that sufficient data does not exist to estimate the costs for retrofitting existing power plants for technology that can achieve the entrainment reduction requirements in the regulation - 60% to 90% for many water bodies.

EPA Response

EPA disagrees with the commenter's assertion. EPA concludes that the database it developed for support of the entrainment reduction standards supports the conclusion that existing power plants can retrofit their intakes to meet the standards. See the Technical Development Document.

See responses to comments 316b.EFR.034.008, 316b.EFR.060.038, 316b.EFR.077.033, 316bEFR.100.004, and 316bEFR.902.001. Also see comments 316b.EFR.088.008, 316b.EFR.207.009.

Comment ID 316bEFR.029.122

Subject Matter Code 4.01

Source data used by EPA

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

EPA also indicates that such reductions may potentially be achieved by cooling towers, aquatic filter barrier systems, and fine mesh screens. In the proposed regulation (Section Vl.B.1), EPA has identified three facilities that operated as once-through cooling plants and then converted to closed-cycle plants using cooling towers. This is an inadequate database to use for the extrapolation of nationwide costs. Two of the three facilities are located in South Carolina, none are located along the coast, and only one is larger than 500 MW. None of the conversions occurred in the last decade. It is unclear how the availability of water arid cost of a reliable water supply were considered in the cost estimate. This is an increasingly important consideration nationwide with increased competition for water resources in recent years.

The proposed regulation gives only one example each for applications of aquatic filter barrier systems and fine mesh screens (Section VI.A2). It is our understanding that each of these applications has required extensive efforts to achieve some level of reliable operation and the target entrainment reductions. The costs associated with implementing these technologies nationwide cannot be extrapolated from these applications. We understand that several pilot and laboratory studies have been performed that indicate that these technologies can achieve the goals. However, until there are more practical applications in the field, the total costs associated with system installation, fine-tuning, optimization, and maintenance for these technologies cannot be estimated with a great degree of confidence.

EPA Response

In developing national costs for the final rule, EPA evaluated other sources in additional to the information the commenter noted in the comment. See the Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule for a discussion on the development of the national costs.

It is unclear what the commenter is stating in the sentence, "It is unclear how the availability of water arid cost of a reliable water supply were considered in the cost estimate." Therefore, EPA can provide no response.

EPA evaluated wide range of technologies including aquatic filter barrier systems and fine mesh screens for the final rule. See the cost modules in the Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule for a discussion on the technologies evaluated for costing.

Comment ID 316bEFR.029.201

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

Status and Trends of Hudson River Fish Populations and Communities Since the 1970s: Evaluation of Evidence Concerning Impacts Of Cooling Water Withdrawals

Lawrence W. Banthouse
Charles C. Coutant
Webster Van Winkle

January 2002

Introduction

The purpose of this paper is to summarize our views concerning the status of fish populations and communities of the Hudson River estuary, and whether those populations and communities reasonably can be said to have changed since the mid-1970s as a result of operation of the Bowline Point, Indian Point, and Roseton generating stations ("stations"). Our concern is with impacts as defined by biologists, using established definitions and standards of ecology and resource management. The paper does not address any of the regulatory issues currently being addressed through the SPDES process, and specifically does not address either (1) the regulatory definition of "Adverse Environmental Impact' (AEI) under section 316(b) of the Clean Water Act, or (2) Best Technology Available (BTA) for minimizing AEI. We have not conducted an independent analysis of the supporting data used in the preparation of the generators' Draft Environmental Impact Assessment (DEIS). We have, however, reviewed both the DEIS and the comments on the DEIS prepared by ESSA and Pisces. We requested and received updated abundance indices through 2000. Our conclusions are based on our evaluation of all three reports, as augmented by the updates.

Rationale for focusing on population- and community-level impacts

Our interpretation of the data is premised on a view that populations and communities are the proper focus for evaluating impacts of cooling water withdrawals on the Hudson River estuary. The reason for this is that all individual organisms have finite life spans, only populations and communities persist through time. As long as key populations are relatively stable, the mix of species present remains relatively constant, and important functional relationships continue, the river can be said to be healthy and can continue to persist in spite of the deaths of individuals. There are ample precedents for a focus on populations and communities. For instance, EPA's Guidelines for Ecological Risk Assessment (EPA 1998, section 3.3.1.1.) identify "ecological relevance" as a key criterion for selecting specific entities to be evaluated in risk assessments. Examples of relevant entities discussed by EPA include individual species, functional groups of species, and communities. A focus on populations and communities is also fundamental to natural resource management. The Magnuson-Stevens Fishery Conservation Act, for example, focuses on maintenance of sustainable yields from exploited populations. In fact, even the concept of "sustainable yield" implicitly focuses on populations and communities, because only populations and communities are persistent and therefore “sustainable”

A population and community-based approach is frilly consistent with the approach taken in the studies that supported the 1980 Hudson River Settlement Agreement (HRSA) These studies, which expressly focused on populations and communities, are frilly documented in the peer-reviewed scientific literature (Barnthouse et al 1988) and are widely regarded as a classic study in environmental impact assessment

A population and community-oriented framework for impact assessment made sense in 1980, and from a scientific perspective it still makes sense today. However, the information base to support population and community assessments vastly exceeds the information available at the time of the settlement. Models were the principal technical approach used in 1980 in large part because long-term monitoring data did not exist. An extraordinarily extensive data set is now available, for use in impact assessment. Techniques for modeling impacts of fishing and power plant mortality on fish populations have also advanced greatly since 1980; these models provide additional insights into the potential impacts of cooling water withdrawals.

Hypotheses concerning expected impacts of cooling water withdrawals on fish populations and communities

Estuarine environments are highly variable. Moreover, land use changes, pollution-abatement harvest restrictions, invasions by exotic species, climate change, and many other factors that potentially influence fish populations and communities have occurred in the lower Hudson River valley since the 1970s. Under these circumstances, simply documenting the types and magnitudes of changes that have occurred is insufficient to fully evaluate the presence or absence of changes related to cooling-water withdrawals. Specific hypotheses concerning the expected impacts of cooling-water withdrawals (termed “risk hypotheses” in EPA’s Guidelines for Ecological Risk Assessment) are useful for distinguishing between changes that could have been caused by cooling-water withdrawals and change that are most likely related to other causes.

Entrainment and impingement by once-through cooling systems can result in mortality of early life stages of fish and other aquatic organisms. If the magnitude of this mortality were high enough, and if this mortality persisted over a long period of years, then the following types of adverse changes in populations and communities might be expected:

-Continued, long-term declines in the abundance of susceptible populations. Such declines would result where entrainment and impingement mortality rates exceed the replacement capacity of the affected populations. Such declines would be most likely to occur in species that (1) are highly susceptible to entrainment or impingement (because of their life history and spatial distribution), (2) are also subject to other sources of mortality, especially harvesting, and (3) have an inherently low capacity to sustain additional mortality. Declines related to cooling-water withdrawals should approximately coincide with the startup of the three stations (possibly with a lag time of several years).

-Reduction in species richness or diversity. Species richness (as measured by the number of species present in a community) and species diversity.(as measured by various numerical indices that consider both the number and the relative abundance of species present in a community) are among the most widely accepted indicators of adverse community-level effects (Rapport et al. 1985, Gotelli and Graves 1996). Declines in species richness and diversity can be caused by a wide variety of stressors, through a wide variety of mechanisms. If cooling-water withdrawals were reducing species richness or diversity, then declines in these indicators should be observable over time, although the declines would not necessarily coincide in time with the startup of the stations. Any such declines could be localized within the immediate vicinity of the stations, or could be estuary-wide. Because changes in species richness and diversity are nonspecific indicators of stress, additional information on spatiotemporal patterns of hypothetical causes is usually needed to: interpret any changes that are observed.

-Change in the balance of predator and prey species. If cooling-water withdrawals were reducing the abundance of predator populations (e.g., striped bass) within the estuary, then the abundance of prey populations (e.g., bay anchovy) would be expected to increase. Conversely, if cooling-water withdrawals were reducing the abundance of forage species such as bay anchovy, then the abundance of predators could decline even if those predators are not themselves vulnerable to entrainment or impingement. Because the dominant predator and prey species in the estuary are migratory and widely distributed, any such changes would be expected to be estuary-wide.

Changes consistent with one or more of the above hypotheses could be related to cooling-water withdrawals over the past 25 years of operation of the stations. Changes inconsistent with these hypotheses (e.g., of a type not expected to result from mortality to early life stages of fish, or occurring at times or locations inconsistent with the expected effects of cooling water withdrawals) likely are related to other causes.

Evaluation of impact hypotheses using results from 25 years of monitoring

The data presented in the DEIS indicate that changes that most fisheries biologists would view as “adverse” have not occurred. Further, changes that have occurred appear to be inconsistent with the ‘impact hypotheses discussed above and; therefore, are not reasonably attributable to the’ stations.
Trends in population abundance

It would be laborious and probably not very meaningful to attempt to summarize trends in the abundance of all 17 of the target species evaluated in the DEIS for this brief analysis. For determining whether cooling-water withdrawals have affected fish populations, it should be sufficient to evaluate those for which station-related mortality, measured in terms of the CMR, is the highest These populations are striped bass, white perch, Atlantic tomcod, American shad, blueback herring, alewife, bay anchovy, and spottail shiner.

Striped bass

This species is, among all of the species present in the lower estuary, perhaps the most vulnerable to cooling-water withdrawals. The spawning grounds of Hudson River striped bass are located primarily north of the Hudson Highlands. Striped bass are pelagic spawners, and the early life stages of striped bass are also pelagic. Striped bass eggs, larvae, and juveniles are subject to tidal transport and are susceptible to entrainment at all three stations. Estimated CMRs for striped bass are consistently among the highest of all of the species evaluated in the DEIS. In addition to entrainment and impingement, the Hudson River striped bass population is also affected by harvesting. Moreover, as a top predator, station impacts on lower trophic levels (e.g., bay anchovy and other forage fish) would be expected to translate into reduced striped bass production.

If entrainment and impingement were adversely affecting the Hudson River striped bass population either directly, through reduced abundance of young fish, or indirectly, through a reduction in prey availability, then a decline in the abundance of these fish should be observable over the 27 years of available data. Figure 1 shows trends in four indices of striped bass year-class strength, each derived from a different data set. The four sets of indices are highly consistent and show that there has been no trend in striped bass recruitment since the initiation of the utility and NYSDEC monitoring programs. At the same time, the abundance of adult striped bass and of early striped bass life stages has greatly increased. The increase was, biologists agree, caused by harvest restrictions imposed beginning in the mid 1980s. Reduced fishing mortality increased the annual survival rate of adult striped bass, resulting in a rapid buildup of the adult population after 1980. The increased spawning stock is now producing far more eggs and larvae per year than were produced in the l970s, although the production of young-of-the-year fish has been stable. Meanwhile, cooling-water withdrawals have occurred at a relatively constant rate (as measured by the CMR) throughout a quarter-century.

One might argue that without power plants the population growth would have been even greater. However, the constancy of year-class strength, even as egg production has greatly increased, supports a conclusion that an additional increase in larval abundance (as would have occurred bad there been no entrainment) would not have translated into an increase in abundance of young-of-the-year striped bass.

White perch

White perch are similar to striped bass with respect to life history and vulnerability to cooling-water withdrawals, except that (1) spawning occurs further up-river, (2) white perch juveniles are more evenly dispersed throughout the river than are striped bass, and (3) adult white perch are nonmigratory and much smaller in size, so they remain vulnerable to impingement throughout their life spans. However, in spite of the lifetime vulnerability of white perch to impingement, entrainment is still the prevalent station-related source of mortality to this species (avenge CMR of 17.5% for entrainment, as compared to 2.2% for impingement).

Trends in the abundance of white perch juveniles and yearlings indicate an apparent decline from 1979 through 1996, however, data for the years 1998 through 2000, which were provided to us by the generators, suggest that the white perch population may have stabilized. The abundance of juvenile and one-year-old white perch appears to have increased since 1996, with an especially strong year class being produced in 1999. As noted in the DEIS, the spatial distribution of white perch within the estuary appears to have shifted, with the decline in juvenile and yearling abundance being much greater in the lower estuary (regions 1-5) than in the upper estuary (regions 6-12). The DEIS discusses possible explanations for these changes (predation by striped bass in the lower estuary; changes in submerged aquatic vegetation in the upper estuary). Although no definitive conclusions appear possible at this time, there is no apparent reason why cool- ling-water withdrawals should have affected white perch but not striped bass. Estimated CMRs for these two species are similar. White perch are more widely distributed throughout the estuary and make greater use of tributaries. Thus, they should be less vulnerable to entrainment and impingement than striped bass. White perch are not heavily exploited, so that this species should be less vulnerable to effects of additional mortality due to entrainment and impingement than should striped bass. During the period in which the abundance of juvenile and yearling white perch was declining, the abundance of post yolk-sac larvae (PYSL, Figure 2) did not decline, indicating that the annual reproductive output of the population was never reduced.

Atlantic tomcod

Atlantic tomcod is unique among the fish species of the Hudson River estuary in that it is adapted to cold climates; and the Hudson River population is the southernmost spawning population of this species. Spawning occurs during winter, primarily between West Point and Poughkeepsie. Atlantic tomcod larvae and juveniles are found primarily in the lower estuary, between Yonkers and Cornwall. Because the Hudson River is at the southern end of the range of Atlantic tomcod, this population may be especially sensitive to climatic fluctuations, especially high summer temperatures. Growth rates in juvenile Atlantic tomcod have been shown to decline when water temperatures rise above 55°F and to stop when they exceed 71°F, a temperature that is exceeded annually in the Hudson River.

Data for evaluating trends in the abundance of Atlantic tomcod are available both from the utilities ichthyoplankton survey, which samples larval and juvenile tomcod, and from an Atlantic tomcod mark-recapture program that samples 1-year old and 2-year old fish. Annual abundance values from these three data sets (from Table V-21 of the DEIS) are plotted in Figure 3. As noted in the DEIS, the design of the mark-recapture program changed after 1979 and age-1 and age-2 population estimates for 1979 and earlier may not be fully comparable to estimates for later years. Although correlations between the larval/juvenile index and the mark-recapture indices are low, all three indices show a decline only after 1989.

The Atlantic tomcod is a short-lived species, with a generation time of 1-2 years. If entrainment and impingement were adversely affecting the Hudson River Atlantic tomcod, then a decline in abundance should have been evident within a few years after the startup of the stations. The recent decline in abundance of this species, however, did not begin until about 1990. Changes in cooling water withdrawal rates that could explain such an abrupt decline did not occur during this period. As noted in the DEIS, warmer summer or winter water temperatures, among other factors, could influence Atlantic tomcod populations. However, a detailed evaluation of these factors has not been performed.

American shad

American shad spawn in the uppermost regions of the estuary, and early life stages, of this species are found primarily in the upper estuary above Poughkeepsie. Juvenile American shad are present in the vicinity of the stations primarily in the fall, during emigration from the river. After emigration, American shad remain at sea until they become sexually mature and return to spawn, at an age of 3-6 years.

Juvenile abundance indices for American shad show limited evidence of a downward trend in recent years. Figure 4 shows trends of the two available indices of juvenile abundance, derived from the utility and NYSDEC beach seine data sets (from Table V-25 of the DEIS). Both indices indicate that strong year classes were produced in 1986, 1989, and 1990, and that relatively weak year classes were produced in 1984 and 1995. Data for 1998-2000, available only for the utility index, indicate that the 1998 and 2000 year classes were also weak.

Other information indicates that the decline in abundance of American shad is coastwide, and is likely due to overfishing. According to the Atlantic States Marine Fisheries Commission (ASMFC 1998a) shad abundance has declined greatly since the end of World War II. Although fishing mortality within the Hudson River itself has apparently declined since 1984, this decline has been offset by an increase, in mortality due to the Atlantic coastal intercept fishery.

Blueback herring and alewife

These two species need to be considered together for purposes of evaluating impacts of cooling-water withdrawals, because the early life stages of these species are indistinguishable.

Figure 5 shows abundance trends for both species for the years 1979 through 2000. Figure 5 shows that the two species have tended to vary together, with strong year classes being produced in 1980, 1985, 1987, and 1996, and weak year classes being produced in 1983, 1986 and from 1993 through 1995. The only years when divergent changes in abundances occurred were 1980 and 1999, when strong alewife and weak blueback herring year classes were produced. Year-class abundance in both species appeared to decline from the late 1980s through the mid 1990s. Otherwise no trends are apparent for either species.

Coastwide populations of both: blueback herring and alewife were severely depleted by, overfishing during the l960s and 1970s. Harvesting has been severely restricted, but coastwide populations of both species have remained depressed (ASMFC l998b). Damming of tributaries is believed to have substantially reduced the available spawning and nursery habitat for both, but especially for blueback herring. There is no evidence of a long-term decline in either species that would be consistent with expected impacts of cooling water withdrawals.

Bay anchovy and spottail shiner

Bay anchovy and spottail shiner are both forage species, meaning that they are small fish that serve as prey for larger, predatory fish. Bay anchovy is the principal forage species in the lower estuary. For this reason, impacts on bay anchovy could indirectly affect predators such as striped bass and bluefish. Spottail shiner is abundant primarily in the upper estuary. Impacts on this species could indirectly affect predators such as striped bass and largemouth bass.

Figure 6 plots time trends in juvenile abundance for both species No trend in abundance of spottail shiner is evident, however, the abundance of bay anchovy appears to have declined between 1995 and 2000 This recent, abrupt decline is inconsistent with the expected effects of cooling-water withdrawals and is likely related to other causes

Trends in species richness and diversity

As documented in the DEIS, changes in species richness and diversity have been observed in the Hudson River estuary. Trends in species richness and diversity have varied between life stages, with the number and diversity of ichthyoplankton species increasing slightly and the number and diversity of juvenile and older fish decreasing slightly over the period from 1974 through 1997. The decline in richness and diversity of juvenile and older fish has resulted primarily from a small reduction in the numbers of freshwater species present, especially in the upper estuary (Regions 6-12). These species should be less susceptible to entrainment and impingement than the marine, diadromous and estuarine species (e.g., striped bass, bay anchovy, white perch, and blueback herring) that dominate the lower estuary (Regions 1-5). The causal mechanism through which cooling-water withdrawals could reduce species richness in a component of the community that is not highly susceptible is unclear. It is possible, as stated m the DEIS, that habitat changes, such as regrowth of water-chestnut beds, have reduced the quality of littoral habitat present in the freshwater zone of the estuary, and thus reduced the ability of this habitat to support freshwater species. Regardless of the specific causes, the observed changes are well within the range of natural variability that would be expected in an estuarine environment and are unlikely to be related to cooling-water withdrawals.

Predator-prey balance

If cooling-water withdrawals were substantially depleting prey populations in the estuary, then predators that depend on those prey populations could also decline in abundance. If, on the other hand, cooling water withdrawals were depleting predator populations, then prey populations could increase because of reduced predation These types of changes have not been observed in the Hudson River estuary. Major prey species such as bay anchovy, spottail, shiner, and juvenile blueback herring have been stable over most of this period. The principal predator species, striped bass, has also been stable. Disruption of predator-prey balance in the estuary clearly has not occurred.

Strength of evidence supporting conclusions regarding lack of adverse changes potentially related to cooling-water withdrawals

The data sets on which the above conclusions are based are unprecedented in our experience. Independent data sets, ranging between 10 and 25 years in duration, include:

-Utilities' Longitudinal River Ichthyoplankton survey
-Utilities' Fall Shoals Survey
-Utilities' Beach Seine Survey
-NYSDEC juvenile beach seine survey
-Utilities' mark-recapture surveys of striped bass and Atlantic tomcod

Like all biological data sets, the data provided by each of the above survey programs is subject to a variety of source of unquantifiable uncertainties and potential biases. However, where comparisons are, possible, the results provided by these surveys are consistent. The consistency of these results is a strong indication that the data sets are providing valid information concerning trends in the abundance of Hudson River fish populations.

At least with respect to striped bass, the conclusions evident from our evaluation of the DEIS are supported by coast-wide assessments performed by federal and interstate resource management organizations. Data summarized in the Stock Assessment Review Committee (SARC) report for 1998 (NMFS l998a) show that the total coastwide biomass of spawning Atlantic striped bass in 1996 was more than ten times as high as in 1982 (NMFS 1998a, Figure C11). Although the contribution of Hudson River striped bass to the growth of the coastal population has not been quantified, data summarized in Tables C17 and C18 of the SARC report show that the abundance of juvenile and 1-year-old striped bass in the Hudson River fluctuated without a discernable trend between 1981 and

1996. The SARC report utilized many of the same data (e.g., the utility and NYSDEC beach seine indices) that were used in the DEIS, indicating that the review committee believed these data to be valid indicators of the status of the Hudson River striped bass population. An updated assessment (ASMFC 2000) showed a slight decline in coastal spawning stock size, but continued stability in the abundance of juvenile striped bass produced by the Hudson River population.

The validity of spawner-recruit analyses as supporting lines of evidence

We firmly believe that the extraordinary long-term database on population and community trends in the Hudson River provides the strongest evidence concerning the ecological significance of cooling-water withdrawals by Hudson River power plants. However, the population modeling results discussed in the DEIS provide valuable supporting evidence.

Spawner-recruit analyses such as the striped bass, American shad, and Atlantic tomcod models presented in the DEIS (and critiqued by ESSA and Pisces) have been especially controversial components of impact assessments performed for Hudson River power plants. Such models have been used both in pre-HRSA assessments and in the DEIS to demonstrate the existence of density-dependent population regulation in Hudson River fish populations and to quantify the impacts of power plants on the long-term abundance of those populations. As shown by Christensen and Goodyear (1988) and by Fletcher and Deriso (1988), the data and modeling techniques available at the time of the URSA were clearly insufficient to support credible modeling efforts. However, significant improvements in both data and modeling techniques have occurred over the past 20 years. These advances, which have been recently reviewed by Rose et al. (2001), include measurement techniques for inferring the age, environmental history, and health of individual fish; demonstrations of the operation of specific density-dependent processes in well-studied populations; new methods for modeling fish populations; improved understanding of the relationship between density-dependence and fish life history; comprehensive data bases for the study of spawner-recruit relationships in many fish species; and improved statistical techniques for detecting and quantifing density-dependence from time series of spawner-recruit data. As documented by Rose et al. (2001), detailed studies of individual fish populations and comprehensive analyses of long-term data sets for many fish populations have demonstrated the existence of density-dependence as a general property of fish populations.

Federal and state resource management agencies also recognize, the necessity of considering density-dependence when making resource management decisions. The role of density-dependence in maintaining sustainable fisheries is implicitly acknowledged in the federal regulations implementing the Magnuson-Stevens Fishery Conservation Act (NMFS 1998b). Technical committees of the ASMFC have developed spawner-recruit models for two of the species evaluated in the DEIS: striped bass (NMFS 1998a) and weakflsh. (NMFS 2000). Appendix VI-4-C of the DEIS, which documents a spawner-recruit model for the Hudson River American shad population, was prepared by NYSDEC staff and consultants.

Whether or not there is agreement on the numerical results of the spawner-recruit models used in the DEIS, even the most conservative interpretations of the data (e.g., the “low compensation” fits shown for American shad in Figure 3 of Appendix VI-4-C) provide evidence that density-dependent processes are operating in these populations. These results provide, at a minimum, supporting evidence for the conclusions we have arrived at through examination of population trends: the

Hudson River fish populations most likely to be affected by cooling-water withdrawals have in general maintained stable populations over the past quarter century. The few declining trends that have occurred are inconsistent with the expected effects of the stations and are likely related to other causes.

Reductions in entrainment and impingement mortality are unlikely to result in detectable improvements in populations or communities.

We have not performed a benefits analysis related to the mitigation proposals being discussed by the generators, NYSDEC, and Riverkeeper. However, to the extent that these mitigation proposals are intended to reduce cooling-water withdrawals, our evaluation of the data suggests that the ecological benefits of those reductions is likely to be negligible. If measurable changes attributable to cooling-water withdrawals have not occurred over the past 25 years of operation of the stations, then reductions in those withdrawals would be unlikely to result in measurable improvements such as increases in population abundance or species richness.

[see hard copy for figures, slides, and references]

EPA Response

EPA acknowledges receipt and has reviewed this submission. This is a review of the draft Environmental Impact Statement regarding the cumulative impact of these facilities on the fish populations of the Hudson River. EPA has also received from NYSDEC and has reviewed the Final Environmental Impact Statement. EPA disagrees with the commenter that populations and communities are the proper focus for evaluating impacts of cooling water withdrawals. EPA agrees with NYSDEC in that attempts to measure specific impacts are complicated by interacting variables that can cause fluctuations in fish populations each year, such as flow, temperature, salinity, dissolved oxygen, nutrients and disease, and thus population models cannot determine the impact of impingement and entrainment losses on adult populations with much confidence. Please see section IV of the preamble for the discussion of the environmental impacts of these facilities on the Hudson River. Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level.

Comment ID 316bEFR.029.301

Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Comments on

Chapter A7: Entrainment Survival

Prepared for Entergy Nuclear Indian Point 2, LLC. and Entergy Nuclear Indian Point 3, LLC.

Prepared by: John R. Young, Ph.D., ASA Analysis & Communication, Inc.

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Comments on

EPA Chapter A7 Entrainment Survival

Overview

In it's §316(b) Existing Facilities Benefits Case Studies, Chapter A7: Entrainment Survival, EPA has reviewed the current state of knowledge about the survival of entrained organisms, primarily fish, and found the existing body of information insufficient to use as a screening tool on a nationwide basis. While this finding is understandable given the relatively small number of studies that have been done nationwide and the site-specific factors that determine survival, EPA has failed to recognize the value of the data that are available at a few selected locations.

EPA's review was primarily of information provided in the 2000 EPRI report "Review of Entrainment Survival Studies: 1970-2000." That report detailed 36 studies conducted at 21 different power stations. While 36 studies nationwide is not a large amount of information, 16 of those studies were conducted at plants in the mid Hudson River estuary: 1 from the Danskammer station, 4 from the Bowline station, 5 from the Roseton station, and 6 from the Indian Point stations. This concentration of information in the Hudson River contrasts with the sparseness of information from the rest of the nation: 4 additional studies in New York; 3 studies in mid-Atlantic states, 7 studies in the mid-West; 4 studies on the west coast, and 1 study in the south (Figure 2-3 in EPRI 2000).

In addition to the 6 Indian Point studies included in EPRI 2000, there were an additional 4 years of in-plant studies at Indian Point not included in the EPRI review (NYU 1974, 1976a, 1977, 1978), and additional studies conducted to examine the mechanisms of entrainment mortality (NYU 1976b, 1979; O'Connor & Poje 1979) that were done with the participation of the Indian Point owners. While these early in-plant studies did not use the specialized sampling gear deployed in later studies, they nevertheless provided valuable information and contributed to the evolution of the sampling gears and protocols.

EPA's recognition of the value of entrainment survival information, but dismissal of all previously collected information as flawed and inadequate is distressing. EPA appears to have forgotten the value its own consultants placed on the entrainment survival data in reaching a settlement of the Hudson River case in 1980 (Klauda et al. 1988; Christensen et al. 1981). EPA consultants participated in some of the in-plant studies, and conducted other experimental work independent of the utilities efforts (Coutant and Kedl 1975; Kedl and Coutant 1976; Suffern 1977; Suffern et al. 1979; Cada et al. 1982) that enhanced the acceptance of the in-plant studies.

There is no logic, given the progress that has been made, in EPA's attempt to turn back the calendar nearly 30 years to the state of knowledge that existed in the early 1970s. EPA should explicitly recognize that some facilities have demonstrated that entrainment mortality is not 100%, and that in certain cases sufficiently rigorous protocols have been followed to allow estimation of the survival rate. Failure to make this recognition will only encourage regional and state permitting activities to ignore the valuable information that exists, and will facilitate incorrect and ill-informed permitting decisions.

Specific Comments

1) In the Introduction to Chapter A7, EPA states "Assessment of ecological and economic consequences of entrainment is based on estimates of the number of fish and shellfish killed as a result of entrainment." Although EPA is correct that estimation of the numbers killed must be part of the assessment process, a realistic assessment of ecological and economic consequences must go well beyond estimation of numbers killed. The assessment should also include information on the subsequent natural mortality processes that would apply to the organisms killed so that the effects of entrainment, mortality can be examined at the population level. To the extent possible with existing information, the population consequences should also be placed in the context of losses to sport and commercial fisheries and effects on other trophic levels should also be part of the assessment. Although there is a trade-off between certainty of consequences and level of biological organization examined, any assessment that attempts to address ecological and economic consequences must proceed beyond mere numbers killed.

However, in the event that EPA follows through with its stated intent to assess compliance without examining population and community levels, it is even more critical that the survival rates of entrained organisms be factored into the assessment. For reasons to be discussed below, an unjustified assumption of 100% mortality of all entrained organisms will be neither correct, nor necessarily protective of the populations subject to entrainment.

2) EPA should revise section A7-1.1 to present a more balanced depiction of the involvement of eggs and larvae with power plant intakes. Eggs and larvae, to be subject to entrainment, must occur in the water column. Many species, for example the catfishes, many sunfishes, and pikes, build nests and/or spawn in the shore zone, and therefore are seldom entrained. Species that are commonly entrained generally, are pelagic spawners or have larval stages that move into the water column. This type of life history is also usually associated with high fecundity, and high mortality rates from the egg stage to adulthood. The high mortality does not necessarily occur within the egg stage, and high natural mortality rates are not necessarily indicative of high entrainment mortality, i.e. high natural mortality could be due to predation. EPA should also recognize that entrainment of a life stage with a high natural mortality rate, or a high natural mortality rate in subsequent life stages, will mean that most of

the entrainment losses would have been removed from the population at a later stage due to natural causes, thus the population effect is not accurately characterized by the number lost to entrainment.

3) In the second paragraph of section A7-1.1, EPA sets a very high standard for demonstrating entrainment survival: “any assertions that survival rates are appreciably greater than zero should be viewed with skepticism, and evidence in favor of that assertion must be quite strong to be convincing.” The studies reviewed by EPA in Section A7-3, although perhaps lacking in many instances as a quantitative estimate of survival rate are sufficient to rebut the presumption that entrainment and passage through a cooling water intake structure would kill most if not all organisms. Even with the problems EPA finds in the prior studies the one underlying message that should come across to an unbiased party is that, in nearly all cases examined, a significant fraction of fish eggs and larvae can survive. The remaining challenge is not to demonstrate that survival can occur, but to determine what sets of circumstances permit survival and to accurately estimate its magnitude.

4) Entrainment survival data can be collected to (1) estimate the realized survival at the subject station and/or (2) provide data with which to develop predictive models of entrainment survival at other plants or in different sets of conditions. EPA needs to understand the difference between these two possible uses for the data, and realize that a complete understanding of the factors affecting survival rates and their potential interactions is not necessary for plant-specific estimates of realized survival.

At any particular time, the ambient water conditions, the numbers and life stages of each species being entrained, and to a large extent the plant operating conditions, are not amenable to experimental manipulation. Therefore, although the data collected will inevitably be a subset of the possible combinations of factors that might potentially be important, the combinations of factors that do occur will generally reflect the relevant combinations for that station. One possible exception would be a limited set of plant operating regimes that might not reflect the range of plant operation typical of that plant.

It would be nearly impossible, in any particular year to collect large samples of all commonly entrained, species and life stages under all potential conditions of ambient temperature, thermal exposure, mechanical stress, and biocide use. In order to obtain a more complete data set, it would be necessary to combine results across years for the same station. This combination can best be done if sampling apparatus and methodology are standardized. Unfortunately, most of the existing survival data were collected during the late 1970s and early 1980s when the sampling gear and protocols were rapidly evolving.

If, as seems necessary, EPA intends to incorporate entrainment survival into its assessment process, it is important that it clearly signals that it recognizes the realities of entrainment survival sampling and will be willing to evaluate entrainment survival studies conducted over a period of years, given that some of the previous shortcomings of design and protocols can be solved.

5) Section A7-1.2 (Thermal stress) lists a large number of temperature-related variables that potentially affect entrainment survival rates. Although these factors may be theoretically relevant, past studies have shown that exposure. temperature (i.e. the temperature measured in the discharge after it exits the condensers) is typically the most important factor. For instance, Jinks et.al. (1978) successfully predicted thermal mortality using a model with exposure temperature (most important),

ambient temperature, and exposure duration as independent variables. It would be impossible to collect real entrainment data sufficient to statistically test the influence, of all the factors, and potential interactions of the factors, that EPA lists.

6) In Section A7-1.2 (Chemical stress) EPA should realize that at many stations, biocides are not "routinely used", and would generally, not be a factor influencing entrainment survival. EPA's characterization of biocide use as routine is particularly surprising because biocide use is far below what it was in the 1970s as a result of EPA's efforts to reduce chlorine discharges. Current. NPDES/SPDES permits incorporate strict limits on chlorine discharges. The SPDES permit issued to the Indian Point units in 1987 is a prime example with a limitations of two hours per day and a maximum of 9 hours per week at both units combined.

Certainly, entrainment survival studies should record when biocides are used and analyze those data separately from data collected when biocides are not used. However, failure to record the data is not likely to result in substantial bias to the entrainment survival estimates, and if any bias exists it would be likely to have a negative effect on the estimated survival.

7) In section A7-2 (Page A7-4), EPA lists deficiencies of previous studies that lessen the applicability of entrainment survival studies. This encyclopedic list includes many factors that have little or limited relevance, but by including them the overall appearance of deficiency of the studies is promoted

-Geographic distribution — The geographic location of an entrainment survival study is not a factor that should carry weight in its evaluation. Although the studies reviewed were highly concentrated with nearly half of the studies being conducted on the Hudson River, their relevance, or lack thereof, to other power plants is independent of geography. Factors that might limit their applicability in other places would be whether the species entrained are similar, whether the life stages occur at the same ambient temperatures, and factors related to thermal exposure and duration and mechanical stress.

-Small sample sizes - in many cases, the sample sizes were not small for the most commonly entrained taxa, and in fact are far larger than is typical in bioassay studies. For instance, the 1977 program at the Indian Point stations collected 806 striped bass post yolk sac larvae (PYSL) at the intake and 518 at the discharge. In 1978, 423 PYSL were collected at the intake and 551 at the discharge. Intake and discharge collections in 1979, 1980, and 1988 were 64 and 114, 142 and 207 and 273 and 2398 respectively.

Naturally, taxa and life stages that are less abundant in the water column will be less abundant in entrainment survival samples. However, in many cases, the common taxa have reasonably large sample sizes.

-Limited species in the studies - Due to the concentration of studies in the Hudson River, a great deal of the available information exists for a relatively few number species, i.e. those that are common in the Hudson However, for plants that entrain these same species, there is a great deal of relevant information

-Variation in sampling procedures - EPA must recognize that most of the existing studies were conducted during a time of rapid evolution in the sampling equipment and protocols. This evolution resulted in substantial improvement in the data collected and in the precision of entrainment survival estimates as the methodology matured (Muessig et al. 1988). EPA should not use the improvements in sampling as a reason to disregard the entrainment survival results, but instead should weight those studies using the improved methods and protocols more heavily.

-Absence of information on chemical stresses - Use of biocides was far less common than EPA suggests, which makes this generally an issue with low relevance. Any bias due to unrecorded biocide stress would be negative.

-Absence of information on mechanical stress - It is not necessary to differentiate the sources of stress in order to describe the empirical entrainment survival at a particular power plant. (See comment 4 above)

-Limited data on latent physiological effects on species - EPA must recognize the trade-off that exists between handling large numbers of larvae and the ability to collect detailed information on individuals. EPA criticizes sample sizes as too small and also criticizes the studies for not collecting detailed information on latent physiological effects, information that could only be obtained by devoting substantially more time and laboratory resources to each collected organism. Requirements for detailed physiological analysis would only make survival studies far more difficult and expensive to conduct.

Even if such studies were attempted they would be severely limited by the artificiality of the laboratory environment. Most past studies were limited to 96 hours or less of post-entrainment observation in order to avoid starvation, cannibalism, and behavioral interactions that could cloud the interpretation of the data. Any attempt to examine longer-term latent effects would be subject to laboratory-induced confounding due to the artificial holding environment, food items and densities provided to the larvae, and behavioral effects.

-Effects from entrainment on growth rates - Information on the effects of entrainment on growth rates could be provided if EPA is willing to compare growth of entrained fish to unentrained control specimens held in the same post-sampling conditions. Comparison of entrained fish to wild unentrained fish would not be a valid exercise due to the unnatural conditions in the laboratory environment.

-Increased vulnerability to natural mortality, maturation, and fertility/fecundity - Aside from a possible increased vulnerability to predation immediately after entrainment, it is difficult to postulate how a short-term (on the order of 30 minutes) exposure to entrainment stresses while sub-lethal, could have life-long effects on the maturation, fertility and fecundity of entrained organisms. Even if EPA could reasonably hypothesize how such effects would occur, it must realize that collection of data demonstrating the magnitude would be impossible in most cases.

8) In section A7-3 (Braidwood Nuclear and elsewhere), EPA embraces the design concept of lagging the discharge sample behind the intake sample so that both samples are drawing from the same pool of organisms. Although this seems logical in practice the conceptual advantage is overridden by the need to ensure that both samples are exposed to the same degree of sampling stress. This consideration is best satisfied when intake and discharge samples are collected and processes simultaneously so that handling stress can be assured to be identical.

9) In A7-3 (Braidwood Nuclear), EPA recommends that dead-opaque larvae should be included with dead in order to calculate entrainment survival. The translucent character of live fish eggs and larvae, and the change in opacity that occurs after death is a useful indicator of prior physiological state. Since opacity generally takes some time to develop, opaque larvae can be considered to have been dead at the time they were initially sampled, and not to have died during or after sampling.

10) In section A7-3 (Braidwood Nuclear at top of page A7-5) EPA suggests Abbott's formula not be used to adjust the discharge survival proportion for sampling-related mortality "the percent survival of all individuals sampled from the discharge without correcting for sampling equipment related mortality be used to ensure a fair accurate and conservative estimate of entrainment survival." If implemented, the "conservative" estimate EPA desires would actually be biased by the severity of sampling mortality and/or the proportion of already dead organisms in the samples This suggestion should not be implemented.

11) In A7-3 (Brayton Point [last paragraph on page A7-5] and Port Jefferson [2nd paragraph on page A7-10]) EPA suggests that discharge survival rates higher than intake survival rates indicate erroneous results. Actually, if entrainment mortality is low there is a distinct possibility that due to chance, discharge survival will at times exceed intake survival. When this occurs, survival obviously is only 100%. Rather than throwing out the data as EPA suggests, researchers should calculate a lower confidence bound for survival using appropriate statistical techniques.

The possibility of control mortality exceeding test mortality also exists in bioassay testing EPA s Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms", which also uses Abbot's formula to adjust for control mortality, does not routinely exclude results when control mortality exceeds toxicant mortality.

12) In Section A7-3 (Cayuga and Indian Point) EPA feels the handling and latent effects studies "may not accurately simulate the actual conditions to which organisms are exposed after discharge from the facility." If EPA is concerned over the immediate post-entrainment environment, then the gradual cooling back to ambient temperatures that occurs during sampling should approximate the mixing of the discharge plume with ambient temperature water. Of course, the actual post-entrainment thermal experience of the unsampled organisms will vary greatly in the field.

For the longer term, e.g. 2 to 96 hours after entrainment, it is not possible to hold test organisms in a natural setting and continue to monitor the health and status of individuals. If EPA is criticizing this aspect of the latent effects studies they are setting an impossibly high standard for the studies. The critical factor is that the entrained and control organisms are both held in the same conditions so holding effects can be removed by applying Abbott's formula.

It should be noted that EPA's sanctioned Whole Effluent Toxicity testing protocols also holds organism under unnatural conditions. But because test and control organisms are held in the same conditions, the effects of the subject effluent can be estimated.

13) EPA takes an inconsistent position on adjustment of discharge survival rates in section A7-3. For the Cayuga studies EPA claims that adjustment of discharge survival for intake survival give "falsely high survival rates." In its review of the Quad Cities studies, EPA argued for adjustment as a means to eliminate the bias of the already-dead larvae in the samples. As previously discussed in comment 10,

the adjustment of the discharge sample for sampling mortality is necessary to produce an unbiased estimate of entrainment survival.

14) EPA infers in A7-3 (Port Jefferson Page A7-10, paragraph 3 and elsewhere) that unequal sample sizes at intake and discharge are a problem. There is no statistical requirement for equal sample sizes for the intake and discharge samples. However, substantial inequalities could indicate non-random sampling at one or both locations. Therefore, it should be recommended that researchers examine the organism densities, survival rates, species compositions and length frequencies at the two stations to assist in detecting non-randomness. For instance, differing length frequency distributions at intake and discharge locations might indicate avoidance by live organisms, extrusion of small organisms, or possibly destruction during plant passage. Sample size differences can also be generated by differing sample volumes at the two locations and by stratification, particularly at the intake. The large differences in sample sizes in the 1988 Indian Point studies were the result of using two samplers at the discharge and only one at the intake and probable stratification of larvae at the intake in depths away from the sample intake point.

15) In A7-4 EPA correctly states that “accurate quantification of biological impacts should include entrainment survival in cases where entrainment survival rates have been estimated by valid means. However, the entire chapter promotes the view that there are no instances where valid entrainment survival estimates currently exist. EPA should make explicit distinctions between situations where data are sparse and collection methods are suspect and situations where data are abundant and have been collected by state-of-the-art techniques (e.g. Indian Point, Bowline, and Roseton plants).

16) In A7-4.1, paragraph 2, EPA incorrectly indicates that no attempts to calculate entrainment survival should be made when control survival is less than discharge survival. As discussed, in comment 11, discharge survival rates higher than intake survival rates are not necessarily an indication of invalid data or violated assumptions.

17) In A7-4.1 (Paragraph 3), EPA recommends studies throughout the year. Entrainment abundance studies at many plants have demonstrated that, entrainment is typically highly seasonal, corresponding to the spawning period of the dominant taxa in the fish community, therefore a year-round entrainment survival study be a significant misallocation of resources. Instead of year-round sampling, information from previous entrainment abundance studies or knowledge of the spawning seasons of the dominant taxa should be used to target the survival sampling to their periods of abundance.

18) EPA recommends ends that 24-hour sampling should be done to capture diet changes in survival Unless plant operating conditions change on a diel basis, there is no reason to expect any diel differences in survival. Therefore, it might be useful to incorporate diet sampling into peaking stations whose generation levels change dramatically between peak and off-peak periods, but at baseload stations, such as most nuclear plants, diel sampling would not be necessary.

19) In Section A7-4.1, paragraph 4, EPA requests information that is for the most part superfluous to measuring entrainment survival at a particular plant, such as impacts caused by speed and pressure changes within the condenser, the occurrence of abrasive surfaces, turbulences within the condenser. This information, if available, could be used to develop predictive models of entrainment survival however it is not necessary to characterize empirical entrainment survival at a particular station.

If predictive models for application to other power plants are desired, a better way to collect the relevant data would be through simulation studies (e g O'Connor and Poje 1979; Coutant and Kedl 1975; Kedl and Coutant 1976; Suffern 1977). In a simulation study, conditions can be closely controlled and sample sizes can be fixed sufficiently high to conduct the necessary statistical analysis to understand the effects of different factors and their interactions.

20) In A7-4.1, paragraph 5 EPA recommends that studies be done under worst-case conditions. Worst-case conditions, generally maximum ambient temperatures and maximum generation levels, often occur over only a relatively brief period of time. This period might not correspond with periods of significant entrainment. In the United States, many fish species subject to entrainment, spawn during the spring, generally before peak ambient temperatures and, for many stations, peak generating loads occur. Usually only a small fraction of entrainment would ever occur under worst-case conditions. Depending on the station an attempt to collect data under worst-case conditions would likely result in small sample sizes for a very limited number of species.

21) EPA states in A7-4.4 that adequate precision of estimates and parameters is required, but correctly provides no standards for determining when precision is adequate. As is typical in statistical analysis, the precision of estimates should be calculated and the estimates should be evaluated based on the precision achieved. Thresholds for precision should not be established.

EPA should also realize that while entrainment survival studies are conceptually similar to bioassays, they will be inherently more variable than bioassays. Thus standards that might be applicable to bioassay studies are not applicable in entrainment survival. The additional variability arises from the differences in test organisms, and the lack of ability to control test conditions. In bioassays, the test species are selected for their ability to provide a reliable test of toxicant effects. The organisms will be relatively uniform in age condition and genetic lineage. In entrainment survival studies, the species collected will be those that are subject to entrainment (whether or not they survive well), and will be very heterogeneous in age, condition, and genetic lineage. In addition, many of the factors that might affect entrainment survival are not subject to experimental control (e g ambient temperature, delta-T, exposure duration, mechanical stress, organism size). These organismic and experimental factors add considerably to the variability of results observed in entrainment survival studies.

22) EPA's statement in the last paragraph of A7-5 that previous studies provide only a "provocative set of anecdotes" is incorrect. Despite the design and analytical problems that occurred in past studies while sampling gear and protocols evolved, the studies have conclusively disproven the presumption of 100% mortality for some species.

23) EPA is incorrect in its view that retaining the 100% mortality presumption is a universally prudent stance for the agency in its precautionary approach. If a 100% mortality presumption is used as the default assumption, then facilities will have only two options to reduce their entrainment mortality: either screen out entrainable life stages or reduce cooling water flow. For species that actually do have substantial entrainment survival, as those on the Hudson River have demonstrated, either option may actually increase the numbers killed and produce a result opposite of the EPA's intention.

Screening out entrainable life stages through the use of fine-mesh screens may well increase the actual number of fatalities for taxa and life stages that currently exhibit non-trivial survival rates. If flow reduction is chosen as the mitigation method, care must be taken that lower flows do not increase the exposure temperature to the point that all entrained organisms are killed by the thermal stress. If that occurs, the actual number killed might be higher at lower flow rates.

Regulatory agencies can properly use entrainment survival data to achieve a correct §316(b) determination only by examining the existing data on a case-by-case basis. Where little or no applicable data exist, an agency may be justified in assuming 100% mortality as a baseline condition. The burden is then on the applicant to collect information to justify an alternative value for survival and to propose mitigation strategies that use that information. However, when data sufficient to demonstrate significant entrainment survival already exist, as they do at Indian Point and other Hudson River plants, agencies should not cling blindly to the 100% mortality assumption and risk implementing mitigation measures that result in increased numbers of fish lost.

[see hard copy for references]

EPA Response

Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule. Please see response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival in site-specific benefit analyses. Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level.

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Implications for nuclear facilities

Author Name Elise N. Zoli
Organization Godwin Proctor Counselors at Law obo Entergy Corporation

n/e/r/a/
Consulting Economists

Electricity System
Impacts of Nuclear
Shutdown Alternatives

Prepared for:
Entergy Nuclear Indian
Point 2, LLC and Entergy
Nuclear Indian Point 3, LLC

Prepared by General
Electric Power Systems
Entergy Consulting and
National Economic
Research Associates

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[see hard copy for slide presentation]

EPA Response

EPA is in the receipt of the attachment.

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Author Name Elise N. Zoli

Organization Godwin Proctor Counselors at Law obo Entergy Corporation

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

ECONOMIC EVALUATION OF THE HABITAT REPLACEMENT COST METHODOLOGY IN THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S 316(B) BENEFITS CASE STUDY FOR PILGRIM STATION

David Harrison, Jr. PhD Project Director
Eric M. Haxthausen
James Patchett

NATIONAL ECONOMIC RESEARCH ASSOCIATES
ONE MAIN STREET
CAMBRIDGE, MASSACHUSETTS 02142
TELEPHONE: 617.621.0444 FACSIMILE: 617.621.0336
INTERNET: http://www.nera.com

Prepared for Entergy Nuclear Generating Company, LLC

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EXECUTIVE SUMMARY

This report reviews and critiques the U.S. Environmental Protection Agency's ("EPA") use of the Habitat Replacement Cost ("HRC") methodology as a means for valuing the benefits of reducing impingement and entrainment ("I&E") by cooling water intake structures ("CWIS") at facilities within the scope of EPA's proposed rule for existing facilities under Section 316(b) of the Clean Water Act ("316(b) Phase II Proposed Rule). We focus on the use of the HRC to calculate benefits at Pilgrim Station ("Pilgrim"), as reported in EPA's Seabrook and Pilgrim Facilities Case Study (U.S. EPA 2002, hereafter "Case Study").

Summary of Findings

The principal finding of this report is that HRC is an invalid method for estimating the benefits of proposed regulatory alternatives for implementing Section 316(b). Although this conclusion is sufficient to disqualify the use of the HRC methodology for benefits analysis, we also evaluate EPA's application of this method in the case of Pilgrim, and find several concerns about the implementation of this flawed methodology. We summarize our findings below.

1. HRC is not a valid method for measuring the benefits of prospective 316(b) policies.
HRC cannot and does not provide a measure of the benefits of a prospective policy designed to reduce I&E by CWIS. HRC is a method that, if implemented properly, can provide a measure of the cost of a specific policy alternative - namely, compensating for I&E losses by developing new habitat that may generate equivalent fish populations and ecosystem services.

2. There is no basis in the economics literature or EPA guidelines for using HRC as a benefits estimation tool.

The economics literature, as well as the recent EPA Guidelines (U.S. EPA 2000), provides examples of methods that may legitimately be used to estimate ecosystem benefits. HRC is not among them. Although HRC superficially resembles some other economic valuation methodologies that are cited by EPA as support, it differs from these methodologies in critically important ways and, therefore, cannot and should not be treated as analogous. None of these other valuation approaches are appropriate precedents that would support the use of HRC to estimate the benefits of reducing I&E losses at Pilgrim or other electric generating facilities.

3. The application of the HRC method to the estimate of habitat replacement costs for the Pilgrim Facility is flawed in implementation (apart from its lack of a sound conceptual basis as a benefit-estimation method).

EPA's application relies on several arbitrary assumptions that are poorly supported in the Case Study. Moreover, EPA provides no conceptual basis for the choice of replacement habitats in the Case Study. Finally, the approach used by EPA exhibits a significant upward bias.

4. The inappropriate application of HRC results in a dramatically higher estimate of the benefits of reducing I&E at the Pilgrim facility than the estimate developed using conventional methods.

Using HRC to estimate the benefits associated with eliminating I&E losses at Pilgrim yields a much higher estimate of benefits than derived by EPA using conventional methods supported in the economics literature and in EPA's guidelines for conducting economic analyses. As illustrated in Table ES-l, the benefit estimates in EPA's Case Study derived using HRC are more than 20 times greater than those derived using conventional methods. <FN 1>

Table ES-1 Summary of EPA Estimation Methods for Damages Due to Impingement and Entrainment at Pilgrim Station.
[see hard copy for table]

Conclusion

The use of the HRC method to develop benefits estimates is completely unsupported in EPA guidelines and in the economics literature. In light of this fundamental and inescapable problem, EPA should eliminate the HRC as a method for benefit estimation in revising the Pilgrim Case Study as part of its analysis of the final rule. Instead, EPA should rely on acceptable economic approaches to measure benefits for Pilgrim in the Case Study.

I. INTRODUCTION

This report evaluates the use of EPA's "habitat replacement cost" ("HRC") methodology, as set out in EPA's proposed rule for existing facilities under the Clean Air Act (67 FR 17121, the "316(b) Phase II Proposed Rule") to estimate the benefits of a potential project - in this case a project that would reduce impingement and entrainment (“I&E”) <FN 2> of fish and other organisms by cooling water intake structures (“CWIS”) at certain existing power plants. We address the fundamental question of whether the HRC method is an appropriate economic methodology as it is used m the case study of the Pilgrim Nuclear Station (“Pilgrim”).

A. Background

EPA’s proposed rule would establish performance standards commensurate with closed-cycle cooling for CWIS at existing power producing facilities with a cooling water intake flow of 50 million gallons per day or more from rivers, streams, estuaries, and other U.S. waters. Under the Rule, where there is an adverse environmental impact (which EPA has presumed), facilities would be required to implement “best technology available” (“BTA”) for CWIS to minimize that impact.

As part of its development of the proposed rule and pursuant to the requirements of Executive Order 12866 (“Regulatory Planning and Review”) and relevant statutes, EPA must perform an analysis of the benefits and costs of the proposed rule and alternatives. To inform this exercise, EPA has prepared a number of ease studies examining the potential benefits of reducing I&E at CWIS in various ecosystems around the U.S. This report examines EPA’s estimation of the value of losses at Pilgrim Nuclear Station (“Pilgrim”) as part of EPA’s Seabrook and Pilgrim Facilities Case Study (“Case Study”). The Case Study evaluates the effect of I&E by CWIS at the Seabrook and Pilgrim facilities; both of which are on the New England Coast and within the scope of the 316(b) Phase II Proposed rule.

The case studies are important for at least two reasons. First, EPA uses the results of the case studies to extrapolate national benefits of the 316(b) Phase II Proposed Regulation and various regulatory alternatives. Second, various permit writers, will undoubtedly use the case study methodologies as guidance for the implementation of benefit-cost analyses to evaluate options for individual permits.

The remainder of this chapter provides an overview of the Case Study results for Pilgrim, a discussion of the specific objectives of this report, and an outline of the other chapters.

B. Overview of EPA Case Study Benefit Results for Pilgrim

EPA’s Seabrook and Pilgrim Facility Case Study presents results for the Seabrook and Pilgrim Nuclear stations on the New England Coast. In this report, we focus on the results for Pilgrim Table 1 summarizes EPA’s Case Study results reported for Pilgrim. The values are annualized, based on the midpoints of the ranges estimated in the case study. According to the Case Study, total annual damages due to impingement and entrainment at. Pilgrim are calculated at about $13.1 million per year (2000 dollars), using the HRC method. The vast majority of the losses are due to entrainment rather than impingement; of the $13.1 million, entrainment accounts for $12.3 million, or 93.6 percent of the total. Note that these values are annualized. Using a discount rate of seven percent and an initial license termination date of 2012 for Pilgrim, subject to extension for an additional 20 years, implies that the present value of losses through 2032 due to I&E at Pilgrim would be approximately $150 million (in 2000 dollars), based on the results of the Case Study.

Table 1. Summary of EPA Estimation Methods for Damages Due to Impingement and Entrainment at Pilgrim Facility.

Method	Impingement	Entrainment	Total
Loss to Fishery:			
Commercial	$1,300	$77,000	$78,300
Recreational	$1,800	$348,600	$350,400
Forage	$90	$29,300	$29,390
Nonuse	$900	$174,300	$175,200
Total Loss to Fishery	$4,090	$629,200	$633,290
Habitat Replacement Cost:			
Total HRC	$840,000	$12,300,000	$13,140,000

Ratio of EEC Estimate to 205:1-20:1Loss of Fishery Estimate 21:1
Source: EPA (2002), Figure G6-4, and NERA calculations.

As Table 1 shows, the estimate of losses obtained with the HRC method are dramatically higher than those obtained using conventional methods for estimating benefits - $13.14 million per year, as compared to $633,000 per year, a difference of a factor of 21. This gross disparity in the value obtained using HRC versus that obtained using the conventional approach suggests the need to reconsider the validity of the approach. Accordingly, this report focuses on examining the conceptual validity of the HRC method and the values developed for the Pilgrim Case Study.

C. Objectives of This Report

The major objective of this report is to evaluate the HRC method used by EPA for Pilgrim. In particular, we consider whether the HRC analyses are based on sound conceptual and empirical methodologies. The criteria for our judgments are based on the economic literature, as well as on current guidelines for regulatory analyses developed by EPA (U.S. EPA 2000) and the Office of Management and Budget (1996).

D. Outline of the Report

The report is organized as follows. Chapter II provides an overview of EPA's HRC methodology and its application to Pilgrim. Chapter III evaluates this methodology and application. Chapter IV concludes the report.

II. OVERVIEW OF EPA'S HRC METHODOLOGY AND ITS APPLICATION TO BENEFIT ESTIMATES FOR PILGRIM STATION

This chapter describes EPA's HRC methodology and its calculation of HRC for Pilgrim.

A. Description of EPA Habitat Replacement Cost Methodology

Chapter A11 of EPA's case study document (U.S. EPA 2002) provides an overview of EPA's HRC method for valuing losses of fish and other organisms resulting from I&E by CWIS. EPA argues that conventional techniques may underestimate: true values for losses sustained as a result of I&E,

because they allegedly fail to account for the impact of losses in early-stage fish and shellfish populations (i.e. eggs and larvae). EPA also implies that conventional means of estimating losses do not account for nonuse value.

Chapter A11 of the EPA ease study document describes the basic approach of the HRC method:

The HRC method values natural resource losses based on the costs of ecological habitat-based restoration activities, as opposed to approaches not based on habitat such as fish stocking, that are scaled to increase natural production as an offset to the I&E losses. Thus, HRC uses resource replacement costs as a proxy for the value of resources lost to I&E. (U.S. EPA 2002, p. Al1-3)

In short, the HRC approach develops an estimate of costs for undertaking an activity that would be intended to have an equivalent result to ceasing or reducing I&E at the affected facility. Under the HRC method, EPA presumes these costs to be a measure of benefits.

B. Application of HRC Methodology to Estimate Value of Fish Losses at Pilgrim Station

Chapter G5 of EPA's case study document (U.S. EPA 2002) presents a step-by-step discussion of its method for valuing I&E losses at Pilgrim. EPA outlines what is essentially a five-step process:

1. Measure I&E Losses

2. Identify a "Preferred" Habitat Restoration Alternative for I&E Species

3. Quantify Expected Increases in Species Production

4, Scale I&E Losses Using Expected Increases in Species Production

5. Calculate Unit and Total Costs

We discuss these steps in detail below.

1. Measure I&E Losses

Pilgrim has been monitoring impingement three times per week since 1974. Screens are washed over once in the morning, once in the afternoon, and once in the evening during a single 24-hour period. The number of organisms obtained is then converted to an hourly impingement rate by dividing by the number of hours between catches. This number is then multiplied by 24 and then by 365 to generate the annual impingement rate. These values are averaged over the course of the year. Pilgrim has also recorded entrainment since 1974. Pilgrim uses a mesh net - which varies depending on time of year - to sample entrained fish.

In its analysis, EPA included only those fish that had losses greater than 0.1 percent of the total I&E losses at Pilgrim EPA converted all values to average annual age-one equivalents.

We understand that EPA's calculations of I&E costs are disputed.. We have undertaken no independent assessment, but have simply assumed EPA's calculations of I&E losses are acceptable for purposes of this discussion. <FN 3>

2. Identify a “Preferred” Habitat Restoration Alternative for I&E Species

EPA identified the habitat requirements of I&E species and generated a list of possible habitat restoration alternatives. In this case, EPA identified six alternatives: submerged aquatic vegetation (SAV), tidal wetlands, artificial reefs, improved anadromous fish passages, improved water quality, and reduced fishing pressures. After identifying feasible restoration alternatives, EPA convened a committee of officials from EPA, National Marine Fisheries Service, and various Massachusetts protection agencies to designate “a preferred restoration alternative for each species” (U.S. EPA 2002, p. Al1-2.4 and G5-4). As discussed below in Chapter III, it is unclear exactly what criterion EPA uses to judge the “preferred” alternative, or how these alternatives were selected.

3. Quantify Expected Increases in Species Production

Because fish species populations living in restored habitats are likely to grow significantly after restoration, EPA calculated the expected increases in species population as a way of quantifying the benefit of the restoration. Given the limited data available, however, EPA used a proxy to estimate this restoration effect:

Unfortunately, available quantitative data is not sufficient to estimate reliably the increase in fish production that is expected to result from the habitat restoration actions ... There is also limited data available on the production of these species in natural habitats that could be used to estimate production in restored habitats. Therefore, in this analysis EPA relied on quantitative information on fish species abundance. in the habitats to be restored as a proxy for the increase in production expected through habitat restoration (U.S. EPA 2002, p.G5-9)

EPA used several techniques to estimate species abundances in the various habitats being considered. As an example, EPA used otter trawls to estimate fish species abundances in SAV habitats. Because fish tend to avoid trapping equipment, EPA adjusted the results using a sampling efficiency - the estimated percentage of fish caught in a given area compared to the real population in that area. EPA estimated sampling efficiency at 40 to 60 percent. Ultimately, EPA adjusted the results by multiplying by a factor of 2.5 (i.e., using the 40 percent figure).

EPA then converted these values to age-one equivalents using survival rates. That is, EPA’s estimated number of juveniles was summed and then multiplied by the estimated survival rate to obtain EPA’s estimate of the equivalent number of age-one individuals that would be expected from this number of juveniles. When survival rates for juveniles were unavailable, EPA estimated the rate using the value for larvae survival averaged with 1.0 (which is, by definition, the percentage of age-one individuals who survive until age one).

4. Scale I&E Losses Using Expected Increases in Species Production

EPA used the estimated abundance (as a proxy for production) values for each species’ preferred habitat to estimate how much restored habitat would be necessary to restore I&E losses. That is, EPA divided I&E losses for each species by the increased production, as calculated above. For each habitat, EPA then took the maximum value - the species that needs the most of that habitat to recoup

I&E losses - and used that as the "assumed units of implementation required to offset I&E losses" (U.S. EPA 2002, p. G5-29) for all of the species with a given preferred habitat.

We understand that EPA's calculations of restored habitats are disputed. We have undertaken no independent assessment, but have simply assumed EPA's calculations of restored habitats are acceptable for purposes of this discussion.

5. Calculate Unit and Total Costs

Using values from organizations with experience in rebuilding habitats, EPA estimated the cost to restore one square meter of each type of habitat (e.g. submerged aquatic vegetation, tidal wetlands, etc.). Because increased fish production units were estimated per 100 square meters, EPA scaled the unit cost to 100 square meters by multiplying by 100.

For each habitat, EPA multiplied this unit cost by the "assumed units of implementation required to offset I&E losses," as determined above, producing a cost for each type of habitat. EPA then summed these values to generate a total cost figure for habitat replacement.

III. EVALUATION OF EPA'S HABITAT REPLACEMENT COST METHODOLOGY AND APPLICATION TO PILGRIM STATION

This chapter evaluates the use of the HRC approach from a methodological standpoint and considers EPA's estimate of habitat replacement costs for Pilgrim.

A. HRC Is a Profoundly Flawed Methodology and Does Not Provide a Measure of the Willingness to Pay for Losses.

This section explains why EPA's use of the HRC approach to measure the benefits of reducing fish losses through I&E is conceptually incorrect and inconsistent with relevant EPA guidelines for benefit estimates.

1. General Principles for Benefit Estimation

Benefit-cost analysis is an established methodology for providing information to decision makers faced with the task of determining whether a project should be undertaken, and if so, at what scale of activity (see, e.g., Stokey and Zeckhauser 1978, Nas 1996). The approach involves systematic enumeration of benefits and costs that would accrue to members of society if a particular project were undertaken. Benefit-cost analysis provides an ex ante perspective; a project is evaluated in advance to aid in deciding in what form it should be undertaken and, indeed, whether the project should be undertaken at all.

The rationale for undertaking a benefit-cost analysis of a particular decision is to allow society's resources to be put to their most economically valuable use. In choosing among alternatives, the basic benefit-cost principle is to select the alternative that produces the greatest net benefits (i.e., benefits minus costs). It is possible that all project alternatives produce net benefits that are negative. In that case, the higher value alternative is to "do nothing," which at least produces a net benefit of $0.

Assuming an adverse environmental impact, benefit-cost analyses of the choice of BTA require the careful enumeration of the monetary value of different impacts resulting from various alternatives. These impacts are typically separated into costs (negative impacts) and benefits (positive effects), although the two categories are closely related.

The benefits included in benefit-cost assessments should reflect benefits to society. Estimates of benefits associated with environmental improvements reflect social benefits when they are based on the willingness to pay ("WTP") of individuals who receive the increased environmental services (e.g., commercial fishing services). WTP represents the value of a good or service in monetary tents (i.e., the amount the individual is "willing to pay' in dollar terms). The current EPA Guidelines for preparing economic analyses explain this concept as follows

The willingness to trade off compensation for goods Or services can be measured either as willingness to pay (WTP) or willingness to accept (WTA). Economists generally express WTP and WTA in monetary terms. In the case of an environmental policy, willingness to pay is the maximum amount of money an individual would voluntarily exchange to obtain an improvement (or avoid a decrement) in the environmental effects of concern. Conversely, willingness to accept compensation is the least amount, of money an individual would accept to forego the improvement (or endure the decrement) (U.S. EPA 2000, p. 60, emphasis in original).

EPA notes that: "In practice, WTP is generally used to value benefits because it is often easier to measure and estimate" (2000, p. 61). As discussed below, HRC does not measure WTP.

2. HRC Does Not Conform Basic Economic Principles

In this section, we first explain the logical flaw in using HRC as a measure of benefits and then discuss its lack of support in the economics literature. Finally, we compare HRC to other superficially similar methodologies that could at first glance - but mistakenly so - appear to provide support for using HRC as a benefits estimation method and conclude that HRC cannot reasonably be used as a benefits-estimation method, particularly in the context of 316(b).

a. The Logical Flaw in the Use of HRC as a Measure of Benefits

HRC is designed to measure costs rather than benefits. Therefore, HRC is not, and cannot be used as, a measure of the benefits of that policy or of any other policy. <FN 4>

HRC provides an estimate of the costs of undertaking an activity - creation of new fish habitat - that theoretically would be intended to have an equivalent result (i.e., increasing the population of certain fish species and other aquatic organisms) to ceasing or reducing I&E at the affected facility. 'But the costs do not provide' a measure of the benefits associated with undertaking such a policy.

Indeed, the purpose of benefit-cost analysis in the context of a regulatory policy decision is to determine whether the additional benefits of particular alternatives exceed the additional costs of undertaking them. <FN 5> To use HRC as a measure of benefits is to assume, without any explicit basis, that the benefits of a potential policy alternative (in this case, habitat replacement) are precisely equal in all cases to their costs. In short; using HRC as a measure of benefits begs the very question that is at issue - what are the benefits of each policy alternative?

EPA may be confusing HRC with a revealed-preference approach, such as a market transaction. The difference is that, in the case of HRC, there is no demonstrable revealed preference for replacing the habitat - no habitat replacement has taken place in a private market transaction. Individuals might, in theory, value the replacement of this habitat at some level equal to or greater than its cost; but the HRC analysis gives us no basis for knowing whether the social value of the habitat replacement is greater or less than the cost of undertaking it.

b. The Lack of Support for HRC in the Economics Literature

Not surprisingly, there is no support in the economics literature for using costs to measure benefits. Indeed, EPA effectively concedes as much by admitting that HRC is a “new approach” (U.S. EPA 2002, p. A11-3).

The reader of the Case Study document should not be misled, therefore, by the fact that EPA cites a number of economic sources in the section of the document describing HRC. These references discuss many useful economic concepts that are tangentially related to HRC, but they say nothing that would validate HRC as a method.

3. EPA Guidelines for Benefit Estimation Do Not Identify HRC as an Appropriate Methodology for Benefits Estimation

EPA’s Guidelines for Preparing Economic Analyses (2000) identify a number of specific techniques that can be used to estimate the benefits of improvements in environmental quality (or conversely, damages associated with environmental degradation). Table 2 provides EPA’s summary of benefits categories with examples of appropriate valuation methodologies. As is evident from Table 2, EPA has recognized several approaches to valuing goods and services, in this case lost early life stages of certain fish and other aquatic organisms, and any associated environmental amenities.

EPA’s Guidelines provide a comprehensive description of methodologies that can be used to estimate benefits of regulatory alternatives. The chapter on analyzing benefits (U.S. EPA 2000, Chapter 7) is extensive and detailed, referencing approximately 200 sources within the economics literature. The EPA Guidelines, and therefore the methods they discuss, were reviewed by a distinguished panel of thirteen environmental economists from the Environmental Economics Advisory Committee of EPA’s Science Advisory Board. Thus, they represent consensus within the field of economics on acceptable methodologies.

HRC is not mentioned or referenced anywhere within the Guidelines as a legitimate method for benefits estimation. As discussed above, this is not surprising, because the fundamental premise of the HRC approach - that the costs of a hypothetical activity can be used as a measure of the benefits of another activity - is completely incompatible with the basic principles of economics, as reflected in EPA’s Guidelines (2000).

[see hard copy for table]
Table 2. Examples of Benefit Categories. Service Flows, and Commonly Used Valuation Methods
Source: U.S. EPA (2000), p. 67.

4. Comparison of HRC to Other Superficially Similar Methodologies

As a further exploration of the misapplication of HRC, it is useful to examine superficially similar methodologies that EPA incorrectly and inappropriately cites as support for use of HRC to estimate benefits.

a. Habitat Equivalency Analysis

In Chapter A11 of the case study document, EPA argues that the HRC is “consistent with and related to lost resource valuation techniques such as habitat equivalency analysis (HEA)” (U.S. EPA 2002, p. A11-3). While HRC is superficially similar to the HEA method, there are important differences that make the analogy faulty, and, therefore, misleading.

The most important, and effectively dispositive, distinction between the two methodologies is the context in which they are used. HEA has been considered an appropriate methodology for estimating the replacement cost of a lost resource in penalty cases. In these cases, because of an applicable requirement, the U.S. is entitled to recover costs or collect compensatory damages under the National Marine Sanctuaries Act (“NMSA”) and related statutes. Further, the cost of acquiring an equivalent resource is appropriate, because the original resource cannot otherwise be restored or replaced. <FN 6> In these circumstances, NMSA provides that damages be compensated and that the National Oceanic and Atmospheric Administration undertake remedial action to preserve or replace the damaged site. <FN 7> Thus, HEA has been used as a means to estimate the costs of an activity that must be undertaken by law so that those costs can be reimbursed to the U.S. Government by the party that caused the damage necessitating the restoration.

HEA, therefore, has been used as a means of estimating costs, rather than benefits, as embodied in the NMSA and other statutes. HEA differs from HRC precisely for this reason. HRC, as it is presently used in EPA’s economic analysis for the 316(b) rulemaking, is intended to inform a decision that has not yet been made about what policy should be undertaken. In contrast, HEA plays no role in the overarching decision about whether restoration should occur - that decision is already embodied in the statute. HEA merely estimates how much cost should be collected in order to finance the implementation of that decision.

b. The Cost Replacement Method

The cost replacement method involves using cost to develop an upper bound on the potential benefits that could derive from undertaking a potential project. In this approach; the cost of an available alternative that achieves the same objectives as the potential project can be used to determine whether the project under, consideration should be undertaken. The key relationship is that the project has the same benefits as the known alternative—even if these benefits are not precisely known. If the alternative is less costly than the potential project, then the project—which has the same benefits - will have fewer net benefits than the alternative, and therefore would have a lower ranking in terms of economic efficiency. This approach can be used as a screening method to eliminate projects from consideration without the need to undertake a potentially benefit-cost analysis. <FN 8>

This method differs from RRC in that the known costs of an available alternative are interpreted as a maximum value—a limit on the cost that should be incurred to undertake any project that achieves the same benefits as the available alternative—rather than an estimate of the actual WTP for the project. Thus, the cost replacement method does not provide information about the actual benefits of undertaking a project, but only informs us as to whether the project is inferior to another alternative means of achieving the same objective.

c. Defensive-Expenditure and Averting-Behavior Methods

Another class of methods that appear superficially similar to HRC, but are distinct and better founded, includes defensive-expenditure and averting-behavior methods. These methods use empirical evidence about costs that have already been incurred to avoid environmental harm. Examples include expenditures on bottled water to avoid contaminated drinking water or expenditures on sunglasses to avoid UV radiation (including any additional time or other resources expended beyond the price. Abdalla et al. (1992) review the literature on this issue, which concludes that averting expenditures will define a lower bound to consumers' WTP. Thus, averting expenditures can legitimately be used to measure benefits, although Freeman (1993, pp. 359-360) notes that it may be difficult to measure benefits this way in practice, because averting behaviors may be motivated by other factors.

The key difference between the legitimate averting behavior approach and the inappropriate HRC method is that the former relies on activities that have already been undertaken by individuals. Thus, individuals' WTP is inherently revealed by their expenditures on certain goods or services. This is not the case for HRC. HRC uses highly speculative projects, which have not been undertaken privately or publicly, to estimate benefits.

5. Other Spurious Claims for HRC

EPA also argues that the HRC method has a broader scope than the methodologies EPA uses to develop benefits associated with commercial and recreational fishing:

The HRC method differs fundamentally from the commercial and recreational impact valuation method because the latter accounts for only those species and life stages that can be valued directly, such as those species targeted by recreational or commercial anglers (U.S. EPA 2002, p. A11-2).

This argument is fundamentally misleading for several reasons. First, to the extent that EPA is using an appropriate biological model to estimate the effects of I&E, that model should reflect the implications of losses of life stages other than age-one populations. In other words, the use values assigned to age-one populations, if properly developed, should reflect the entire life cycle of the population. Similarly, if the commercial and recreational impact valuation method does not value an appropriate range of species, it is because EPA has not used it appropriately. If any species have been omitted from the estimation procedure, that reflects a flaw in the application rather than in the methodology. Third, if there are ecological services provided by the habitat that cannot be properly valued in the commercial and recreational impact estimates, they presumably reflect nonuse values. But methods exist within the economics literature for measuring nonuse values. Finally, the quotation above suggests that the application of the HRC would account precisely for all species and life stages. But EPA's application of the HRC to Pilgrim exhibits a flaw that would cause benefits to be overestimated. Specifically, by selecting an amount of habitat corresponding to the maximum needed by the most habitat-intensive species, EPA guarantees that the habitat will produce species, and individuals beyond the number that have been impinged or entrained, i.e., effectively compelling substantial overcompensation by regulated entities

B. In Addition to Overwhelming Conceptual Problems, EPA's Impletnentation of the HRC Method Has Many Failings as a Cost-Estimation Method

EPA's use of the HRC method to measure benefits, at Pilgrim is fundamentally and conceptually flawed. However, even ignoring this, EPA's implementation of this approach has a number of shortcomings even as a cost-estimation tool, which we discuss below.

1. The "Preferred" Habitat Restoration Alternative

In order to estimate the HRC for the Pilgrim Station, EPA first convened a committee of officials from EPA, National Marine Fisheries Service, and various Massachusetts, protection agencies to discuss what habitat is "preferred" by each species affected by I&E. EPA then assigned a specific "preferred" habitat to each species and calculated posts based on this. Despite EPA's frequent assertion that it has made many cost-reducing assumptions, as discussed below, this methodology seems both vague and cost-inflating.

a. Lack of Selection Criteria

The Pilgrim Case Study provides no explanation of the criterion used to determine the habitat for each species except, that it is "preferred." Without an understanding of the steps undertaken to determine the "preferred" habitats, it is impossible to know whether EPA's selection process was valid. Absent specific criteria or a selection methodology, EPA's selection of the "preferred" habitats for the Pilgrim Case Study appears quite arbitrary.

b. Effects on Species from Habitats Other than the "Preferred"

In order to determine total costs, EPA summed the costs from each of the four "preferred" habitats. However, this takes no account of the effects on a species derived from habitats other than the "preferred." As an example, EPA's analysis assumed that the estimated. 242,981,200 square meters of tidal wetlands restoration would have no positive effect on any species except those for which tidal wetlands is the "preferred" habitat. It seems unlikely - if not impossible - that there would be no positive effects whatsoever on other species.
A more reasoned approach would be to select the habitats that are most cost-effective overall. However, it is impossible to know whether EPA selected those, habitats that would be most effective in reducing total cost. Even if EPA chose the habitat that is most cost effective for a given species, it may not have selected the option that would keep total cost the lowest. At the very least, EPA should have considered multiple alternatives for each species.

2. Using Current Species Abundance to Measure Increases in Fish Production

Due to data limitations, EPA could not calculate the effect of restoration on fish production in various habitats. As a result, EPA used a measure of the current species abundance in the relevant habitats as a proxy for fish production. Like the HRC method itself, this presents both a fundamental conceptual flaw and implementation-specific issues.

a. Confusing Stock as Flow: Abundance as a Proxy for Production

EPA's use of abundance as a measure of production in the Pilgrim case study is fundamentally flawed. Instead of measuring the potential growth in fish production (the "flow"), EPA measures the current "stock" of fish. As discussed in ENSR (2002), EPA's approach can lead to an overestimate of the amount of habitat, that would be needed to "compensate" for I&E losses at Pilgrim. Specifically, ENSR notes that tidal wetlands serve as spawning and nursery areas for fish that migrate to the larger marine ecosystem at adulthood. Thus, the production of these areas may well exceed the abundance of fish that would be measured there.

b. Correcting for Sampling Inefficiencies

In order to estimate current species abundances in various habitats, EPA used nets to collect specimens in each habitat and counted' the number of species caught, then calculated fish production per square meter. However, because many fish can sense the equipment, these catches do not accurately reflect the population of the region. The Case Study for Pilgrim uses a sampling inefficiency number to correct for this.

As an example, in the case of submerged aquatic vegetation habitats, EPA, used offer trawls to estimate fish species abundances. There, EPA assumed sampling efficiency to be approximately 40 to 60 percent. Ultimately, EPA adjusted the results by multiplying by a factor of 2.5 (i.e., using the 40 percent figure). The case study document provides no rationale for this. Indeed, the use of this number appears arbitrary. In addition, EPA uses a single sampling efficiency for all species and ages. Presumably, the probability of a fish getting caught varies by species and age. EPA's methodology appears not to take account of any of these differences.

3. Scaling Up Costs

EPA's Pilgrim analysis estimated habitat restoration costs on a per square meter basis and then scaled up to the project size. This methodology fails to take account of a common economic phenomenon - increasing returns to scale or declining average total cost. It is often very costly to produce the first unit of a good, but costs tend to decline, often significantly, as production is scaled up. In this case, larger-scale wetlands restorations would probably generate savings on both labor—because workers would become more efficient for longer projects—and materials, This suggests that EPA's estimates of the total restoration cost may be significantly overstated, particularly for the larger projects. <FN 9>

4. Requiring One-for-One Replacement

In implementing the HRC methodology, EPA estimated costs based on replacing each fish with a fish of the same species. In many cases, it might be far more cost effective to substitute species that are more affordable in relation to their value. For example, if species A were worth $5 and cost $20 to produce, and species B were worth $5 and cost $5 to produce, producing species B would be far more cost effective than producing species A. However, the EPA analysis of Pilgrim does not take this consideration into account. By ignoring this important consideration, EPA further overstates its valuation of consumers' willingness to pay.

IV. CONCLUSION

EPA's use of the HRC method to measure the benefits of alternative approaches to reducing I&E losses at CWIS is fatally flawed and appears to overstate the benefits of reducing I&E by at least 20 times their actual value.

A. Fundamental Flaws in the Use and Application of HRC

The use of HRC as a measure of benefits is inconsistent with the theoretical foundations of benefit estimation. It purports to replace long-established methods with a new method that is utterly lacking in foundation in the economics literature and in EPA's own guidance. Superficial similarities between the HRC method and other methods that have been used in other contexts are not sustained upon a closer evaluation.

Even if one were to set aside the lack of a theoretical basis for the use of HRC, EPA's implementation of this inappropriate method fails on several fronts:

-First, EPA's selection of each species' "preferred" habitat appears arbitrary and lacking in any methodological basis. This approach fails to consider the possibility that species could successfully thrive in alternative non-"preferred" habitats.

-Second, EPA's calculations of potential increases in fish production from habitat restoration appear to adjust for errors in an inaccurate and arbitrary way.

-Third, EPA fails to take account of potentially increasing returns to scale in habitat restoration.

-Finally, EPA does not consider the production of alternative species as a cost-saving measure.

As a result, EPA's implementation of the inappropriate HRC method overestimates the costs of habitat replacement.

B. Recommendations for Future Action

EPA's use of the HRC method is irreparably flawed. But this, does not mean that satisfactory methods for benefit estimation do not exist. Indeed, EPA's Case Study already presents benefits estimates developed with conventional methods of valuing commercial and recreational fisheries. Although we do not evaluate them here, in principle the other methods can provide estimates of the benefits of fish protection that will be consistent with the EPA guidelines and with the well-established economic literature on benefits estimation.

Indeed, this problem is an indication of the general flaw of confusing costs and benefits (WTP for reduced I&E of various species).

C. Summary

HRC is a deeply flawed methodology, lacking in foundation within economic theory or acceptable applied economic analysis. Moreover, its application to estimate the costs, of implementing habitat replacement to “compensate” for I&E at Pilgrim suffers from numerous flaws and arbitrary. assumptions that tend to bias the estimates upwards.

Footnotes

1 We do not consider whether the other benefit assessments in the Case Study are consistent with sound economic methodology.

2 Impingement is defined as the trapping of fish and other aquatic life on equipment at the entrance to CWIS. Entrainment occurs when aquatic organisms, eggs, and larvae are taken into the cooling system, passed through the, heat exchanger, and then discharged back into the source water body.

3 ENSR (2002) provides a technical assessment of EPA’s I&E estimates at Pilgrim. The ENSR comments identify a number of sources of error in EPA’s estimates of I&E at Pilgrim. These errors result in EPA overstating the true effect of I&E at Pilgrim on fish populations.

4 This same conclusion is reached in other economic reviews of EPA’s HRC methodology. See Stavins (2002) and Desvouges et al (2002).

5 Benefit-cost analysis also can identify which alternative provides the greatest net benefits (benefits minus costs).

6 See US. v. Fisher (1997) and US. v. Great Lakes Dredge & Dock Co. (1999, 2001).

7 As distinct from the Clean Water Act, NMSA specifically requires that damages (defined at 16 U.S.C. 1432(6), excerpted below) be reflected in terms of compensation for the lost resource and various costs likely to be incurred by the government:

(A) compensation for:

(i) the cost of replacing, restoring, or acquiring the equivalent of a sanctuary resource; and

(ii) the value of the lost use of a sanctuary resource pending its restoration or replacement or the acquisition of an equivalent sanctuary resource; or

(iii) the value of a sanctuary resource if the sanctuary resource cannot be restored or replaced or if the equivalent of such resource cannot be acquired;

(B) the cost of damage assessments under section 1443(b)(2) of this title;

(C) the reasonable cost of monitoring appropriate to the injured, restored, or replaced resources;

(D) the cost of curation and conservation of archeological, historical, and cultural sanctuary resources; and

(E) the cost of enforcement actions undertaken by the Secretary of Commerce in response to the destruction or loss of, or injury to, a sanctuary resource;

8 As an example, if the cost of supplying bottled water to a neighborhood is less expensive than cleaning up a water supply that is ‘valued solely for supplying drinking water, this method would suggest that remediation of the water supply should not be undertaken. (Note that this example abstracts from other values that may be associated with remediation of the water supply — that is not to say that such values should not be considered, but only to simplify the example.)

9 See ENSR (2002) for a related observation—that EPA overstates monitoring costs by assuming that they would scale linearly.

EPA Response

EPA agrees that the cost replacement method, the defensive expenditure, and averting behavior methods can be useful tools in the decision making process.

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see EPA's response to comment #316bEFR.005.035. Please also see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method.

Please also comment #316bEFR.306.105 for EPA's response to comments on the feasibility of doing original stated preference work.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

T.G. Ringger

On Behalf Of:

T.G. Ringger

Author ID Number:

316bEFR.030

Comment ID 316bEFR.030.001

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 9.0

Costs

Economic Considerations

It's pretty amazing how consistently regulators under-estimate the costs of their initiatives and over-estimate the benefits…just like business tends to over-estimate those same costs. But you guys really get the prize this time. How can you honestly say that the sum total, industry-wide compliance cost will be $182 million? With 420 affected utility facilities, you can not honestly believe the costs of studies, engineering, installation, O&M, energy losses and monitoring…for EVERYONE…will be this low. If I ran a power plant, I wish I could use your figures for my facility and give you what you say it would cost…then hold you to achieving the results you would demand from me…on that amount. Fat chance.

EPA Response

The comment provides an opinion unsupported by factual evidence. For the record, the Agency believes that the costs of compliance with the final rule will approach $389 million (year $2004 dollars). This is for all facilities within the scope of the rule, specifically 543 facilities.

Comment ID 316bEFR.030.002

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 13.0

More Stringent Requirements

Is this rule really more flexible?

EPA has loaded this regulation with so many provisions and angles to make compliance with the [alleged] flexible parts so difficult…then they throw in a threat of even worse regulation because more stringent requirements could be imposed based on water quality standard issues or T&E species or habitat protection laws. The agency suggests that these requirements could be imposed under other laws like the Wild & Scenic Rivers Act [When was the last time we had a power plant operating on a designated Wild &/or Scenic River?] This about getting everyone to throw up their hands and build cooling towers [which would be a wonderful addition to a Wild & Scenic River, no?]. Your rule should acknowledge not just the cost but also the other economic and environmental impacts of cooling towers. Especially in this time where water availability is looking like the major domestic water issue of the new century, I would not want to advocate widespread use of such a consumptive technology unless the site watershed could accommodate the impact.

EPA Response

EPA believes today's final rule maintains the desired flexibility for both the permitting authority and the permitted facility to determine the most cost-effective means to reduce impingement mortality and entrainment losses. EPA recognizes that there will always be considerations raised by obligations to other regulatory programs; nothing in today's rule forecloses the implementation of applicable state or tribal law, or other federal law.

EPA is not requiring the installation of cooling towers in today's rule. See response to comment 316bEFR.206.022 for a further discussion on why EPA is not requiring closed-cycle cooling in today's' rule.

EPA agrees with the commenter's concerns over cumulative stressors on a waterbody or within a watershed and believes that such stressors should be considered during the decision-making process. Because of the potentially numerous variables that interact in various waterbodies and watersheds, EPA believes the Director will be best suited to make a determination of an appropriate watershed boundary for his or her constituency.

Comment ID 316bEFR.030.003

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 13.0

More Stringent Requirements

EPA should acknowledge the other causes of stress to fish populations

Also, you suggest that there may need to be an explicit provision to establish criteria for when more stringent requirements could be imposed. Examples would be “if the rule by itself” would result in unacceptable effects on sport of commercial fisheries or would not adequately address multiple impacts or multiple stressors. This seems to be going too far and loading this one regulatory consideration with justifications or responsibilities to fix everything that is wrong with aquatic populations.

EPA Response

Please see response to comment 316bEFR.002.016 and 316bEFR.030.002.

Comment ID 316bEFR.030.004

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 6.0

Environmental Impacts

Commercial and sport fisheries are stressed by over fishing, invasive species and habitat degradation. SHUTTING DOWN power plants entirely will not change the status of many stressed populations. The agencies responsible for managing and regulating the fisheries resources need to do their part to bring back the numbers. To put this all on the power plants is folly. Don't acknowledge the environmentalists' assertion that power plants are the root of all evil. Use your scientific sense. You're supposed to be the experts in this area.

EPA Response

Many anthropogenic activities work concurrently on the environment. It is extremely difficult to separate the effects of any one factor. The intention of section 316(b) of the Clean Water Act is to minimize the adverse environmental impact of cooling water intake structures specifically and does not seek to eliminate stress on fisheries due to overfishing, invasive species, habitat degradation or any other factor. EPA did not receive any comments asserting that power plants are "the root of all evil". EPA has received data, however, which indicate that billions of fish are killed by cooling water intake structures yearly. This situation hinders improvements to the nation's fisheries made by fishery resource agencies. Today's final rule to minimize the effects on the fisheries from cooling water intake structures is just one step in aiding stressed fisheries. Fishery management plans, water quality improvements and habitat restoration will also help reduce stress, but those solutions are outside the scope of section 316(b) of the Clean Water Act.

Comment ID 316bEFR.030.005

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 10.01.02.02

Fish Population Modeling

This should be about SCIENCE, not politics – You are supposed to be the environmental experts

COMPENSATION is an accepted cornerstone of fisheries management science. The NMFS and every state natural resource agency could not get to first base in its resource planning without programs based on compensation…you know it and I know it. You guys are supposed to be the experts. The political pressures are over-riding your common sense and understanding of how nature works.

EPA Response

Contrary to the commenter's characterization, EPA's analysis is based on sound science. Reasons for not considering compensation are provided in EPA's response to Comment 316bEFR.025.015.

Comment ID 316bEFR.030.006

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment survival is real. You know it happens. You should make the standard one of mortality as you have proposed for impingement…or acknowledge that microscopic/planktonic biomass returned to the system does not reduce its ultimate function or purpose in the aquatic environment. To instead deflect the issue of entrainment survival by questioning utility data and the methods employed is stonewalling. To cast suspicions on the reliability of the studies and draw the line on how future studies might be approved is intimidating. I see no similar considerations applied to the studies EPA cites that support the proposed regulation.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. The return of "microscopic/planktonic biomass" to the ecosystem from a cooling water system does change its function. Eggs and larvae are available for consumption by juvenile and adult fish (organisms at a higher trophic level), whereas disintegrated eggs and larvae "biomass" are typically available for consumption by detritivores (organisms at a lower trophic level).

Comment ID 316bEFR.030.007

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 7.01.03

Option 3--Site-specific determination

As our environmental regulators, you are supposed to understand environmental science. You are not supposed to ignore everything that does not support the underlying objective – that's what the environmentalists do. You can't deny that a significant number of organisms survive entrainment. You can't deny the existence of compensatory actions in aquatic populations. You can't ignore all the information out there that does not fit your thesis. The people who want to close down Millstone say it has nearly destroyed the winter flounder population in the area yet, when it was down for nearly three years, there was no recovery. Over-fishing is the culprit. If you can't regulate that, find someone who can. The Connecticut River was studied exhaustively to determine if the Connecticut Yankee plant was harmful in any way. Even the state's regulators had to admit it was not. Now the plant is closed and there has been no rebound in any population…because there was no problem to begin with. This is not to absolve all power plants as benign. It is to encourage a site-specific approach that honestly assesses impacts and takes steps to control them when they are adverse.

EPA Response

EPA acknowledges that other factors such as overfishing or declining water quality may also affect fish populations. However, these factors do not diminish the increased potential for adverse environmental impact from cooling water intake structures in tidal rivers and estuaries.

For information on entrainment survival, please refer to the entrainment survival chapter in the Regional Studies document (DCN 6-0003 in OW-2002-0049, the docket for the final rule).

For information on compensation in fish populations, please refer to the response to comment 316bEFR.025.015.

Comment ID 316bEFR.030.008

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code OPP

General Statement of Opposition

Write a rule that gets to the heart of the issue…and it will work

This looks like another example of an agency trying to be comprehensive at the expense of actual success. The rule demonstrates scant awareness of the potential consequences. There seems to be little sense of how to craft a rule that will actually get us a net environmental benefit…after the true costs are objectively considered.

EPA Response

EPA disagrees. Please refer to the preamble and the supporting documents for more information.

Comment ID 316bEFR.030.009

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name T.G. Ringger

Organization T.G. Ringger

While some plants may need to re-do their demonstrations, I would suggest that the bigger problem is that some plants have not made these assessments at all. As one who has worked in a state that has taken it's charge seriously and made its power plants address its §316 impacts, I resent that certain regions have been allowed to slide all these years. I am certain that this lack of attention to this issue by some facilities has contributed towards the drive to litigate and develop new regulations. However, it is frustrating that a new round of requirements are being laid on every plant, many of which have spent millions to study their impacts, install improvements and demonstrate, to the satisfaction of their regulators, that their cooling water intakes do not have an adverse environment impact. These plants should not have to pay again because EPA has failed to address its regional consistency problems. Make the plants that have not done the work do the work.

EPA Response

EPA acknowledges that many States have made rigorous efforts to implement 316(b) programs. As such, EPA is allowing the use of alternative State programs to be used in lieu of today's final rule, as long as the State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94 (see § 125.90(c)). EPA disagrees, however, that certain facilities should be allowed exemptions from today's final rule based on historical assessments. Many 316(b) studies were conducted 20 years ago or more, and may not be reflective of current conditions. In order to ensure that today's final rule is both protective and consistently applied, all facilities will be required to submit a minimum of information to demonstrate whether additional protective technologies are required. In cases where facilities have recently studied their impacts and/ or installed protective technologies or implemented operational or restoration measures, all of those elements will be considered by the Director. Historical biological studies may also fulfill certain Comprehensive Demonstration Study requirements. See final rule preamble and EPA's response to comment 316bEFR.034.005. Finally, a facility that wishes to comply through Compliance Option 2, may demonstrate to the Director that the facility's existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards (see § 125.94(b)(2)). For all of the reasons described, EPA believes that States and facilities that have made efforts to implement 316(b) programs will most likely have reduced burden relative to those States and facilities that have not been proactive in already establishing such programs.

Comment ID 316bEFR.030.010

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code OPP

General Statement of Opposition

I believe that many plants are actually ready to do something. They are grateful that the rule does not mandate cooling towers. I suggest this rule can present a fine opportunity to make significant environmental improvements in a number of areas. However, the rule also tries to be all-inclusive and totally comprehensive and the result could easily be that much less is actually accomplished because you demanded too much…and focused on process and ancillary issues more than results…and minutiae more than the big picture…and the insignificant more than the important…and the politics more than the science.

EPA Response

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.030.011

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 21.04

Determination of compliance

The proposed rule lacks critical information on implementation and compliance

Compliance with the requirements is another issue that needs clarification.

What if a plant does not meet the standard after two years? Is it a violation? Will the plant have to add more technologies or mitigation or will it be required to modify/refine the approved approach in place.

[Even if some regulators don't want to make many decisions and want some clear-cut guidance that shows them the way, it won't be like that. They are going to have to work with utilities and be a party to negotiating some acceptable approach. However, after that, both parties are going to be involved to see IF it works. And, if it doesn't, both parties are going to have to decide why and what needs to be done next…and NONE of that is covered in this proposed regulation.] – This is NOT how to make it easier on understaffed, resource-strapped agencies.

EPA Response

The permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. EPA disagrees that regulators and facilities will not have to work together. On the contrary, EPA has designed the rule to facilitate a great deal of feedback and consultation among State and local agencies and the regulated community. For details on this please refer to EPA's response to comment 316bEFR.034.066.

Comment ID 316bEFR.030.012

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

EPA suggests that a "comprehensive reevaluation" of the 316(b) demonstration might be necessary every time the NPDES permit is renewed [CITE]

With all due respect, this goes beyond burdensome. It is ridiculous and seems like one of those extreme positions you throw in just to negotiate away and settle on something more reasonable [and then complain about how much you are giving away]. Here, you have a chance to make significant environmental improvements in intake impacts and you put in things like this. It can scare off a community that is largely ready to do something. It makes it seem like the real intent is to keep revisiting the issue and ratchet the impact down to zero. Biological populations are not like toxics or carcinogens where the [also mistaken] view is "any quantity, no matter how small, must be bad and must be eliminated". Absent a definition of 'adverse environmental impact', this provision suggests there are still some interest in the 'one-dead-fish' viewpoint.

Please don't go overboard. Concentrate on the plants that need to assess their impacts, get them to make the necessary changes, ensure they comply and declare victory.

EPA Response

In today's final rule, EPA has provided facilities with the opportunity to reduce their permit application requirements, so that they may avoid conducting a thorough Comprehensive Demonstration Study following the first permit term. Please refer to EPA's response to comment 316bEFR.034.005 for details on how facilities may request reduced submittal requirements following the first permit term. Regarding the definition of adverse environmental impact, EPA has not chosen to not define this term for the purpose of today's final rule. A facility's capacity to cause adverse environmental impact is dependent upon a multitude of site-specific factors, including the structural and operational characteristics of the facility's intake, the volume and velocity of the intake, and the physical, biological and chemical conditions of the waterbody itself. Because each facility will have unique attributes, EPA chose to not establish a "one-size-fits-all" definition of adverse environmental impact. Instead, EPA has left the determination of a facility's impact to the individual permitting Directors, who know the facilities in their jurisdiction and will be best able to make these decisions.

Comment ID 316bEFR.030.013

Author Name T.G. Ringger
Organization T.G. Ringger

Subject Matter Code 21.09
Permit applications/implementation schedule

Timing – You ask a simple question @ p. 17173 – “When does the proposed rule become effective?” Why do I feel like I need a lawyer to make sure the answer is clear? Proposed §125.92 [in too many words] says one must comply when the new NPDES permit is issued. This would clarify and support a compliance schedule that BEGINS with the new permit instead of having applicants, absent any final regulation or guidance, try to put together the Comprehensive Demonstration Study and all the other components that are needed for the permit renewal application. If you want something that WORKS, recognize the need for final guidance and time to do what will be required. Make the compliance schedule a permit condition and give the plants, the states and EPA staff the time to do it right.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. See also the preamble to the final rule for a discussion of how compliance with the rule will be determined.

Comment ID 316bEFR.030.014

Author Name T.G. Ringger
Organization T.G. Ringger

Subject Matter Code 21.04
Determination of compliance

Re: 'Calculation Baseline' – The definition @ §125.93 seems to be another piece of vague subterfuge. If you mean that impingement is based on the presence of a 3/8" traveling screen, why not just say it? With each element in this massive requirement that is unclear, you further defeat one of your primary objectives – to reduce the burden on the implementing agencies and permit writers. They need clarity and instead are forced to take the time to address matters that should be clear at the federal level.

EPA Response

EPA has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013 and the preamble to the final rule.

Comment ID 316bEFR.030.015

Author Name T.G. Ringger

Organization T.G. Ringger

Subject Matter Code 1.01

Comment period

Again, I appreciate the effort EPA has put into this rulemaking and the attempt to make it more flexible and cost-effective. I also appreciate to opportunity to express my opinions in the public comment process. However, I respectfully urge the Agency to craft a final rule that incorporates more reason, judgment and scientific reality.

EPA Response

EPA believes that today's final rule is both reasonable and scientifically sound.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Terrence O'Brien

On Behalf Of:

California Energy Commission

Author ID Number:

316bEFR.031

Comment ID 316bEFR.031.001

Author Name Terrence O'Brien

Organization California Energy Commission

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

We have found, as a result of this recent experience, that the historical cooling water intake effects information on most existing power plants in California is not adequate to assess current facility operational impacts. One year of current impingement and entrainment data has typically been required to provide a basis to establish mitigation requirements.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Chuck Wemple

On Behalf Of:

Reliant Resources Inc.

Author ID Number:

316bEFR.032

Notes

EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.032.001

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 2.04

EPA's legal authority to:

Reliant supports, and incorporates by reference, the comments prepared by Utility Water Act Group, and Edison Electric Institute. Reliant acknowledges the challenges to EPA in drafting the proposed rule, and while we disagree that the overall structure of the proposal meets congressional intent in implementation of the Clean Water Act (CWA) […]

EPA Response

UWAG comments are addressed throughout the comment response database/ document. See those responses. See, generally, the preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.032.002

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 7.01.03

Option 3--Site-specific determination

[W]e applaud EPA's general recognition that site-specific evaluation, flexibility on alternatives, and cost tests are essential components of the final rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.032.003

Subject Matter Code 7.02

Performance standards

Author Name Chuck Wemple

Organization Reliant Resources Inc.

A Flexible Site-Specific Approach is Essential

While Reliant recognizes that a generalized approach might reduce the potential burden on State agencies in implementing the proposed rule, Reliant believes that uniformly applying specific national performance standards to highly variable and complex site settings is technically flawed and runs the risk of unfairly penalizing facilities that have operated in compliance with the CWA 316(b) for decades. The collective experience of the industry, states, and EPA regions is that adverse environmental impact and the successful deployment of cooling water intake structure (CWIS) technologies is highly site specific.

EPA Response

Today's rule provides the desired flexibility for facilities to determine the most cost-effective combination of design and construction technologies, operational measures, or restoration measures best suited to each individual facility.

Comment ID 316bEFR.032.004

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

Furthermore, despite decades of operation, the presence of adverse environmental impact has not been documented at the vast majority of sites, EPA has not demonstrated the need to add extensive new requirements under §316(b).

EPA Response

Please see the response to comment 316bEFR.029.023.

Comment ID 316bEFR.032.005

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 7.02

Performance standards

Reliant requests that EPA abandon the proposed national performance based standards, i.e. specific reduction standards, and implement a flexible site-specific approach which considers local ecological settings and living resource population dynamics when defining adverse environmental impact and identifying best technology available options. To truly gage adverse environmental impact (AEI), EPA should ensure that the permittees and implementing entities have the flexibility to define and evaluate it at the community and population level as they have done as part of resource management programs for 30 or more years.

EPA Response

Please see response to comment 316bEFR.311.002 and the preamble to today's rule.

Comment ID 316bEFR.032.006

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 10.01.02.02

Fish Population Modeling

Consistent with the findings of the Electric Power Research Institute, Reliant believes that EPA's equating sensitivity to density in developing national performance standards has essentially no basis in biological science and is therefore substantially flawed. This flaw is of particular significance within estuarine systems, where salinity fluctuations and high pre-adult mortality rates have driven the evolution of sophisticated density dependent survival mechanisms such as reproductive compensation (producing enormous numbers of eggs, larvae, and juveniles to overcome naturally high mortality rates). Entrainment of egg and larval stage organisms and impingement of juveniles in these rich and productive systems are unlikely to have an adverse environmental impact to local communities and populations. If EPA is determined to base performance goals on sensitivity, EPA should base the goals on species diversity and community dynamics rather than population density.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation. Population- and community-level assessment was not a goal of EPA's analysis.

Comment ID 316bEFR.032.007

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 18.0

Discussion of Site-Specific Approaches

The case for a flexible site-specific approach can be illustrated by example of Galveston Bay, a Gulf of Mexico estuary located along the upper Texas Coast. It should be noted that the unique biological and physical nature of Gulf of Mexico estuaries has not been adequately considered under EPA's proposed rule. EPA's only example from the Gulf of Mexico is a facility located in Tampa Bay, Florida, an area unaffected by the extensive riverine silt and detrital plumes that feed the estuaries of the upper and western Gulf. Estuaries in Louisiana and along the upper Texas coast, including Galveston Bay, experience very high suspended-sediment loads and have extremely high levels of particular organic matter that form the basis of a complex and extremely productive detrital food web.

The very high aquatic productivity levels seen in the Galveston Bay estuary result from long growing seasons, an abundant food supply, freshwater inflows, and prolific intertidal marsh and reef habitats. This intense productivity, although seasonally and diurnally variable, is seen virtually year-round with a myriad of phytoplankton and zooplankton assemblages, abundant nekton species, as well as invertebrate and mollusk species.

Although impingement and entrainment of organisms in this setting is unavoidable, previous 316(b) studies conducted at the five Reliant facilities located along the tidal rivers and side bays of the Galveston Bay estuary indicated that CWIS impingement was insignificant relative to other anthropogenic sources of potential AEI. (HL&P, 1979 and 1980). However, under the proposed rule and despite nearly three decades of operating in compliance with the CWA, the above-referenced facilities would be assumed to be causing adverse environmental impact and be subject to national technology based performance standards for impingement and entrainment, and CWIS best technology available (BTA) retrofits.

EPA Response

EPA disagrees that some waterbodies are under-represented. Please refer to the response to comment 316bEFR.333.002 for more information.

With respect to the use of previous studies, a goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities. Today's rule also provides for site-specific determinations based on cost-cost and cost-benefit considerations.

Comment ID 316bEFR.032.008

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 7.03.01

Sample facilities/technologies

EPA's proposed rule for applying section 316(b) of the Clean Water Act to existing facilities asserts that certain intake technologies, including wedgewire screens, fine mesh screens, and aquatic fabric filter barriers, represent BTA for reducing impingement mortality and entrainment. With over 30 years of operating and maintaining CWIS in Galveston Bay, Reliant believes that the very high aquatic productivity, heavy sediment loading in the water column, intense biofouling communities (i.e., oysters, barnacles, mussels, and colonial hydroids), shallow waters, and dead-end intake canals, will clearly limit the application of the proposed BTA in this system. The problems posed by this example, specifically a lack of demonstrated AEI and unworkable BTA alternatives, further support our earlier comments regarding the need for a flexible site-specific approach and reinforce UWAG's proposal for a simpler alternative for facilities that have already proven they are not harming the aquatic community.

EPA Response

EPA recognizes the variability between waterbody conditions, species densities, and intake configurations and has adopted performance ranges in today's rule. EPA does not state, nor does it expect, that any given design and construction technology will necessarily achieve identical performance rates at different facilities.

Today's rule allows for a facility to demonstrate to the Director that its current design and construction technologies, operational measures, and/or restoration measures are already meeting the performance standards, thereby not triggering the requirement for additional or alternative measures.

Comment ID 316bEFR.032.009

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Cooling Tower Retrofits Cannot Be Required To Meet BTA

If mandated in the final rule, cooling tower retrofits and operating measures would result in increased fuel usage, increased air emissions, energy penalties associated with reduced efficiency, and retrofit construction downtime, and potential decommissioning of existing facilities that are currently in compliance with the provisions of the Clean Water Act. As indicated by EPA, facilities located on oceans, estuaries, and tidal rivers would incur huge capital and operating and maintenance costs for conversions of their cooling water systems. Furthermore, since impacted facilities would be concentrated in coastal regions, there would be significant unanalyzed short-term energy impacts and potential supply constraints in these areas. The short and long-term national impacts associated with mandated cooling tower retrofits would be staggering and totally unsupported by the rulemaking record.

EPA Response

EPA thanks the commenter for these comments. EPA has decided that it would not base the requirements of the final rule on cooling tower technology.

Comment ID 316bEFR.032.010

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Reliant supports EPA's decision not to base BTA for any Phase II existing facilities on cooling tower retrofits. To remain within the intended scope of §316(b), proposed BTA alternatives must be limited to the plant intake structures. Cooling towers are used to dissipate heat produced during the generation process and are not intake structures. As a result, cooling towers are beyond the scope of §316(b).

EPA Response

EPA disagrees that forming the basis of a 316(b) rule on cooling towers would be beyond the scope of the intention of the Clean Water Act. As a matter of fact, there exists a regulation for new facilities that contradicts the commenter's assertion. Simply stated, cooling towers utilize cooling water and affect the design of the cooling water intake structure. They are within the scope of Section 316(b).

Regardless of this issue, the Agency does not base the requirements of the final rule on cooling towers and the commenter's point is not directly applicable to the final rule.

Comment ID 316bEFR.032.011

Author Name Chuck Wemple
Organization Reliant Resources Inc.

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Habitat Enhancement/Restoration Should Be A Flexible and Voluntary Alternative

Reliant applauds EPA's proposal to include voluntary habitat enhancement and restoration as an alternative approach to addressing potential adverse environmental impacts associated with impingement and entrainment. The habitat enhancement/restoration approach to achieving compliance compliments the concept of assessing potential adverse environmental impacts at the community level.

Habitat restoration options include benefits that extend far beyond fishery population dynamics. In addition to extensive wildlife benefits discussed by UWAG, non-fisheries benefits include, but are not limited to, water quality improvements, flood control, erosion control, increased recreational and educational opportunities, and improved economic values that accompany all of these benefits. These added-value benefits should be recognized in the crediting process.

Once preserved, habitat will be unavailable for development and subsequently will have ensured productivity essentially in perpetuity - well beyond the operating life cycle of the generating facility. The long-term benefits of preserving existing productive habitats should also be considered during the crediting process.

Site-specific restoration approaches are essential because ecological benefits can have a much greater overall impact than implementation of BTA for impingement and entrainment compensation. Eligible site-specific restoration approaches should include Estuary Program Prioritized Conservation Plans, as well as other State or local habitat management initiatives.

As stated earlier, flexibility and the consideration of site-specific conditions are critical to achieving compliance under the proposed rule. To that end, Reliant believes that EPA should consider working with State and Federal agencies, industries, and the scientific community to develop a reasonable and consistent approach to determining spatial scale, units, monitoring requirements, and values of restoration projects.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316RFR.060.022.

The goal of restoration measures in the final rule is not to reduce impingement mortality and entrainment of individual fish, but to minimize, or help to minimize, through production and increase of fish and shellfish in the impacted waterbody or watershed, the adverse environmental impacts that derive from impingement and entrainment of individual aquatic organisms.

The commenter cites a number of benefits (such as habitat preservation in perpetuity) potentially associated with successful restoration measure implementation. EPA notes that the ecological benefits required from restoration measures are described in section 125.94 of the final rule. Compliance with the rule will be determined based on whether the ecological benefits have been realized, i.e., whether fish, shellfish, and community structure and function in the relevant waterbody or watershed is maintained at a level that is substantially similar to the level you would achieve through compliance with the applicable impingement mortality and/or entrainment requirements. While there could be other types of benefits from restoration measures, those benefits would not be relevant to compliance determinations.

For discussion of the use of existing restoration measures, see EPA's response to comment 316bEFR.034.032.

Because restoration measures are to be used specifically in place of or as a supplement to installing design and construction technologies and/or operational measures that reduce impingement mortality and entrainment under section 316(b), facilities may not claim credit for a restoration measure's fish and shellfish production when that production is already required under other applicable law (e.g., wetland creation to satisfy CWA 404 requirements).

EPA believes the restoration requirements in the final rule provide state permitting agencies and permit applicants with a significant amount of flexibility. In the final rule, EPA has given some specific requirements for determining spatial scale, monitoring, and other aspects of restoration measures, but has left flexibility for permitting authorities to determine additional requirements on a statewide or case-by-case basis.

Comment ID 316bEFR.032.012

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 10.1

General: cost tests

The Cost-Cost and Cost-Benefit Tests Are Essential to the Rule

Reliant supports UWAG's belief that, without an alternative for excessive cost situations, the proposed rule would be insufficient as a matter of law. Reliant believes that both tests must be flexible, site-specific, and are necessary alternatives to the nationwide performance standards.

EPA Response

The final rule includes cost-cost and cost-benefit tests that are flexible, site-specific alternatives to the national performance requirements.

Comment ID 316bEFR.032.013

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Exemptions Based on Operational Thresholds Must Provide Flexibility

EPA proposals to include exemptions from portions of the proposed rule based on operational thresholds are sound. Our comments regarding freshwater river withdrawal and generating capacity utilization thresholds are presented below.

Reliant proposes that EPA adopt a flexible approach to determining the fresh water river withdrawal threshold for triggering the requirement for entrainment controls. Recognizing that the alternative approaches, other than the 5% of median annual flow, contained within the proposed rule could require detailed studies and monitoring, Reliant suggests that the 5% of median annual flow be used as a default value. Providing a suite of options and a default value would allow facilities greater flexibility in selecting the flow measurement method that best fits their needs.

Reliant's facilities operate across a broad range of capacity factors to meet base load and peak supply demands in a wide variety of markets. Reliant is concerned that the proposed 15% Generating Capacity Utilization Rate Threshold calculated over "several years" does not provide sufficient flexibility for peaking plants. To that end, Reliant proposes that the utilization threshold be set at 20%, corresponding to the low end of the entrainment goal and allowing greater flexibility for peaking plants. In addition, Reliant suggests that "several years" be defined as the number of years covered by the permit, rather than a subjective, un-quantified number between one and many.

EPA Response

The Agency invited comment on the following alternative withdrawal thresholds for triggering the requirement for entrainment controls: (1) 5% of the mean flow measured during the spawning season (to be determined by the average of flows during the spawning season, but remaining applicable to non-spawning time periods); (2) 10% or 15% of the mean annual or spawning season flow; (3) 25% of the 7Q10; and (4) a species-specific flow threshold that would use minimum flow requirements of a representative species to determine allowable withdrawals from the waterbody.

The commenter states that it "suggests that the 5 % median annual flow be used as a default value." The commenter does not give reason or evidence as to why the "median" should be used, as opposed to the "mean." The Agency continues to consider the "mean" annual flow definition to be the most reasonable decision, and point out that the "mean" will be more flexible to facilities than "median" in typical cases. The commenter suggests that EPA provide a "suite" of options and a default value, but does not suggest or cite any of the "options" he refers to. In addition, the commenter states that the other alternatives suggested by the Agency (as noted above) require "detailed studies and monitoring." The Agency interprets this to mean that the alternative approaches were not favorable to the commenter. As such, the Agency continues to consider the approach adopted for the proposal, NODA, and final rule of 5% of mean annual flow to be the best suited for this national rule.

EPA disagrees that the capacity utilization rate cutoff be raised to 20 %. The commenter does not provide a rationale for why plants require more flexibility than the 15 % already provides. However, the Agency agrees that a less subjective measure than "several years" be defined. As such, the Agency has provided clear requirements for the calculation of the capacity utilization rate. See the preamble to the final rule.

Comment ID 316bEFR.032.014

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 8.05

Proposed standards for oceans

States Should Have Discretion Not to Apply Entrainment Standards to Ocean Intakes

The proposal to subject all ocean intakes to entrainment standards is scientifically unjustified. Ocean habitats, are disproportionally inhabited by the adult stages of fishes and invertebrates, and do not sustain the intense populations of eggs, larvae and juveniles life stages so common to the coastal estuary. For these reasons, it appears unsupported to require facilities with ocean CWISs located offshore and away from the mouths of estuaries to meet the proposed performance standards for entrainment. The absence of organisms near ocean intakes in life stages susceptible to entrainment and the costs associated with technology installation and maintenance clearly do not justify the implementation of proposed performance standards for entrainment at ocean CWISs.

EPA Response

EPA disagrees. Facilities located on oceans (and having a capacity utilization rate greater than 15%) are subject to additional requirements, as these waterbodies are similar to estuaries in that they have areas of high productivity and sensitive habitat.

EPA continues to believe that oceans are a unique system that deserve additional protection from the impact of cooling water intake structures. Oceans are large waterbodies with a variety of habitats. While EPA recognizes that not all habitats in the oceans may be as sensitive as others, there are many areas that are similar to an estuary in terms of productivity, and therefore of similar sensitivity. EPA also notes that the more sensitive areas are often located in the nearshore areas of larger waterbodies, which is also a common location for cooling water intake structures. Facilities may also be located in close proximity to migratory pathways.

Comment ID 316bEFR.032.015

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 3.07

Special definitions

Cooling Reservoirs Represent Closed Cycle Cooling

Cooling reservoirs function as closed cycle recirculating systems, and in many cases have been constructed specifically to support the operation of generating facilities. The reservoirs are often stocked for recreational fishing and have maintained (or more correctly, introduced) a highly valued perennial habitat where historically there may have been an intermittent streambed. These are artificial systems and it makes little practical sense to consider such reservoirs in the same manner as the other waterbodies in EPA's proposal. In man-made reservoirs, the hypothetical shoreline intake won't exist independent of the reservoir. In a practical sense the reservoir is an extension of the plant intake that was installed for multiple uses including cooling and water storage/reuse. Reliant requests that EPA define cooling reservoirs as closed cycle cooling.

EPA Response

EPA agrees that in some cases, cooling reservoirs are part of a closed-cycle cooling system, though the final determination will be left to the Director. The final rule defines "cooling water intake structure" to mean the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the U.S. The cooling water intake structure extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps. EPA has not defined the phrase an "associated constructed waterway." Whether or not a waterway is considered part of the cooling water intake structure can vary depending on the location, type of facility, and other factors. EPA has left this determination up to the permit writer, who will evaluate each situation on a case-by-case basis.

In general, how the definition of "cooling water intake structure" is applied to a particular facility should be based on consultation between the permittee and the permitting authority. In determining whether an irrigation ditch or other water conveyance system is part of the cooling water intake structure, the permitting authority is to consider whether the structure or constructed water way is used to withdraw water from the source waterbody (which must be a "water of the U.S.") into the cooling water.

This final rule does not define the term "cooling ponds" (or cooling lakes) or change the status of cooling ponds under the Clean Water Act. The final rule recognizes that cooling lakes can be part of a closed-cycle recirculating system, which EPA agrees conserves water resources. However, in certain circumstances cooling ponds (or cooling lakes) can be "waters of the U.S." See 40 CFR 122.2. This determination is made on a case-by-case basis. The applicability of this rule to any new facility, and in particular the cooling lake at that new facility, must be determined by the permitting authority.

EPA has not categorically excluded facilities that withdraw water from cooling ponds from the final rule. In certain circumstances, cooling ponds can be "waters of the U.S." (See 40 CFR 122.2). Given that the Clean Water Act applies to and seeks to protect "waters of the U.S.," a categorical exclusion is not appropriate. The determination of whether a cooling pond is a "water of the U.S." is made on a case-by-case basis by the permitting authority through application of 40 CFR 122.2.

Comment ID 316bEFR.032.016

Author Name Chuck Wemple

Organization Reliant Resources Inc.

Subject Matter Code 1.01

Comment period

Reliant appreciates the opportunity to provide EPA with our comments on this important rule.

EPA Response

EPA appreciates Reliant's comments.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Keith Dimoff

On Behalf Of:

Ohio Environmental Council

Author ID Number:

316bEFR.033

Comment ID 316bEFR.033.001

Subject Matter Code OPP
General Statement of Opposition

Author Name Keith Dimoff
Organization Ohio Environmental Council

The Ohio Environmental Council (OEC) is concerned with the proposed regulations that would establish requirements for cooling water intake structures at existing power plants (Phase II existing facilities).

EPA Response

No response is required.

Comment ID 316bEFR.033.002

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Existing power plants, even the largest water users, are not required under the proposed regulations to install proven technology that will greatly reduce the kill rates for these intake structures. The OEC disagrees with the proposed language and supports the requirement that was in the USEPA's original draft regulation--to require the largest plants to install "closed-cycle cooling technology". This technology would be of great benefit to aquatic life, yet this requirement has been dropped, reportedly at the demand of the Office of Management and Budget. The OEC is requesting that closed-cycle cooling technology be a required "best technology" for all existing plants.

EPA Response

The Agency refers the commenter to the preamble to the final rule, which explains the reasons the Agency did not adopt closed-cycle cooling for any existing plants. The Agency disagrees that the rule will not greatly reduce entrainment mortality, especially for the largest water users. The Agency estimates that entrainment rates will decrease substantially upon implementation of this rule. The fact that the requirements are not based on closed-cycle cooling is not paramount for entrainment reduction. The Agency has taken a more practical approach to the requirements of the final rule than requiring closed-cycle technology retrofits in situations that may not warrant or allow their adoption. See response to comment 316b.EFR.404.058.

Comment ID 316bEFR.033.003

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Power plant companies will be allowed, under the proposed regulations, to say that special economic circumstances should let them off the hook for meeting the minimum technology or performance standards. The OEC disagrees with the proposed regulation. We believe that these facilities have already had the benefit of decades of inaction on their first round of NPDES permits, many of which were inadequate, and that no further delays or “special economic circumstances” should be allowed. If this weakened provision remains in the final regulations in some form, we believe it should be written so that the corporation must provide a significant burden of proof, including engineering and cost studies by independent third parties. The applicant should be required to provide substantial funding to the USEPA which the USEPA can use to hire an independent assessment of the cooling water intake structure.

EPA Response

EPA disagrees. The final rule does not let facilities that seek a site-specific determination of BTA "off the hook," but includes the site-specific alternatives to ensure that the costs of the rule remain economically practicable and that there is a reasonable relationship between the costs of cooling water intake structure technology and the benefits associated with its use. See section VII of the preamble to the final rule. Under the final rule, cost and benefit studies, as well as a technology plan and a monitoring plan are required under these compliance alternatives. In addition, the Director must review these documents, so independent review is not necessary. EPA has not required the applicant to fund an independent review, again, because the Director will review these documents. The Director will use all available resources, including in-house expertise and possibly other experts and resources as appropriate, in assessing this information.

Comment ID 316bEFR.033.004

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Power plants, under the proposed regulations, would be able to avoid the technology standard by pleading special economic circumstances or by claiming that the local ecosystem does not merit protection. The OEC disagrees with this provision for site specific determinations, believing that they would greatly undervalue aquatic ecosystems.

EPA Response

See response to 316bEFR.033.003. Facilities that seek a site-specific determination of BTA are not avoiding the technology standard; rather, they are to required to demonstrate that they qualify for a site-specific determination of best technology available. In addition, the rule requires a facility seeking a site-specific determination of BTA based on significantly greater costs compared to benefits to develop a benefits valuation study that fully values both impacts and the benefits of compliance. (See § 125.95).

Comment ID 316bEFR.033.005

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Additionally, restoration measures should not be used in lieu of technology measures to meet performance standards. These measures remain vague and unproven, and are rarely intended the replace the number or variety of aquatic life killed during the water intake process.

EPA Response

EPA disagrees somewhat with the commenter's statement that restoration measures should not be used in lieu of technology measures to meet performance standards. EPA is instead providing permit applicants and permitting authorities with significant flexibility in how they comply with the requirements of the final rule. The requirements for restoration measures described in the final rule, including those under sections 125.94 and 125.95, allow facilities to use restoration measures wholly in lieu of design and control technologies and operational measures.

However, under the final rule, permit applicants must demonstrate to the permitting authority that they have considered the use of design and control technologies and operational measures. EPA requires this demonstration to ensure that permit applicants and permitting authorities examine the variety of compliance alternatives available to them. Also, EPA is concerned about the uncertainties associated with restoration measures (see EPA's response to comment 316bEFR.206.055). EPA agrees with the commenter that there are uncertainties associated with the use of restoration measures.

EPA also agrees with the commenter that for some facilities, it will be difficult to create restoration measures that address all of the types and number of fish and shellfish impacted by a cooling water intake structure.

Comment ID 316bEFR.033.006

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 21.01

Submittal of required information

The proposed regulations do not require that engineering or scientific studies need to be done at the maximum withdrawal capacity of the power plant. Rather, we believe that this should be required in order to ensure that the information on environmental and ecosystem impacts is adequate at any possible level of withdrawal. Such a requirement will avoid the problem of a power plant being permitted to withdraw more water than studies have shown that the ecosystem will support. These studies should also take into consideration the physical nature of the intake and outfall.

EPA Response

EPA disagrees that studies should be conducted exclusively at the maximum withdrawal capacity of the facility; in general, EPA believes that studies should reflect typical conditions and take into consideration other variables such as seasonal fluctuations and periods when additional capacity may be necessary. However, the Director has the final determination on specific study parameters.

Comment ID 316bEFR.033.007

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Keith Dimoff

Organization Ohio Environmental Council

The proposed regulations do not contain strict enforcement and renewal provisions. The OEC believes that these permits should be required to be renewed annually and that the power plant corporation should not be eligible to receive a renewal if they have failed to comply with their permit.

EPA Response

Permits have a five year term and applications will be reviewed by the Director and new conditions will be provided, as necessary, in a renewed permit. If a facility is not complying with its permit conditions, the facility is subject to enforcement action.

Comment ID 316bEFR.033.008

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 21.09

Permit applications/implementation schedule

Finally, the application, the permit and all supporting documentation need to be public and should be provided to all local governments and to any citizens that request them in a timely manner.

The OEC is basing our comments on our experience with cooling intake structures in Ohio. We believe that the NPDES permits in place today are not adequately protective for several reasons, including:

-Changes in the physical structures have taken place without any study of the effect of the changes on the kill rates for aquatic life.
-Power plants have withdrawn quantities of water well beyond the quantities that were used in the original applications and associated studies.
-The quantities of water being withdrawn are often a significant percentage of the source waterbody's flow, yet no modeling or biosurveys have been conducted to determine if the reduced flow is harming aquatic life.

Two examples of plants in Ohio that exhibit these problems are the Edison Bay Shore power plant in Oregon, Ohio, and several of the Dayton Power and Light facilities.

EPA Response

NPDES permits and supporting administrative records are public documents and copies may be requested directly from the State or EPA Regional office. However, portions of the record that are identified as confidential business information will not be released.

Through provisions of today's final rule, EPA hopes to curtail the actions that the commenter has cited above.

Comment ID 316bEFR.033.009

Author Name Keith Dimoff

Organization Ohio Environmental Council

Subject Matter Code 1.01

Comment period

Thank you for the opportunity to submit these comments. Please contact us if you have any questions. We are hopeful that you will revise the final regulations so that each of our concerns is addressed. You are facing the opportunity to fulfill the promise of the Clean Water Act to protect and restore the biological, chemical and physical integrity of our nation's waters, as well as to carry out the will of Congress to "minimize adverse environmental impacts" from power plant cooling water intake structures. We hope that you take advantage of this critical opportunity.

EPA Response

EPA believes that today's final rule reflects the best technology available for minimizing adverse environmental impacts associated with cooling water intake structures.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Michael E. Wilder

On Behalf Of:

Georgia Power

Author ID Number:

316bEFR.034

Comment ID 316bEFR.034.001

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code SUP
General statement of support

Georgia Power supports several aspects of the proposed rule and applauds EPA's efforts on certain issues such as restoration and the possible use of market-based approaches[.]

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.034.002

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code OPP

General Statement of Opposition

[T]here are aspects of the proposed rule and particular positions taken by EPA in the context of the proposed rule that are arbitrary and unsupported by the record. In certain other instances, EPA is going beyond the scope of its delegated authority. In addition, Georgia Power believes various provisions of the proposed rule require clarification, and proposes ways to improve the proposed rule.

EPA Response

EPA disagrees. The final rule is well-supported by the record and EPA is within its authority. Please refer to the preamble for more information on EPA's authority.

No response is required, as each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.034.003

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Section 316(b) requires that the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). Through this rulemaking process, EPA is attempting to implement this statutory provision with technology-based performance requirements. Under the proposed rule, the facility's owner or operator gets to choose the technology (or combination of technologies and other measures) the owner/operator believes will meet the performance standards. Georgia Power supports leaving it up to the facility owner or operator to determine what technology is most appropriate for its facility and believes the Clean Water Act intends for the facility owner or operator to make that decision.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.034.004

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.02

Performance standards

The proposed rule establishes performance standards for each type of waterbody in which a cooling water intake structure may be located. The proposed rule addresses oceans, estuaries, tidal rivers, freshwater rivers and streams, lakes, and reservoirs. Each standard calls for owners or operators to minimize their impacts to aquatic life by reducing, by a certain percentage, the number of organisms entrained or killed by impingement. Georgia Power believes that to the extent EPA continues to choose this regulatory approach, these standards and their implementation can be vastly improved over EPA's current approach.

EPA Response

Please see the preamble to the final rule for a discussion of the performance standards and their applicability in today's final rule.

Comment ID 316bEFR.034.005

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 21.01

Submittal of required information

To begin the process of complying with the new performance standards, each facility submitting a permit renewal application will need to include a possibly overwhelming amount of information in its application, including: waterbody characterization data for the waterbody in the vicinity of the cooling water intake structure and data characterizing the design and operation of the structure itself. Proposed 40 CFR § 122.21(r)(2)-(3), (5). Each facility must also submit a Comprehensive Demonstration Study, unless it has or will implement controls which have or will reduce its intake flows to a level commensurate with the use of a closed-cycle, recirculating cooling system. Proposed 40 CFR § 125.95(a), (b).

EPA Response

EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements. First, the final rule offers five compliance alternatives including a site-specific determination of best technology available. Under compliance alternative 1(i) (see 125.94(a)(1)(i)), facilities with design intake flows commensurate with closed-cycle recirculating systems are exempt entirely from the Comprehensive Demonstration Study requirements and are deemed to have met the performance standards; and, if a facility has reduced its design intake velocity to less than or equal to 0.5 feet per second, the facility is only required to submit studies relating to entrainment reductions. In addition, compliance alternative 4 (125.94(b)(4)) allows a facility to install a pre-approved technology with minimal Comprehensive Demonstration Study requirements. For facilities that select this alternative, only the verification monitoring plan and design and construction technology plan are required. Director burden is also reduced for facilities that select compliance alternative 4 since only minimal studies are required.

EPA is also allowing the use of historical data as long as it is reflective of current conditions. EPA believes that some historical data may be appropriate for determining the calculation baseline and for characterizing the nature of impingement and entrainment at the site, and therefore has given the Director the discretion to determine whether historical data are applicable to current conditions. If the facility uses historical data, it must show that the data is representative of current conditions and that the data was collected using appropriate quality assurance/quality control procedures (see 125.95(b)(1)(ii)).

Additional flexibility is provided through both the Technology Installation and Operation Plan and the Restoration Plan, which reduce the facility's burden by eliminating the requirement to comply with performance standards during the first permit term (and subsequent permit terms, see preamble section 9 for a full discussion).

An opportunity for reduced Comprehensive Demonstration Study requirements is also offered at each permit renewal cycle. EPA has included a provision in today's final rule whereby the facility may receive reduced information collection requirements if conditions (such as biological, chemical, or physical) at the cooling water intake structure and waterbody have not substantially changed since the last permit issuance (see 125.95(a)(3)). The facility must request the reduced information requirements at least one year prior to the expiration of the existing permit and provide justification for each information requirement in 122.21(r) and 125.95 that they believe has not changed. EPA believes that over time, natural and anthropogenic changes that occur in a waterbody may affect a facility's ability to meet performance standards. Thus, EPA believes that it is important to ensure that the in-place design and construction technologies, operational measures, and/ or restoration measures are still appropriate for conditions at the facility. If conditions have changed, facilities will be required to submit all of the relevant Comprehensive Demonstration Study studies when they submit the application for permit renewal. If conditions have not changed, the facility may be granted reduced Comprehensive Demonstration Study requirements at the discretion of the Director.

Comment ID 316bEFR.034.006

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code OPP

General Statement of Opposition

Georgia Power believes that EPA needs to properly address these comments in order to improve the Rule's enforceability, make the rule more effective and consistent with the overall NPDES regulatory program, and maximize the overall use of resources. Furthermore, by failing to address these comments, EPA runs a significant risk of having the rule, if finalized as proposed, be held arbitrary and capricious and, for certain aspects, beyond the scope of EPA's delegated authority.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.034.007

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.02

Performance standards

The Proposed Percent Reductions from the Calculation Baseline are too High.

Under the proposed rule, applicability of the performance standards vary, depending primarily on the source waterbody. If a facility withdraws water from a freshwater river or stream and that facility withdraws five percent or less of the river or stream's mean annual flow, then the facility must reduce fish and shellfish impingement mortality by 80 to 95 percent from the baseline. If the facility's design intake flow is more than five percent of the mean annual flow, the facility must lower impingement mortality by 80 to 95 percent and lower entrainment by 60 to 90 percent.

For an entity whose cooling water <FN 2> intake structure withdraws water from a lake or reservoir, the facility must reduce impingement mortality by 80 to 95 percent from the baseline. For entities whose cooling water intake structures withdraw water from the Great Lakes system, tidal rivers, estuaries, or oceans, those facilities must lower impingement mortality by 80 to 95 percent and lower entrainment by 60 to 90 percent. Regardless of the waterbody, however, the entrainment reduction component does not apply if the facility has a capacity utilization rate that is less than 15%.

EPA states that the performance ranges "reflect the uncertainty inherent in predicting the efficacy of a technology on a site-specific basis." In essence, EPA recognizes the inherently variable nature of aquatic environments. 67 Fed. Reg. 17141, Col. 3. The low end of the range indicates the minimum level of impingement or entrainment reduction that EPA believes all facilities -- even those operating in the most sensitive environments -- could achieve with the existing technologies on which EPA's assumptions are based. The high end of the range reflects EPA's belief that in some environments the same technology (technology upon which EPA based its proposed performance standards) will be more effective.

While the overall structure of the rule is not the ideal approach, <FN 3> Georgia Power believes it is workable. However, in addition to other deficiencies, the percent reductions from the calculation baseline are too high and not justified by the record.

Footnotes

2 EPA defines "cooling water" to mean "water used for contact or noncontact cooling, including water used for equipment cooling, evaporative cooling tower make up, and dilution of effluent heat content." Proposed 40 CFR § 125.83. Georgia Power requests that EPA make it clear that the water is no longer "cooling water" after it has performed its intended cooling function.

3 Georgia Power agrees with UWAG that the site-specific approach is better.

EPA Response

For a discussion of the basis for the performance standards ranges selected by EPA, see the preamble to the final rule.

Comment ID 316bEFR.034.008

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 7.03
Available I&E technologies

EPA's Places Too Much Confidence in Existing Technology For Which Only Limited Information is Available.

The impact reduction levels were set based on limited experiences with certain technologies, which EPA implicitly expects facilities will opt to use. EPA based its impingement mortality reduction performance standards on design and construction technologies like wedge wire screens and aquatic filter barrier systems (which EPA believes can achieve a 99% impingement mortality reduction); barrier nets (EPA believes barrier nets are capable of 80-90% mortality reduction); and modified screens and fish return systems, diversion systems, fine mesh traveling screens, and fish return systems. 67 Fed. Reg. 17142, Col. 1.

For reducing entrainment, EPA acknowledges that the performance that can be expected from available technologies is less clear than with impingement mortality reduction. 67 Fed. Reg. 17142. The situation is further complicated by the fact that some of the entrainment reduction technologies cause problems by increasing impingement. Still, EPA believes technologies such as aquatic filter barrier systems, fine mesh wedge wire screens, and fine mesh traveling screens with fish returns should reduce entrainment by 80 to 90 percent from the baseline.

Notwithstanding EPA's admission that the support for its entrainment reduction technologies is less than ideal, EPA proposes using these impact reduction benchmarks anyway. Georgia Power believes EPA is being hasty in its approach and needs to re-examine the performance standards and make appropriate adjustments so that the standards will be more consistent with the practical realities of the numerous uncertainties that are associated with the regulation of cooling water intake structures and their very site-specific environments.

EPA Response

EPA does not expect nor does it require any facility to use a specific technology (except those facilities opting for compliance alternative 4) to meet the requirements of today's rule. EPA evaluated technology performance data published over the last three decades, and consulted with industry stakeholders, technology vendors, laboratory analysts, environmental organizations, academics and the public to determine the practicability of the performance standards presented in today's rule. EPA believes that the performance standards it has selected in today's rule represent the optimal ranges that facilities can be expected to achieve without incurring unreasonable costs.

EPA disagrees with the assertion that "[t]he impact reduction levels were set based on limited experiences with certain technologies." While some technologies are relatively new to the market and have not been evaluated at many facilities (e.g. aquatic filter barriers), other technologies have enjoyed wide use and have been continuously evaluated under a variety of circumstances over the past three decades (e.g. fish handling and return systems). In response to comments received at proposal, EPA expanded the scope of data used to support the performance standards (see Chapter 3 of the Technology Development Document) and compiled a database containing basic information about technologies and their performance (see Technology Efficacy Database in the Docket). EPA attempted to include as much data as it could collect in these documents but acknowledges that additional data may still be available.

EPA agrees with the commenter that some entrainment technologies can interfere with desired impingement mortality reduction goals. EPA does not, however, believe that such conflicts, as uncommon as they may be, are insurmountable and maintains that the requirements for entrainment can be reasonably achieved at all Phase II facilities.

Comment ID 316bEFR.034.009

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.02

Performance standards

EPA Needs to Modify its Proposed Performance Standards to Reflect the Uncertainties Related to the Operation and Impact of Cooling Water Intake Structures.

For several reasons, EPA needs to adjust down the ranges of the performance standards. First, the technologies that EPA relies on have not been broadly tested to guarantee the kinds of results EPA identified. Indeed, perhaps with the exception of fine mesh screens, which have their own shortcomings, there is very little reliable data on the technologies EPA identifies.

Second, EPA itself recognizes the inherent variability of aquatic environments. Adding to the complexity of this problem is the fact that the limited evaluation data that is available does not reflect the diversity of aquatic environments in which EPA expects that these technologies will be applied. Accordingly, EPA should create more room in the standards to accommodate the uncertainties and variabilities.

EPA Response

Please see response to comment 316bEFR.029.040.

Comment ID 316bEFR.034.010

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 15.0
State or Tribal Alternative Requirements

Third, such substantial percentage reductions assume that this issue has been completely overlooked by state agencies. This is simply not the case. Many of the facilities have been around for decades with not only significant and proper regulatory oversight, but also noteworthy public scrutiny. With volumes of NPDES-related data generated regarding water bodies and studies conducted under the various state programs, including assessments done by state wildlife resources departments, significant entrainment and impingement would not have gone unnoticed. Moreover, in certain areas, general knowledge about recreational fishing would have helped to identify facilities that are having significant impacts as a result of entrainment or impingement.

EPA Response

EPA recognizes that several states and agencies have made great strides in reducing impingement mortality and entrainment losses resulting from cooling water intakes and notes that significant impacts are not necessarily occurring at all sites. With public input and regulatory oversight, many facilities have addressed the concerns associated with cooling water impacts by installing new technologies, modifying facility operations to reduce cooling flow, or developing habitat restoration measures to restore and maintain impacted aquatic communities. EPA notes, however, that cooling water operations at many facilities do result in adverse environmental impacts and warrant further oversight to minimize these impacts.

EPA agrees with the commenter that an understanding of recreational fishing, along with commercial fishing and other waterbody uses, helps to identify the impacts resulting from impingement and entrainment. Several of the compliance alternatives in today's rule require the collection and analysis of these types of data when determining the most efficient means of meeting the rule's requirements.

Comment ID 316bEFR.034.011

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.02

Performance standards

A Possible Improvement to the Rule is to Broaden the Range.

There are several approaches EPA should consider to establish more reasonable standards that are workable within EPA's current structure. One option is to broaden the ranges and allow permit writers to establish the percent reduction for individual facilities based on characteristics of the waterbody, existing aquatic communities, and other site-specific data. Georgia Power recommends using 50-70% range for impingement reductions and 40-60% range for entrainment reduction. These ranges are much more reasonable in light of the numerous uncertainties associated with the water bodies, the individual intake structures, the water quality of the various waterbodies, the extent of existing aquatic species, the types of aquatic species, the abundance or lack of nuisance species, the potential for endangered species, and the limited information available regarding the technologies identified by EPA.

EPA Response

Please see response to comment 316bEFR.040.

In addition, today's rule also authorizes site-specific determinations of Best Technology Available (BTA) for minimizing adverse environmental impacts, for example, to account for cost-benefit considerations or for special needs of the affected waterbody in accordance with state, tribal, or other federal laws (e.g. Endangered Species Act).

Comment ID 316bEFR.034.012

Subject Matter Code 7.02

Performance standards

Author Name Michael E. Wilder

Organization Georgia Power

EPA Could Establish Interim Limits Until More Is Understood About Available Technology.

Another option that Georgia Power would support is the establishment of interim standards (e.g., for the next five years, reduce impingement by 40% and entrainment by 30% compared to the calculation baseline, where applicable). Then, at the end of that five year period, when assessments of both the waterbodies and technologies have been conducted, a permanent, more stringent standard can become effective.

EPA Response

EPA does not see the benefit of interim standards and in fact believes that such an approach would add unwarranted cost to facilities during the compliance process. For a discussion of the Technology Installation and Operation Plan provisions of the rule, see response to comment 316bEFR.029.040.

Comment ID 316bEFR.034.013

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

EPA Needs to Establish Clear Definitions of the Objectives of an Acceptable Impingement and Entrainment Study, Including Some Guidance Regarding the Calculation Baseline Impingement and Entrainment Rates.

Under the proposed rule, the permittees of those facilities not employing, and not planning to employ, closed-cycle recirculating cooling systems (or their equivalent) will be required to submit an Impingement Mortality and Entrainment Characterization Study. Proposed 40 CFR § 125.95(b)(3); 67 Fed. Reg. at 17175, Col. 3. This Study is one of several steps to be undertaken as part of the Comprehensive Demonstration Study. This is arguably the heart of a 316(b) Comprehensive Demonstration Study, yet EPA provides very little meaningful guidance as to how to accomplish this component of the demonstration. Because clear objectives and guidelines are not established, the permittee is left with very little information as to how, as a practical matter, to scope the Study and how to extrapolate to a "calculation baseline." Compounding the problem is the absence of a definition of adverse environmental impact. Establishing clear guidelines for impingement and entrainment studies is important not only in the context of individual facilities that will be subject to the proposed rule, but also for the overall, long-term goal to reduce the effects of impingement and entrainment and improve the effectiveness of protective technologies. There is a great deal of information available from previous 316(b) studies. However, the scope, objectives, methods, estimation and reporting of these individual studies vary greatly. The variability in the studies themselves is one of the largest obstacles to creating a useful 316(b) database that could be used to help predict impingement and entrainment effects, or help predict the potential effectiveness of various protective technologies for a given set of environmental and operational conditions. Requiring facilities to conduct characterization and demonstration studies, without providing clear guidance to standardize those studies, is short-sighted and only promotes additional variability.

EPA Response

In today's final rule, EPA has provided an explanation of what facilities must submit for the Impingement and Entrainment Characterization Study (see § 125.95(b)(3)). EPA intends to develop implementation guidance for owners and operators that will address how to comply with information submission requirements, the sampling and monitoring requirements, and the record keeping and reporting requirements in these final regulations. In addition, when the applicant submits a this information, he or she will have ample opportunity to receive feedback from his or her permitting Director, who will be able to assess whether the proposed Impingement and Entrainment Characterization Study is sufficient.

Regarding EPA's definition of calculation baseline, it should be noted that in the NODA, EPA requested comments on the proposed definition of calculation baseline (see 68 FR 13580). The amended definition in today's final rule is found at § 125.93. The calculation baseline may be estimated using the facility's historical impingement mortality and entrainment data, or that of another facility with comparable design, operational, and environmental conditions. A facility may also use current impingement mortality and entrainment data that is reflective of the facility’s actual impingement mortality and entrainment rates.

The calculation baseline provides a standard intake configuration by which facilities can determine relative reductions in impingement and entrainment. EPA recognizes that this definition cannot address the variety of intake configurations and other conditions at all facilities and therefore cannot define the calculation baseline in all settings. In these instances, however, EPA believes that the calculation baseline in the final rule is clear and straightforward to implement, and allows for proactive facilities (i.e., those with control technologies, operational procedures, or restoration measures already in place) to take credit for existing measures. For additional explanation of the calculation baseline, refer to the final rule at § 125.93, and the following sections of the preamble: Section VI, VII and VIII, as well as the Phase II NODA, 68 FR 13580.

Finally, EPA disagrees that it should define adverse environmental impact. For an explanation of EPA’s decision to not define this term, please see the preamble to the final rule and EPA’s response to comment 316bEFR.030.012.

Comment ID 316bEFR.034.014

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 10.01.01

Ecological Risk Assessment

Employing EPA's Ecological Risk Assessment methodology in this context could provide structure for characterizing the potential ecological risk due to impingement and entrainment at cooling water intake structures. Georgia Power encourages EPA to consider using its own guidelines (US EPA, 1998 Guidelines for Ecological Risk Assessments, EPA/630/R-95/002F) in this context.

EPA Response

EPA agrees that its Ecological Risk Assessment Framework provides a useful structure for characterizing impingement and entrainment impacts. See Chapter A1 of EPA's Phase II Regional Study Document (DCN #6-0003)for a discussion of the Ecological Risk Assessment Framework as it applies to section 316b.

Comment ID 316bEFR.034.015

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Elements of an Impingement Mortality and Entrainment Characterization Study Needs to be Clarified.

The preamble identifies three elements of an Impingement Mortality and Entrainment Characterization Study. First, the preamble states that the characterization would include "taxonomic identifications of those species of fish and shellfish and their life stages that are in the vicinity of the cooling water intake structure and are most susceptible to impingement and entrainment." 67 Fed. Reg. at 17175, Col. 3. EPA needs to elaborate further and provide more clarity as to what it means with respect to this first element. For example, with respect to "taxonomic identifications" of species in the vicinity of the cooling water intake structure, to what extent can facilities rely on existing data generated by State natural resource and wildlife agencies or others? We understand from EPA's language that not every specie needs to be evaluated, just the ones that are "most susceptible" to impingement and entrainment. But what does EPA mean by "most susceptible?" One possible interpretation of this term is to focus on those species that are noticeably higher than the rest with respect to the frequency and abundance of the extent of entrainment or impingement. Another concern is to what extent can the permittee select representative species when the species that are being impacted are similar?

The second element EPA mentions is no clearer than the first. EPA expects a "characterization of these species of fish and shellfish and life stages, including a description of the abundance and temporal/spatial characteristics in the vicinity of the cooling water intake structure." Id. What does EPA mean by "characterization of these species?"

The third element is the "documentation of the current impingement mortality and entrainment and an estimation of the calculation baseline." Id. EPA does not explain the extent of the documentation that may be needed. Nor does EPA provide any useful guidance regarding the establishment of the theoretical baseline. As a practical matter, if the facility is once-through cooling with no existing technology, Georgia Power is concerned that EPA may take the position that the facility is itself equal to the baseline. However, there might be other considerations that may have already lowered the extent of any impingement or entrainment that may not be limited to technology. For example, certain operational controls or the location/angle of the cooling water intake structure may operate to limit the extent of entrainment or impingement. EPA should, therefore, provide facilities with the opportunity to take into account other considerations beyond technology for purposes of determining the calculation baseline.

EPA Response

EPA disagrees that it needs to further clarify "taxonomic identifications of those species of fish and shellfish and their life stages
that are in the vicinity of the cooling water intake structure and are most susceptible to impingement and entrainment." In today's final rule, EPA has provided a clear explanation of what facilities must submit for the Impingement and Entrainment Characterization Study (see § 125.95(b)(3)). In

addition, EPA believes that any questions a facility may have will be answered through dialogue with their State permitting authority. A facility must submit to the Director a Proposal for Information Collection, which is a description of the information the facility will use to support the various components of its Comprehensive Demonstration Study. The Director will review the Proposal and provide feedback to the facilities. Therefore, facilities will be informed by their State permitting agency if their proposed data collection efforts are not sufficient. The Director will be most familiar with the site and waterbody conditions in his or her jurisdictions and will be able to comment on lists of species of concern proposed by the facilities. In answer to the question regarding the use of existing data, EPA does permit the use of such existing or historical data so long as it is reflective of current conditions. For information on the circumstances under which existing data is accepted, please see the final rule preamble section VIII.E.2.c. Other means of determining compliance, section VIII.E.4. a. Requirements and burden, and EPA's response to comment 316bEFR.034.005. Furthermore, EPA has specified in today's final rule what is meant by "characterization of these species." Please see § 125.95(b)(3)(ii). Finally, EPA has clarified its definition of calculation baseline in today's final rule (see EPA's definition at § 125.93). For additional detail on determining a facility's calculation baseline, see EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.034.016

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 10.03

Case Study Specific Comments

EPA's Case Studies Are of Limited Value.

Georgia Power has some concerns about the case studies that EPA provided. Because of variabilities in the way the studies were conducted and reported, there is little information that can be transferred in a meaningful way to other facilities. Those case studies, therefore, have limited use. In addition, the case studies are repeatedly qualified as out of date and likely to underestimate impingement and entrainment, suggesting that EPA would like some as yet undefined but better process. Finally, Georgia Power is concerned that a calculated baseline scaled to design MGD is not a defined measure if the underlying impingement and entrainment studies are open to significant criticism. In real operations, actual pumping rates are often significantly less than design MGD, which might put some facilities in a position of trying to reduce a "calculation baseline" that is greatly overestimated.

EPA Response

EPA disagrees with the commenter's assertion that I&E estimates cannot be extrapolated. Please see EPA's response to Comment 316bEFR.041.041 on EPA's extrapolation approach.

Comment ID 316bEFR.034.017

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.04
Determination of compliance

Allowances for Unavoidable Episodic Impingement and/or Entrainment Events.

In development of the Final 316(b) Rule for existing facilities, EPA should acknowledge and make allowances for the occurrence of unavoidable episodic impingement and entrainment events that are beyond the control of the cooling water intake structure facility operator. For example: Threadfin shad (Dorosoma petenense) are a temperate freshwater forage fish species that occurs throughout the southern and southwestern United States. (Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer, Jr. 1980 et seq., Atlas of North American Freshwater Fishes. N.C. State Mus. Nat. Hist., Raleigh. i - x + 854 pp.)

Threadfin shad are very sensitive to water temperatures with significant mortality of young and adults occurring below 7 C (44.6 F), with 5 C (41 F) reported as the lower lethal temperature for the species. Threadfin shad experiencing decreased swimming ability and/or mortality due to cold stress/shock are subject to impingement, and possibly entrainment, as they enter the cooling water intake structure hydraulic Zone of Influence. Winter stress or kill of threadfin shad commonly occurs in the northern portion of the species range and large die-offs have been known to result in excessive cooling water intake structure impingement rates to the point of intake screen collapse and, consequently, facility power curtailment and/or shutdown. King, R.G., GeoSyntec Consultants, personal communication re: Gentleman Station, Nebraska Public Power District (2002).

Similar phenomena can occur in marine environments involving a variety of thermally (cold) sensitive fish (e.g., snook, Centropomidae, and mullet, Mugilidae). Marine invertebrates are also susceptible candidates for unavoidable episodic impingement and entrainment, particularly planktonic species whose movement is subject to the wind, tides, and currents, and whose populations undergo cyclical expansions or "blooms" (e.g., jellyfish, a group that includes Scyphomedusae, Hydromedusae, Siphonophores, and Ctenophores).

The occurrence of such an unavoidable episodic event during the conduct of the Impingement Mortality and Entrainment Characterization Study, as currently required by the proposed rule, would unfairly bias the results of the study whose objectives are to provide representative data to support development of the Baseline Calculation for evaluating reductions in impingement mortality and entrainment; document current impingement mortality and entrainment; and provide the basis for evaluating the performance of potential technologies, operational measures, and/or restoration measures. Additionally, in the absence of provisions acknowledging unavoidable impingement and/or entrainment, should such an event occur during Compliance Monitoring a facility could face possible regulatory actions ranging from enforcement penalties to unnecessary implementation of more stringent and costly technological controls and/or restoration measures to meet a required reduction in impingement and/or entrainment mortality from the facility Calculation Baseline; a baseline value that, at the time determined, may not have experienced a similar episodic event.

Therefore, the Final 316(b) Rule for existing facilities should: 1) include language defining and recognizing the occurrence of unavoidable episodic impingement and/or entrainment events; 2) allow exclusion of such events during the conduct of the Impingement Mortality and Entrainment Characterization Study and associated Calculation Baseline determination; and 3) provide exemption from any regulatory actions, including enforcement actions, arising from an unavoidable impingement and/or entrainment event that might occur during Compliance Monitoring or otherwise during the life of the facility NPDES permit.

EPA Response

EPA agrees that provisions for unavoidable episodic impingement and entrainment events and emergency intakes should be considered. However, EPA believes that it is incumbent upon the facility to build protective measures into their technology selection and operation to accommodate these potential events. In other words, it is EPA's position that a facility needs to install a technology that is protective enough to account for periods of variability. Furthermore, EPA has designed the rule so that a Director has tremendous flexibility in establishing how compliance with performance standard will be determined, including approving averaging periods proposed by the applicant for determining compliance. EPA envisions that most episodic events will be "averaged out" over a longer interval of time, as deemed acceptable by the Director. In this way, facilities that are generally in compliance, but experience an unusual peak of impingement mortality and/ or entrainment, may be considered to still be in compliance due to past good performance. Therefore, EPA respectfully disagrees that it should 1) include language defining and recognizing the occurrence of unavoidable episodic impingement and/or entrainment events; 2) allow exclusion of such events during the conduct of the Impingement Mortality and Entrainment Characterization Study and associated Calculation Baseline determination; and 3) provide exemption from any regulatory actions, including enforcement actions, arising from an unavoidable impingement and/or entrainment event that might occur during compliance monitoring or otherwise during the life of the facility NPDES permit. See also the preamble for additional discussion of compliance issues.

Comment ID 316bEFR.034.018

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

The Use of Off-Stream Lakes or Ponds Should be Viewed in the Context of the Overall Reduction of Water Withdrawn.

Under the proposed rule, existing facilities with intake flow levels “commensurate with” that which can be attained by a closed-cycle recirculating cooling system using minimized makeup and blowdown flows are deemed to be in compliance with the rule as proposed. Georgia Power believes that certain aspects of this section of the rule is arbitrary, legally unsupported, and in need of clarification. Because of EPA’s unclear definition of “closed-cycle recirculating cooling system,” Georgia Power is concerned about the regulatory status of several of its power plants with cooling towers and off-stream ponds or reservoirs.

EPA Response

Please refer to the response to comment 316bEFR.063.011.

Comment ID 316bEFR.034.019

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 3.02

Definition: Cooling Water Intake Structure

Georgia Power recommends a more practical definition of closed-cycle recirculating cooling system as follows: "A system that minimizes the extent of its overall water withdrawal rate and/or use by recirculating its cooling water through any one of several mechanisms that does not involve once-through use of a significant percentage of the cooling water. Such systems can involve the use of a cooling tower, with a source of make-up water such as an off-stream lake or a cooling pond."

EPA Response

The comment does not explain the shortcomings of the proposed definition of closed-cycle recirculating system (which referenced the Phase I definition in 40 CFR 125.83) or why the commenter's suggested definition is more practical than the proposed definition. The definition in the final rule (see, § 125.93) is the same as the one discussed in the proposal and included in the Phase I rule (40 CFR 125.83). EPA believes this definition is sufficiently clear and provides adequate flexibility for practical application on a case-by-case basis.

Comment ID 316bEFR.034.020

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 3.07

Special definitions

Use of Off-Stream Ponds is a Practical Component of a Closed-Cycle System.

In Georgia Power's case, off-stream ponds were created to ensure compliance with Georgia's water withdrawal regulatory scheme and to provide a reliable, easily accessible source of water for cooling tower make-up. <FN 4> Essentially, an off-stream pond adds a step to the water withdrawal process while at the same time providing a buffer to the original source waterbody. Water is pumped from the original source waterbody into the off-stream pond. The pumps at the original source waterbody operate on a limited basis to maintain the off-stream pond at a certain level. Water is then pumped from the off-stream pond to serve various plant functions. The pond's primary function, however, is to serve to make-up the cooling tower water when it is reduced, mostly as a result of evaporation or blowdown. Because Georgia's water withdrawal law implemented through water withdrawal permits imposes certain pumping restrictions, off-stream ponds enable Georgia Power to meet the plants' water needs without overburdening the source waterbody or otherwise violate the water withdrawal regulatory scheme.

Georgia Power believes that a determination of whether a system is "commensurate with" a closed-cycle recirculating system should be based on the overall reduction of water use based primarily on the reduction in water withdrawn from the original source waterbody. Whatever definition EPA ultimately uses, however, Georgia Power's sole concern is that the definition does not inadvertently exclude facilities with off-stream ponds.

Footnotes

4 Georgia Power does not believe that off-stream ponds are waters of the U.S.

EPA Response

EPA disagrees that in the example provided by the commenter, the off-stream ponds represent part of a closed-cycle cooling system. Rather, the off-stream ponds could be functioning as part of the cooling water intake structure. They may constitute "waters of the U.S," depending upon the facts presented. For additional explanation, please refer to the response to comment 316bEFR.032.015.

Comment ID 316bEFR.034.021

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 3.07
Special definitions

At the Very Least, EPA Needs to Change or Clarify Certain Terms Used in the Current Definition of Closed-Cycle, Recirculating System.

EPA does not explain the meaning of certain key terms included in the proposed rule. EPA's failure to define some of these terms and certain related concepts will make the preliminary determination regarding whether the facility's system is "commensurate with" a closed cycle, recirculating system difficult. First, EPA does not define "commensurate with." Webster's dictionary definition of "commensurate" is "equal in measure or extent, corresponding in size, extent, amount, or degree." This being the case, we assume EPA to mean "equal to" or "same as" when it uses the term "commensurate with."

We believe "commensurate with" is too inflexible for situations where a variety of factors can affect the need for make-up water or the extent and frequency of blowdown. These factors include climate differences, the need for certain water quality within cooling towers, differences in water quality standards applicable to the receiving waterbodies, and evaporation. For these reasons, Georgia Power recommends using "similar to" instead of "commensurate with".

Second, EPA does not explain what is meant by "minimized make-up and blowdown flows." Configurations of closed-cycle, recirculating systems vary. As mentioned, some systems, such as Georgia Power's, use reservoirs or off-stream ponds to provide make-up water. Depending on the configuration of the system, the amount of make-up water needed may vary, due largely to evaporation. A system should be considered minimized provided that the majority of the water used does not serve a once-through cooling function.

Also, the frequency of blowdown varies depending, in part, on applicable water quality standards and the quality of the intake water. The quality of the water in the cooling tower must be maintained at a certain level to preserve the system. A system's blowdown should be considered minimized when blowdown is not performed more than is reasonably necessary.

EPA Response

EPA disagrees that it should change the definition of "commensurate with" to "similar to." The language used in the definition of closed-cycle cooling has been used historically (see the Phase I rule), and thus far EPA's choice to not define the term has in no way hampered the ability of facilities to implement the rule. EPA also disagrees that it should quantify "minimized make-up and blowdown flows." Because each facility has unique intake configurations and surface waterbody conditions, EPA has decided to leave the determination of how much a facility should minimize its make-up and blowdown to the Director's discretion. EPA therefore believes that it is sufficient to state that facilities are required to minimize make-up and blowdown flows, thereby minimizing the impacts associated with those flows and increasing the efficiency of the facility.

Comment ID 316bEFR.034.022

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

EPA Should Increase the Water Withdrawal Threshold Relating to Rivers and Streams.

Under the proposed rule, facilities located on freshwater rivers or streams do not need to address entrainment, provided that the facilities' design intake flow is 5% or less than the source river's mean annual flow. EPA explains that the 5% withdrawal threshold is based on the concept that, "absent any other controls, withdrawal of a unit volume of water from a waterbody will result in the entrainment of an equivalent unit of aquatic life…suspended in that volume of the water column." 67 Fed. Reg. 17151, Col. 2.

Accordingly, EPA concludes that "if 5% of the mean annual flow is withdrawn, it would generally result in the entrainment of 5% of the aquatic life within the area of hydraulic influence of the intake." Id. Because EPA believes that it is unacceptable to impact more than 5% of the organisms within the area of an intake structure, EPA is choosing to require those facilities that withdraw more than 5% of the mean annual flow of a fresh water river to reduce entrainment by 60-90%. For several reasons, Georgia Power believes that EPA's approach is arbitrary.

First, the 5% criterion uses design intake pumping rate and annual average flow. Operational measures which may be implemented because of the hydrologic regime are ignored but may minimize entrainment and impingement. Also, consideration should be given to use of actual volume pumped and river flow for periods during critical life stages when fish and shellfish would be impacted.

Second, the 5% criterion assumes a uniform distribution of entrainable organisms to derive a conservative estimate of the potential for adverse impact. See EPA 2002, EPA -821-R-02-002, page A1-5. Examination of the case study data EPA provided shows no relationship between design intake pumping rate and total entrainment or impingement. See The Ohio River Watershed Case Study, EPA 2002, EPA-821-R-02-002, Part C. This can be seen qualitatively by noting that the facility with the greatest capacity to withdraw water from the Ohio River, the W. H. Sammis facility, with design intake capacity of 7.46% of annual river discharge, reports lower annual entrainment rates than four other facilities with design intake capacities ranging from 0.36% to 4.75% of mean annual flow. Possible reasons for this include: different habitat preferences for various fish species; orientation of the intake in relation to the source water body; differences in life history including differences in reproductive strategies. As far as Georgia Power can tell, EPA has provided no supporting data for the proposition that entrainment is proportional to design pumping capacity as a percent of average annual river flow.

Third, the existing intake structure may be located in a waterbody segment that supports minimal valuable aquatic life. In certain cases, potential impingement or entrainment may be reduced because of the location of the structure relative to the channel, migratory pathways or other desirable microhabitats. The 5% threshold makes no allowance, for example, for situations where nuisance species may be the primary species being entrained or impinged.

EPA's broad-brush approach to the 5% withdrawal threshold ignores these factors that could justify a higher threshold.

Given various considerations that could affect the potential relationship between aquatic organisms present in the water body and the percentage that is likely to be entrained, we recommend a higher threshold with the opportunity for the permit writer to be more stringent if the situation requires it. EPA should use a threshold flow equal to 15% of the spawning season flow.

Regardless of the ultimate threshold EPA decides to apply, Georgia Power believes that at any such threshold, the risk of entrainment and the relative significance of impingement should be sufficiently low to warrant an avoidance of both impingement and entrainment requirements below the threshold.

EPA Response

Facilities withdrawing greater than 5% of the mean annual flow from freshwater rivers and streams (and having a capacity utilization rate greater than 15%) are required to meet both impingement and entrainment requirements. The withdrawal threshold is based on the concept that absent any other controls, withdrawal of a unit volume of water from a waterbody will result in the entrainment of an equivalent unit of aquatic life (such as eggs and larval organisms) suspended in that volume of the water column. EPA discussed these concepts in more detail and invited comment on the use of this threshold and supporting documents in its NODA for the New Facility Rule (66 FR 28863). EPA believes that a 5% mean annual flow requirement for freshwater rivers and streams achieves an acceptable level of protection for the source water while remaining economically and practicably reasonable for existing facilities.

With respect to the use of design intake flow, this standard is not applicable to the daily operation of a facility's cooling water intake structure (i.e., actual intake flow). That is, a facility is not expected to constantly monitor the instream flow of the source water and adjust its water intake accordingly. EPA believes the design intake flow standard for riverine facilities affords a level of protection for the source water body acceptable under most, if not all, stream conditions.

EPA continues to believe that the 5% mean annual flow requirement for freshwater rivers and streams is appropriate with respect to the distribution of organisms. EPA recognizes that, in some cases, organisms may not be uniformly distributed in the water column. However, EPA believes that assuming a uniform distribution is a conservative and appropriate approach to estimating impingement and entrainment rates.

With respect to nuisance species, today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7)), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

With respect to increasing the withdrawal threshold and using the spawning season flow, EPA disagrees with the commenter. As stated earlier in this response, EPA believes that a 5% mean annual flow requirement for freshwater rivers and streams achieves an acceptable level of protection for the source water while remaining economically and practicably reasonable for existing facilities. Also, as stated earlier in this response, EPA believes the design intake flow standard for riverine facilities affords a level of protection for the source water body acceptable under most, if not all, stream conditions.

With respect to facilities withdrawing less than the withdrawal threshold, EPA disagrees that said facilities should have no impingement or entrainment requirements. These facilities continue to withdraw from the waterbody and may continue to impinge or entrain organisms, and are therefore potentially subject to applicable requirements. However, such a facility could elect to demonstrate that its current intake configuration meets the applicable performance standards, as described under § 125.94(a)(2) or could opt to seek a site-specific determination of best technology available, as described under § 125.94(a)(5).

Comment ID 316bEFR.034.023

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Author Name Michael E. Wilder

Organization Georgia Power

The Utilization Rate Needs to be Increased.

EPA proposes to exempt facilities from entrainment reduction requirements when a facility operates less than 15% of the available operating time (based on historical data). Proposed Rule 40 CFR § 125.94(b)(2); 67 Fed. Reg. 17153, Col. 3. EPA explains that "because these facilities operate only a fraction of the time compared to other facilities, such as base-load plants, the peaking plants achieve sizable flow reductions over their maximum design annual intake flows." 67 Fed. Reg. 17153, Col. 3. EPA also explains that the reduced standard is further justified on the basis that these peaking facilities operate during the peak of winter and summer, which are not the most crucial periods for aquatic organisms. Georgia Power agrees that low capacity utilization facilities should be granted certain exemptions. However, EPA's threshold is too low.

EPA needs to increase the utilization rate that triggers entrainment reductions and give permit writers the flexibility to agree to permit conditions regarding the facility's utilization rate that may depart from the facility's historical operation with or without supporting data, provided that the facility can demonstrate future compliance with the utilization rate it chooses.

Georgia Power believes that a 30% utilization threshold is justified on the basis that, compared to 100% utilization, there is an overall reduction in flow of about 70% which puts the facility within range of the proposed reduction in entrainment (60-90%). In addition, Georgia Power believes the impingement requirement should not apply to facilities with capacity utilization rates up to 20%. This would also be in line with the performance standard (80-95% reduction) for facilities that have 100% utilization.

EPA Response

Correlating the utilization rate directly and solely to the performance targets for entrainment or impingement reduction is an incomplete justification of the capacity utilization threshold. The Agency cannot adopt the suggestions for the final rule. The commenter does not clarify which side of the range would the commenter have the Agency adopt. If the Agency were to adopt the upper bound of the ranges referenced by the commenter, then the capacity utilization rate threshold would be lowered by 5 % for entrainment requirements. The commenter provides no justification as to why the rate should be lower. The commenter's desires for a lessening of the requirements is not sufficient basis for said lessening.

The Agency explains its rationale for selecting the 15 % capacity utilization rate at DCN 6-3586.

Comment ID 316bEFR.034.024

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 2.04.02
Apply 316(b) before a det. of impact/AEI

Adverse Environmental Impact Cannot be Presumed.

To the extent that EPA is using 316(b) to regulate cooling water intake structures that are not having an adverse impact on the environment, EPA is acting beyond the scope of its authority. Consistent with the Clean Water Act, EPA must allow a two step process that enables a utility to show whether there is any adverse environmental impact in the first place. Section 316(b) of the Clean Water Act requires the location, design, construction, and capacity of cooling water intake structures to "reflect best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). On the basis of strict statutory interpretation, if adverse environmental impact is absent, then the question whether the facility has best technology available becomes largely irrelevant.

Under the rule as proposed, EPA assumes that there is adverse environmental impact by virtue of the operation of a cooling water intake structure. Georgia Power disagrees with this position and finds it to be not only arbitrary, but completely at odds with the Clean Water Act. EPA is without delegated authority to require facilities to undertake activities with respect to their cooling water intake structures where there is an absence of adverse environmental impacts.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.034.025

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Georgia Power supports the UWAG definition of "adverse environmental impact" as stated in the proposed rule. See 67 Fed. Reg. at 17163. EPA appears to take the position that a definition for "adverse environmental impact" is relevant only if the Agency adopts a site-specific approach. See 67 Fed. Reg. at 17164. Georgia Power disagrees with EPA's approach. Consistent with the Clean Water Act, a determination of adverse environmental impact is a necessary first step.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking. In addition, EPA disagrees that it is required to define adverse environmental impact. In this case, EPA has reasonably exercised its discretion not to codify a definition.

Comment ID 316bEFR.034.026

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 18.01

RFC: Definition of “adverse environmental impact”

There are many considerations that may factor into the presence or absence of adverse environmental impact. At the very least, those considerations should include the following factors: (1) whether species compensate for or accommodate the impact to an extent that the overall impact is “not adverse” (e.g., the nuisance species are minimized or the impacted species would have otherwise died or that the species otherwise make up for the loss); (2) if the facility is impacting the waterbody to an extent that is less than 75% of the calculation baseline then the facility should be exempt under the theory that a 25% impact relative to the baseline is acceptable unless endangered or threatened species are involved.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.034.027

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 20.0

Role of Trading

Expansive Trading Should be Allowed.

Georgia Power believes that the rule should be modified to specifically allow trading. To ensure maximum flexibility and to encourage some experimentation among the states, EPA should let individual states develop their own trading programs. States should be allowed to pursue interstate trading if they desire. States should be given the flexibility to have their programs include the potential for source-based controls, receptor-based mitigation, and compensation based mitigation.

A trading program would be especially useful in this area because of the variety of methodologies that can be employed. As examples, a program can be structured to augment current water quality standards schemes or to meet broad biodiversity goals.

One possible way for a state to design a program would be to conduct a survey of facilities located in the state (perhaps on a per watershed basis) and identify a series of mitigation measures each facility can undertake in order to achieve certain biodiversity goals, achievement of water quality standards or some other measurable outcome. The state can then assign a certain value to these measures and relate these measures to units that can be applied toward reduction in impingement and entrainment as compared to the calculation baseline. Ultimately, fashioning the program should be up to the states. However, EPA should provide the regulatory basis and encourage states to develop such programs

EPA Response

Trading in the context of section 316(b) raises many complex issues. Due to the complex issues relating to trading, EPA has elected not to specify how a trading program in the context of section 316(b) should be implemented but rather has left it to the discretion of a permit director to decide whether a trading program is a beneficial use of State resources. Should a State choose to propose a trading program under § 125.90(c), EPA will evaluate the State's proposal on a case-by-case basis to ensure the program complies with the regulatory requirement – that it will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at §125.94. To this end, EPA foresees potentially approving only those trading programs which allow trades within individual watersheds and trade for numbers of the same species.

Comment ID 316bEFR.034.028

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.0

Role of Restoration

Voluntary Restoration Should Not Be Limited to a Supplementary Role.

Under the proposed rule, restoration measures are allowed in lieu of or in combination with reductions in impingement mortality and entrainment. 67 Fed. Reg. at 17146. Georgia Power strongly supports the use of restoration and does not believe that the role of restoration should be limited to supplementing technology or operational measures.

EPA Response

Under the final rule, facilities may use restoration measures either in lieu of or in combination with technologies that reduce impingement mortality and entrainment.

Comment ID 316bEFR.034.029

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 2.04.06
Restoration measures in place of technologies

Voluntary Restoration is Consistent with the Clean Water Act.

Georgia Power can find no regulatory or legal reason to limit the use of restoration. In fact, one of the key premises of the Clean Water Act is restoration. 33 U.S.C. § 1251. To the extent that EPA is concerned about over-reliance on restoration measures or that industry may avoid practical technological fixes, this reflects a failure on EPA's part to allow permit writers to fulfill their roles. The permit writer is positioned on the ground and can recognize when an owner or operator is proposing deficient restoration measures. In any event, the permit writer will eventually be able to identify if the restoration project is a failure and will be able to require additional compliance measures.

EPA Response

For information on EPA's authority to allow restoration under today's rule, see the preamble to the final rule. EPA agrees that its restoration provision is consistent with the goals of the Clean Water Act (CWA) as expressed in CWA section 101(a).

Under the final rule, it is the responsibility of the permitting authority to review a permitee's application and decide whether or not restoration measures are an appropriate means for the permittee to comply with the requirements of the final rule. As described in section 125.95, the rule requires permittees to develop a Restoration Plan and submit several pieces of information to the permitting authority in order to aid both the permittee and the permitting authority in their consideration of the feasibility of restoration measures. Once permittees obtain the permitting authority's approval and implement restoration measures, it is their responsibility to ensure and demonstrate to the permitting authority that the measures meet the requirements of the final rule.

Comment ID 316bEFR.034.030

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Voluntary Restoration Ensures Flexibility and the Best Use of Resources.

Under EPA's preferred regulatory approach, EPA has opted not to pursue the site-specific approach. In order to add some level of flexibility to EPA's approach, it is imperative that EPA make restoration completely voluntary. While Georgia Power does not believe that voluntary restoration will provide a complete fix for the proposed rule, it will certainly translate to a significant improvement. Because owners and operators are best positioned to determine how to maximize their resources, they will be able to identify the optimum approach (or combination of approaches) to comply with the rules. There might be situations where restoration is simply not cost effective. On the other hand, physical limitations may make employment of technical improvements unattractive or impracticable. Giving the owner or operator the regulatory freedom to determine which approach or combination of approaches would be most efficient and effective would produce the best result. Indeed, it may enable the employment of more creative, environmentally beneficial solutions.

EPA Response

EPA believes the inclusion of the option to use restoration measures in the final rule provides permitting authorities and permit applicants with additional compliance flexibility.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

For a discussion of the responsibilities of the permitting authority and the permit applicant in the assessment and application of restoration measures, see EPA's response to comment 316bEFR.034.029.

For a discussion of the requirement to consider design and construction technologies and operational measures before choosing restoration measures, see EPA's response to comment 316bEFR.033.005.

Comment ID 316bEFR.034.031

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

While Georgia Power supports broad flexibility to engage in restoration projects, Georgia Power would support limiting restoration to the watershed that serves the facility's intake, at least for initial projects. Georgia Power believes restoration projects should not be located elsewhere until opportunities for reasonable restoration within the source watershed are not available.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.034.032

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.0

Role of Restoration

Credit for Past Environmentally Beneficial Projects or other Activities that Limit the Extent of Impingement or Entrainment.

Under the proposed rule, facilities that have certain technologies in place that reduce entrainment and impingement will be credited for such technologies when calculating the "calculation baseline." While it is not clear how such projects should be taken into account in determining the "calculation baseline," Georgia Power believes the same treatment should be granted to past projects that may not have involved the employment of technology or technological improvements, but yet served whether directly or indirectly to minimize entrainment or impingement. Credit should be expanded to include, among other things, historical operational measures, regardless of whether such measures were put in place to address entrainment or impingement. Similar credit should be given to projects that improved the quality of the aquatic environment.

EPA Response

EPA believes that facilities should be given credit for existing restoration measures undertaken for the purposes of mitigating adverse environmental impacts from cooling water intake structures. Under section 125.94 of the final rule, facilities may request credit for existing design and control technologies, operational measures, and restoration measures. Existing restoration projects must meet the requirements described under sections 125.94 and 125.95. Facilities may claim credit for the ongoing fish and shellfish production from the restoration measures. They may not claim mitigation of cooling water intake structure impacts by restoration measures that have been implemented in order to fulfill some other environmental requirement (e.g., wetland creation in order to satisfy CWA 404 requirements).

Comment ID 316bEFR.034.033

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Streamlined Demonstration, Monitoring, and Implementation.

Because a significant amount of the costs to electric utilities that could result from this rule will be associated with the 316(b) demonstration studies, verifying the effectiveness of the selected compliance methods, and post-permit issuance monitoring, Georgia Power believes that these costs can be substantially reduced, without jeopardizing EPA's objectives, if EPA were to streamline the process.

EPA Response

Please see EPA's response to comment 316bEFR.034.005 for details on measures EPA has taken to streamline the information collection requirements and implementation of today's final rule.

Comment ID 316bEFR.034.034

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 18.02
RFC: Use of previous demonstration studies

Streamline the Demonstration Study.

First, a 316(b) demonstration should never have to be repeated unless circumstances have so changed to make the original demonstration unreliable. If a utility holds a NPDES permit with an accepted 316(b) demonstration, a re-evaluation of entrainment and impingement should only be required under specific circumstances such as: (1) when there has been material change in the operation of the facility that would increase the extent of impingement or entrainment; (2) when technological improvements are determined to be ineffective; (3) when restoration projects have failed; and (4) when significant changes are made to the cooling water intake structure. New and significant information should be evaluated through consultation with state and federal natural resource agencies to determine whether species of concern (threatened and endangered species) may be present or changes in the fishery have occurred which may significantly increase the rate of impingement and entrainment at a facility.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.034.035

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.09
Permit applications/implementation schedule

Streamline the Implementation.

EPA is concerned about the potential burden on permitting agencies associated with the implementation of the proposed rule. Georgia Power believes that one of the best opportunities to minimize the impact of the proposed rule on both the responsible agencies and the regulated community is through the permit implementation process. The implementation process needs to be streamlined. Too much information is being required at the permit re-issuance application first step. The responsible agencies are likely to be overwhelmed and the permitees are likely to struggle with having to address so many issues at one time.

Under the proposed rule, owners or operators must submit the following information when applying for a re-issued NPDES Permit: (1) physical data to characterize the source waterbody in the vicinity where the cooling water intake structures are located (proposed 40 CFR § 122.21 (r) (2)); (2) data to characterize the design and operation of the cooling water intake structures (proposed 40 CFR 122.21 (r) (3)) which is to be provided in two components, the first being the cooling water intake structure data and, the second being the existing facility cooling water system description; and (3) a Comprehensive Demonstration Study (proposed § 125.95(b)). Only facilities with closed-cycle, recirculating systems (or their equivalent) are not required to provide the Demonstration Study. Georgia Power believes that this amount of information will be overwhelming to the agencies and may have numerous negative results. Georgia Power recommends a more streamlined/orderly approach as follows:

-All permittees with permits that will expire within two years after the date the rule becomes final shall submit information to the responsible agencies in two steps. In step one, the permittee shall submit: the source water physical data; the cooling water intake structure data; and the existing facility cooling water system description to the director within 60 days of the permit expiration date. These permittees should be required to follow the normal permit renewal process (i.e., new permit conditions related to the 316(b) rule will not be imposed in the first renewal process for permits that will expire within the first two years after the date the rule becomes final). This information gathering stage merely gives the agency the ability to determine (1) whether the facility has a closed-cycle recirculating system and is therefore in compliance with the rule, or (2) what performance standard the facility would need to comply with absent a request for a site-specific determination.

-In step two, facilities with permits that will expire within two years after the date the rule becomes final and that do not have closed-cycle recirculating cooling systems (or their equivalent) should be required to submit a Comprehensive Demonstration Study within two years from the day the permit expires. The permitting agency will review the results of the Study and other factors, and shall request any necessary additional information. The permitting agency shall impose all 316(b) related permit conditions when the permit is renewed in the next renewal cycle.

-For those permits with expiration dates beyond the two years after the date of the final rule, steps one and two above are consolidated. The permittee shall submit (1) the physical data to characterize the source waterbody; (2) data to characterize the design and operation of the cooling water intake structure; and (3) a Comprehensive Demonstration Study along with the normal permit renewal application.

EPA Response

EPA has added many efficiencies to today’s final rule since the proposal and NODA to provide options for streamlining application requirements. Please see response to comment 316bEFR.034.005 and the preamble to the final rule.

Comment ID 316bEFR.034.036

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 21.03

Monitoring requirements

Streamline the Verification Monitoring and the Post Permit Monitoring Requirements.

All monitoring activities related to verifying that the various 316(b) compliance measures are effective should cease after sufficient data has been collected. "Sufficient" should mean nothing more than representative data. There should be no minimum monitoring period. The permit writer should be given the flexibility to craft appropriate monitoring requirements.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.034.037

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 3.07

Special definitions

EPA Should Provide a Definition of "Significantly Greater."

Under the proposed rule, the owner or operator of an existing facility may demonstrate to the Director that a site-specific determination of best technology available is appropriate for its facility if the owner or operator can meet one of the two cost tests. 67 Fed. Reg. at 17145. To obtain a site-specific determination, the facility must first demonstrate (1) that its costs of compliance with the applicable performance standards specified in proposed § 125.94(b) would be significantly greater than the costs considered by the Administrator in establishing such performance standards, or (2) that its cost of complying with such standards would be significantly greater than the environmental benefits at the site.

EPA has not provided any meaningful guidance concerning the term "significantly greater." To begin with, it is not clear why "significantly" is even part of the analysis. From an economic standpoint, Georgia Power believes that it should be enough that the costs of compliance are "greater" than the EPA costs or that the costs are greater than the benefits to be able to qualify for a site-specific determination. We fail to see any reason, whether legal or purely economic, to oppose a site-specific determination when the costs outweigh the benefits under the performance standards approach. To the extent EPA's primary concern and, the reason for its insertion of "greater," is because of potential administrative costs associated with reviewing the appropriate documentation in support of a site-specific determination, EPA could encourage permit writers and agency experts to consult with the owner or operator as much as needed to make the permit writer's work as easy as possible. In other words, Georgia Power, and probably most, if not all of industry, would be happy to do as much as possible to ease the permit writer/agency workload.

One thing is for sure, it would certainly ease the burden on both EPA and the regulated community if EPA were to provide clear and precise guidance on the meaning of "significantly greater." One way to do this is to identify a cap, beyond which a presumption of "significantly greater" would be established (e.g., 25% more than EPA's estimated compliance costs or if the costs exceed the benefits by more than 25%).

EPA Response

EPA has not defined the term "significantly greater" in today's final rule. It is EPA's position that the determination of what constitutes "significantly greater" should be determined on a case-by-case basis, based upon the cost tests presented by the applicant. Please refer to comment 316bEFR.006.003 for more details.

Comment ID 316bEFR.034.038

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival Has Been Documented.

The proposed rule would establish a performance standard for reducing entrainment, not entrainment mortality. In fact, the proposed rule does not account for entrainment survival. EPA does not provide a credible basis for not recognizing entrainment survival. In particular, EPA states that it chose to regulate entrainment because it does not have sufficient data to establish performance standards based on entrainment mortality. Limited data or the absence of data should not preclude a facility from justifying compliance with the performance standard, at least in part, on the basis of credible scientific data that species survive.

EPA Response

Please see response to comment 316bEFR.305.001 regarding the inclusion of entrainment-based performance standards.

Comment ID 316bEFR.034.039

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 7.02.02

RFC: Directors set performance levels for a facility?

Should EPA require the greatest achievable reduction (within the proposed ranges), or leave it to the Director to determine appropriate performance levels? 67 Fed. Reg. at 17142, Col. 1.

EPA should leave it up to the Director (or the states) to determine appropriate performance levels. <FN 5> Further, leaving this determination up to the Director or the states will enable more flexible use of each facility's uniqueness while still within the performance range. In addition, if a trading program is put in place, the market will entice facilities to achieve the greatest possible reduction where they will gain a marketable commodity from doing so. Also, mandating the greatest achievable reduction increases the burden, possibly in a very uneven way, on facilities.

Footnotes

5 As stated earlier in Part II.A. of this document, EPA should go even further and lower the performance ranges.

EPA Response

EPA has adopted national performance standards for today's rule but notes that in considering a permit application, the Director must review the performance of the technologies implemented and require additional or different design and construction technologies, operational measures, and/or restoration measures, if needed, to meet the impingement mortality and entrainment reduction, or production, requirements for all life stages of fish and shellfish. In addition, the Director may consider any other factors including chemical, water quality, and other anthropogenic stresses on the source waterbody and other factors in determining whether to impose more stringent conditions to comply with the requirements of the applicable State and Tribal law or other Federal law (see § 125.94(f)).

Comment ID 316bEFR.034.040

Subject Matter Code 7.02

Performance standards

Author Name Michael E. Wilder

Organization Georgia Power

Should EPA require compliance with the performance standards, or should the rule specify that proper design, installation, operation and maintenance would satisfy the permit terms until it is reissued? 67 Fed. Reg. at 17143, Col. 3.

The rule should specify that proper design, installation, operation and maintenance will satisfy the permit terms until the permit is re-issued. To the extent that the permitting authority requires specific information for a determination of compliance, such information can be requested when the permit is being renewed. In any event, Georgia Power believes that if any compliance monitoring is required, it must be streamlined.

EPA Response

Please see response to comment 316bEFR.029.040.

Comment ID 316bEFR.034.041

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Should EPA grant exception for an entity whose costs are "significantly greater" rather than "wholly disproportionate to the costs in EPA's record"? 67 Fed. Reg. 17146, 17166.

"Significantly greater" is a more appropriate standard. Georgia Power agrees with EPA's effort to make the site-specific determinations more available to Phase II facilities, for which complying with new technological standards may be more complicated than for Phase I facilities. Also, site-specific determinations in general are an appropriate way to allocate the burdens of compliance, and the "significantly greater" standard in particular is a more reasonable means for allowing that option to be pursued where merited. Note, however, as discussed in Part II, Georgia Power believes "significantly" should be dropped so that site-specific determinations can be pursued where the cost to the facility is "greater" than EPA's costs.

EPA Response

Comment supports rule. Regarding "significantly greater" versus "greater," see response to 316bEFR.018.009.

Comment ID 316bEFR.034.042

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

Will the proposed performance standards, which are less stringent than Phase I threshold, invite backsliding by facilities that already have superior technologies than this proposed rule requires? 67 Fed. Reg. 17146, Col. 2.

State and federal law allow backsliding only under certain narrow circumstances. Those laws should continue to apply regardless of this rule.

EPA Response

See response to 316bEFR.021.013.

Comment ID 316bEFR.034.043

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

Should restoration measures be allowed only as a supplement to installing control technologies or operational measures? 67 Fed. Reg. 17146, Col. 3.

No, as discussed in Part II, restoration should be allowed as a 100% substitute, where it will achieve similar or better results as installing the proposed technologies. The purpose of the rule is to reduce impact; EPA should explore all ways to do so. Furthermore, the more restoration is allowed, the greater the possibility facilities will have credits to sell and trade; the more efficiently facilities can allocate resources to meet the standard, the better the results.

EPA Response

Facilities may use restoration measures under the final rule either in lieu of or in combination with technologies that reduce impingement mortality and entrainment. All restoration measures must satisfy the requirements in the final rule, including those described in sections 125.94 and 125.95.

Under the final rule, permitting agencies may develop trading programs. For additional discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.034.044

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Should voluntary restoration measures be considered in determining what counts toward compliance? What criteria should be included for measuring effectiveness? 67 Fed. Reg. 17166, Col. 3.

Any restoration effort should be considered toward compliance. Restoration is an excellent way to give industry the flexibility it needs in trying to achieve meaningful reductions in impact. EPA should focus on the overall goal of building and maintaining sustainable communities of the species involved. Restoration is another way of achieving that goal, and may significantly improve the cost-effectiveness of reducing adverse environmental impact.

The appropriate criteria to determine effectiveness will vary and should be left up to the Director and the state's natural resources expertise.

EPA Response

For a discussion of the general role of restoration measures in the final rule, see EPA's response to comment 316bEFR.056.006.

Restoration measures must meet the requirements described in the final rule, including those in sections 125.94 and 125.95.

EPA believes the inclusion of the option to use restoration measures in the final rule provides permitting authorities and permittees with additional compliance flexibility.

For a discussion of the roles and responsibilities of the permitting authority, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.034.045

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Author Name Michael E. Wilder

Organization Georgia Power

Which, if any, restoration approach makes the most sense: discretionary, mandatory or restoration banking? 67 Fed. Reg. 17169 - 17170.

Discretionary restoration with the option of restoration banking. Each situation is too different, and facilities and permitting agencies need the discretion to employ appropriate restoration where they make the most sense. As a practical matter, mandatory restoration is unwise as it ignores cost benefit considerations, especially in situations where a technological fix will not only be less costly, but can also be implemented much more rapidly with almost instant results. As a legal matter, the Clean Water Act does not authorize nor give EPA authority to require restoration in the NPDES permitting context. Still, restoration should be strongly encouraged and made broadly available as an option. Same with restoration banking -- this should be made available, but not mandatory. It is a means for bringing market forces to bear on allocating resources, so the market forces should be left to decide how it works.

What should be the spatial scale on which restoration can take place and be attributable to a facility? Water body, watershed, state…? 67 Fed. Reg. 17146, Col. 3.

The largest possible scale on which restoration will, as a biological matter, adequately displace impacts. This may be complicated, but EPA should strive to broaden the availability of restoration if the program is to work.

How do you measure "substantially similar performance" of restoration measures? What can be done to reduce the uncertainty? How do you measure success or failure? Should a facility be required to restore more individual species than are being impinged/entrained? 67 Fed. Reg. 17147, Col. 2.

Restoration is imprecise, and its success or failure should be measured in terms of whether, over the term of the permit, and beyond, as appropriate, the restoration measure provided a similar level of stability to the overall population of the species in question that other technologies meeting the standards would have provided.

A facility should not be required to restore more species than are impacted. However, for purposes of trading or other state or local reasons, a facility should be allowed to restore more than are impacted. One way to continue to emphasize the need for the broadest parameters for restoration and credit trading is that if restoration is encouraged on a larger scale, we will have better and better information about it, and future restoration efforts may not be so uncertain.

EPA Response

For a discussion of the extent to which restoration is voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

For a discussion of the appropriate spatial scale on which to implement restoration measures, see EPA's responses to comments 316bEFR.212.001 and 316bEFR.059.008.

For a discussion of the role of the permitting authority in determining the appropriate For a discussion of the extent to which restoration is voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of the requirement to consider design and construction technologies and operational measures before choosing to implement restoration measures, see EPA's response to comment 316bEFR.033.005.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

All restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.034.046

Subject Matter Code 11.07

RFC: Restoration above BTA level

Author Name Michael E. Wilder

Organization Georgia Power

Who is the appropriate authority for establishing margins of safety and measures to ensure safety of restoration activities? What is an appropriate basis on which to add safety margins (e.g. project uncertainty, nature of species, etc.)? 67 Fed. Reg. 17147-8.

EPA should establish some guidance in the final rule on restoration ratios, with some flexibility. However, this is an area where the permit writer must rely on the State Water Resources and Fisheries expertise. A "one-size-fits-all" approach to this issue would only discourage practical and highly beneficial uses of restoration.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to satisfy the requirements of the final rule, see EPA's responses to comments 316bEFR.060.026 and 316bEFR.212.001.

Comment ID 316bEFR.034.047

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

Should additional (incidental) environmental benefits be considered besides impingement and entrainment in determining proper restoration measures? (e.g., habitat conservation). If so, how? [key: restoring water quality may benefit species more than reducing direct impacts] 67 Fed. Reg. 17148.

Absolutely. EPA’s goal should be focused on preservation of the aquatic environment, however that preservation is efficiently assured. If, for example, some action improves water quality in a way that contributes to the health of the population, by all means, credit should be given to the owner/operator.

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.034.048

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

Should fish & wildlife agencies be consulted or involved in restoration measures? If so, what information should be submitted to state, tribal or federal fish & wildlife agency? What should be the role of fish & wildlife agencies in any site-specific approach? 67 Fed. Reg. 17146-7, 17167

Fish & wildlife agencies should be involved in restoration issues, particularly state agencies, since it is not only largely their jurisdiction, but also because they are far more familiar with the particular issues of the individual water bodies. All relevant information already prepared for the application should be made available, as needed, to the fish & wildlife agencies. EPA should recommend that facilities consult with the fish & wildlife agencies in designing a site-specific approach.

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

Comment ID 316bEFR.034.049

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Are the narrative criteria at proposed 40 CFR § 125.95(b)(1) sufficiently comprehensive and specific to ensure adequate data is used to determine best available technology? 67 Fed. Reg. 17148.

In general, narrative criteria are difficult to implement and present opportunities for abuse. To improve this provision, EPA should specify with more clarity, exactly what is required. Further, EPA should use quantitative requirements whenever appropriate.

EPA Response

EPA agrees that the narrative criteria at § 125.95(b)(1) of the proposed rule alone will not be sufficient for basing a best technology available (BTA) determination. For this reason, EPA has required that facilities conduct quantitative studies or present existing data that is reflective of current conditions before state permitting Directors may make determinations as to which compliance option will be appropriate. Please refer to EPA's response to comment 316bEFR.034.066 for more details.

Comment ID 316bEFR.034.050

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 12.02

RFC: Monitoring frequencies

Should EPA set specific, minimum monitoring frequency requirements to deal with uncertainty? One suggestion: once a month over 24 hour period for at least 2 years following permit issuance. Would more frequent sampling be needed to accurately assess diel, seasonal and annual variations in impacts? 67 Fed. Reg. 17149.

EPA should not set minimum monitoring frequency, except to state that monitoring data should be generated as long as necessary to provide representative data. The Director should determine what frequency of monitoring would be appropriate, taking into consideration the circumstances unique to the situation. Some facilities will be dealing with very predictable outcomes, and should not be held to the same level of monitoring as a facility dealing with unique problems and stresses on the biotic population.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7) for review and approval by the Director. EPA has included a two-year monitoring minimum for facilities that must meet the specifications of a Verification Monitoring Plan. EPA feels that this is a reasonable, and not overly burdensome, means of verifying that the design and control technology or operational measures are meeting the performance requirements. The Director may consider additional monitoring requirements as well. For an explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Please also see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.034.051

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 13.0
More Stringent Requirements

Should EPA allow the Director to require more stringent controls where ordinary compliance would slow the recovery of a listed species? 67 Fed. Reg. 17151.

Only where impingement mortality and entrainment at the facility are clearly primarily responsible for the slow recovery. If there are numerous stressors affecting the species' recovery, the Director should be required to consult with the state's natural resources agency and, as appropriate, the US Fish & Wildlife Service to determine whether other factors should be more closely considered than the CWIS.

EPA Response

Please see response to comment 316bEFR.002.016 and 316bEFR.030.002.

Comment ID 316bEFR.034.052

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

Is the threshold of diverting 5% mean annual flow of a river useful for triggering entrainment controls? What about spawning season flow?

Georgia Power recommends using spawning season flows with a threshold of at least 15%

EPA Response

Please refer to the response to comment 316bNFR.034.022.

Comment ID 316bEFR.034.053

Subject Matter Code 15.01

RFC: State or Tribal alts. achieve comparable perf.

Author Name Michael E. Wilder

Organization Georgia Power

Should EPA allow states and tribes to suggest an alternate regulatory requirement at the watershed level which would achieve comparable reductions in impacts? If so, what should definition of watershed be? Should states be allowed to demonstrate comparable performance at the state level instead? 67 Fed. Reg. 17152.

This is a good idea. This is one potential mechanism for allowing states and tribes to continue with pre-existing, successful state programs.

EPA Response

Please see response to comment 316bEFR.099.020.

Comment ID 316bEFR.034.054

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.05
Role of States and Tribes (alt./equiv. programs)

What criteria should EPA use to determine whether an alternate state or tribal program to reduce impingement and entrainment mortality is "functionally equivalent"? Should restoration and habitat enhancement be part of a functionally equivalent program? 67 Fed. Reg. 17180.

Restoration and enhancements should certainly be part of a functionally equivalent program. The overall goal is protecting populations. Relying on "functionally equivalent" further emphasizes this point. EPA is right to focus on the bottom line of population protection, and all the features EPA has proposed -- trading, restoration, habitat enhancement, etc. -- help focus everyone on the primary purpose of reducing overall adverse impacts.

EPA Response

EPA believes that a State or Tribal program is functionally equivalent if the program will result in environmental performance within each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that will be achieved under 125.94 under today's final rule. The State or Tribe may use any methodology that it deems appropriate to achieve these levels.

Comment ID 316bEFR.034.055

Subject Matter Code 15.03

RFC: Watershed boundaries within political?

Author Name Michael E. Wilder

Organization Georgia Power

At what scale should a watershed be defined to reflect the variability of the receptors? Should watershed boundaries lie within political boundaries of a tribe or state? 67 Fed. Reg. 17152.

The watershed should be defined in the broadest possible terms which make sense as a biological matter. If the watershed goes beyond the jurisdiction of the state or Tribe, the state or Tribe should seek cooperation from the neighboring jurisdiction. If that cooperation can be established, comparable performance should go forward. Although this sounds complicated administratively, we believe in the long haul states and Tribes will successfully establish these relationships, and that industry will be able to allocate its resources toward their most effective use.

EPA Response

In the proposal, EPA requested comment on the appropriate definition for watershed with regard to achieving comparable environmental performance through alternative regulatory requirements in a State (§ 125.90(c)). In today's final rule, EPA has deferred the decision on the appropriate definition of watershed to the permit director. With regard to watersheds that cross political boundaries of a Tribe or State, the permit directors involved should consult each other.

Comment ID 316bEFR.034.056

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 7.01.03
Option 3--Site-specific determination

Should EPA use minimum standards for comprehensive cost evaluation studies (to qualify for the site-specific option)? EPA also invites comment on the burden reviewing these studies places on permitting agencies. 67 Fed. Reg. 17153.

Only if such minimum standards do not exclude any significant number of facilities from having a fair opportunity to present their case. It is reasonable to ask a facility for the information the Director needs, but it is not reasonable to exclude a facility that would otherwise qualify for a site-specific determination from seeking one because it has no way to get the information EPA is looking for. Any minimum standard should allow for exceptions. The important thing is that the standards be designed so no facility that would qualify for a site-specific determination is arbitrarily forced to comply with the proposed standard, and to absorb particularly high costs.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For more information on the cost-cost test and the cost-benefit test, please refer to the responses to comments 316bEFR.410.001 and 316bEFR.005.020, respectively.

Comment ID 316bEFR.034.057

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Should EPA base best technology available on closed-cycle, recirculating technology? 67 Fed. Reg. 17155.

No, EPA has gone on record concerning the prohibitive costs associated with existing CWIS, and how the Phase I rule was strengthened to take a more flexible approach toward existing facilities.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.034.058

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 21.08
Burden on permitting agencies (general)

What are the burdens of a site-specific option on permitting agencies? Have the resource requirements created a disincentive for revisiting permit conditions every 5 years? 67 Fed. Reg. 17167.

Georgia Power does not believe that site-specific determinations are necessarily more burdensome on the agency.

EPA Response

In today's final rule, EPA has preserved the site-specific determination of BTA option for facilities whose costs of compliance with the final rule may be significantly greater than the costs estimated by EPA, or whose costs may be significantly greater than the benefits of complying with the national performance requirements in 125.94(a). In addition, EPA has added several other compliance alternatives to provide flexibility for streamlining the permitting process (e.g., the pre-approved technology alternative at 125.94(b)(4) and compliance using a Technology Installation and Operation Plan at 125.94(e)). EPA believes that this approach will provide the combined benefit of addressing site-specific concerns and ensuring that permits are finalized in a timely manner.

Comment ID 316bEFR.034.059

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Should EPA allow impingement trading, as well as entrainment trading? EPA views impingement control as inexpensive, so there is more need for entrainment trading. 67 Fed. Reg. 17170.

If in fact impingement trading is truly unlikely to generate any real interest, then there is not much sense in establishing a program for it. But EPA should not be quick to dismiss it. There may be instances where facilities are located in close proximity and can work together to allocate the impingement mortality reduction more efficiently through credit trading. Again, trading programs -- for impingement mortality, entrainment, restoration -- all serve to make compliance more effective by reducing costs and maximizing benefits.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.034.060

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 20.02

RFC: Would trading afford greater protection?

Would a trading program afford greater watershed protection by being designed to increase the number of facilities involved?

Absolutely. Trading programs are designed to spread the resources across a large spectrum of responses to a similar problem. EPA's mission is to lessen CWIS impacts nationwide. It makes sense that programs to make the best use of resources, such as a trading program, will necessarily result in more reduction of impacts.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.034.061

Author Name Michael E. Wilder
Organization Georgia Power

Subject Matter Code 20.08
RFC: Challenges of implementation of trading

Should it be mandatory to consider credit purchases before the Director determines technology requirement? 67 Fed. Reg. 17170.

No.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.034.062

Subject Matter Code 20.03

Spatial scale for entrainment trading

Author Name Michael E. Wilder

Organization Georgia Power

What should the spatial scale be for trading? Waterbody? Watershed?

General waterbody type - the scale that will encourage the most trading - although EPA should monitor trading to ensure that neither impacts nor benefits become too geographically concentrated as a result of trading.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale of trading. Should a State voluntarily choose to adopt a trading program under 125.90(c), EPA will evaluate the State's proposal to ensure the program will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established under 125.94. However since trading would be a State program, implementing, monitoring and cataloging the trades within a trading program must be performed by the State, and not by EPA, to ensure that impacts are not inappropriately geographically concentrated.

Comment ID 316bEFR.034.063

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 20.04

RFC: Potential trading units/ credits

What should be the trading unit? Species density? Species counts? Biomass? Should trading be species-specific? 67 Fed. Reg. 17171.

Species density makes more sense than species counts, since density speaks more to the overall health of the population than simple counts, which fail to account for variations in population size. Biomass is too general to prevent impacts to a certain species; trading should at least attempt to be species-specific to ensure that the offsets are truly offsets.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion regarding the appropriate unit for trading.

Comment ID 316bEFR.034.064

Subject Matter Code 20.03

Spatial scale for entrainment trading

Author Name Michael E. Wilder

Organization Georgia Power

Should a national register of trades be established, as opposed to doing it on the local scale? 67 Fed. Reg. 17173.

Yes. Again, as long as it satisfies the biological benefits of a trading program and does not concentrate impacts or benefits, it should be done on as large a scale as possible.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale of trading. Should a State voluntarily choose to adopt a trading program under 125.90(c), EPA will evaluate the State's proposal to ensure the program will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established under 125.94. However since trading would be a State program, implementing, monitoring and cataloging the trades within a trading program must be performed by the State, and not by EPA, to ensure that impacts are not inappropriately geographically concentrated.

Comment ID 316bEFR.034.065

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 20.07

RFC: Harmonize of permit reissuance with trading

When should permits be reissued to trading partners? Should timing be harmonized among partners in a trading area? 67 Fed. Reg. 17173-75.

Harmonizing trading could cause more problems than it solves. If a facility has a credit to sell, it should be able to hang on to that credit until it finds a trading partner, even after it receives its permit. The timing issue should be made an issue for purchasers of credits only, since these facilities will need to procure credits to show that they meet the standard. If the system can be designed so that the sellers are under no time pressure to sell their credits, but still have plenty of incentive to create saleable credits even in the absence of an immediate buyer, then there should not be a major timing issue.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.034.066

Author Name Michael E. Wilder

Organization Georgia Power

Subject Matter Code 21.01

Submittal of required information

Should EPA establish a specific time frame for submitting the information collecton proposal required as part of the Comprehensive Demonstration Study? Should the Director's approval of the info collection be required? 67 Fed. Reg. 17175

There is no reason to mandate a timing. Facilities should know that submitting the information collection in advance is in their interest. Approval of the director is not necessary, either, although the director should be required to respond if any additional information is needed within 60 days of receiving the information collection, so that facilities will have time to follow up.

EPA Response

As outlined in the preamble to today's rule, EPA has clarified the timeframe for the required studies. The timeframe is based on the amount of data gathering and research activities required by the final rule. For a typical facility that will install technology, EPA expects section 316(b) activities to commence prior to reissuance of the permit with submission of the Proposal for Information Collection. The Director would then review the Proposal for Information Collection and provide comments to the facility. The facility may begin the required studies prior to receipt of comments from the Director at its discretion. As stated in the preamble, it is expected that a facility may need about one year to complete the necessary studies. For facilities not having to install a technology, the timeframe for information collection activities may be shorter. Facilities currently holding a permit must submit the majority of application information and data 180 days prior to the end of the current permit term, including all information required under 40 CFR 122.21(r)(2), (3), and (5) and all sections of § 125.95. EPA has revised the regulation to account for facilities whose permits expire four years from the publication of the rule. In these situations, the facility would submit the required information according to a schedule determined by the Director after submission of its permit application. The Director will review the application materials and prepare a draft permit for public review and comment. This provides the applicant and other interested parties an opportunity to review the draft conditions and provide feedback to the Director. Following the comment period, the Director will address all comments and prepare the final permit.

If the permit is reissued prior to the completion (or consideration) of the studies, section 316(b) requirements would need to be included in the permit on a best professional judgment (BPJ) basis.

EPA believes that this schedule is reasonable and will not force facilities into noncompliance. The Agency has built a tremendous amount of flexibility into the rule, including in particular, the facility's choice to comply using a Technology Installation and Operation Plan and/or Restoration Plan (see preamble for further discussion).

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Roger Claff

On Behalf Of:

Cooling Water Intake Structures Coalition

Author ID Number:

316bEFR.035

Comment ID 316bEFR.035.001

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Clarify that storm water permits do not subject an otherwise non-applicable facility to coverage under the Phase II rule.

EPA proposes to apply the Phase II rules to existing power generation facilities that (1) are point sources subject to an NPDES permit, and (2) use a cooling water intake structure (CWIS) to withdraw certain amounts of cooling water from waters of the United States. Indeed, the preamble discusses a hypothetical facility that discharges wastewater, storm water, and cooling water, or some combination thereof, and suggests that the permitting agency would include CWIS requirements in the NPDES permit. The preamble then goes on to state:

In the event that a Phase II existing facility's only NPDES permit is a general permit for storm water discharges, the Agency anticipates that the Director would write an individual NPDES permit containing requirements for the facility's cooling water intake structure. The Agency invites comments on this approach for applying cooling water intake structure requirements to the facility. 67 Fed. Reg. 17129.

The Coalition disagrees with EPA's assertion of jurisdiction over facilities that have NPDES permits only for storm water. There are both legal and practical arguments against such an approach. First, Section 316(b) of the Clean Water Act (CWA) does not grant EPA comprehensive authority to address all cooling water intake structures. Instead, EPA is directed to develop Best Technology Available (BTA) requirements in connection with "any standard established under section 301 or section 306 and applicable to a point source." The special provisions addressing storm water discharges
in CWA section 402(p) were enacted subsequent to that directive in section 316(b), and in any case they do not constitute a "standard established under section 301 or section 306." There is thus no indication that Congress intended that a facility subject only to a storm water permit would have to comply with section 316(b) standards.

In addition to the absence of CWA statutory authority for applying the proposed rule to storm water permits, there are a number of practical reasons why it would be inappropriate for EPA to do, especially considering the potential impacts that such an action would have if similarly applied in Phase III. If EPA were to subject to section 316(b) those facilities whose only direct discharge is storm water, most of which are subject to an NPDES general permit, EPA would be imposing a significant administrative burden on both the regulated community and on state and EPA permit writers. Permitting authorities would have to somehow identify such facilities and then develop, following procedural requirements that apply to NPDES permitting, individual NPDES permits for such facilities for the first time. EPA should avoid imposing this burden, in light of its lack of statutory authority and the questionable environmental benefit to be obtained from such an action.

EPA Response

The final rule applies to Phase II existing facilities that meet the requirements in § 125.91. These provisions include a requirement that such facilities constitute a point source (i.e., they discharge or might discharge pollutants from a point source to waters of the Unites States and thus have an NPDES permit or may be required to obtain one). As noted in section II of the preamble to the final rule, the requirement that a facility is a point source that has or is required to have an NPDES permit includes being subject to a storm water permit. Facilities subject to storm water permits are addressed under this rule because section 316(b) requirements apply to all point sources subject to standards under CWA §§ 301 or 306 (i.e., 316(b) does not exclude any categories of NPDES-permitted facilities from its requirements).

With regard to EPA authority for this approach, the requirements of section 301 establish, in conjunction with section 402, the basic framework for the NPDES permitting program, including permitting of storm water discharges. Section 402(p) of the CWA is a component of this permitting authority but does not provide stand-alone authority for storm water permitting. Rather, it addresses when storm water permits can be issued and to whom, as well as specifies certain permit and permit application requirements. In fact, EPA has permitted storm water discharges well before the enactment of section 402(p). In addition, section 402(p)(3)(A) itself specifies that permits for discharges associated with industrial activity must meet all applicable provisions of section 301. Thus, storm water NPDES permit requirements are sufficiently among the requirements and standards established pursuant to section 301 and 306 to justify application of section 316(b) to permitted storm water discharges.

EPA does not agree that it would be highly impractical to implement 316(b) requirements at facilities with storm water permits. Given the applicability requirements in § 125.91, which includes a requirement that the design intake flow at a Phase II existing facility must be 50 MGD or greater, available data regarding in-scope facilities with only storm water permits does not suggest that a significant number of Phase II existing facilities possess only storm water permits, and will be required to comply with this rule. Thus, any burden associated with this aspect of the Phase II rule is expected to be limited.

Comment ID 316bEFR.035.002

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.06

RFC: Cooling water withdrawal thresholds of 25%

The definition of a cooling water intake structure, and the applicability threshold for the rule, should be based on a minimum of 50% of the intake water used for cooling purposes. EPA should not require monthly determinations of the applicability of the Phase II rule on the basis of water use.

The proposed rule states, in effect, that it applies to an existing facility if the facility is a point source with a water intake structure, and the facility uses for cooling purposes at least 25% of the water drawn through that intake structure. As Coalition members stated in comments on the Phase I rule, there is no logical reason for asserting that an intake structure constitutes a "cooling water intake structure" where the primary purpose of the intake structure is to withdraw water for non-cooling purposes. A cooling water intake structure should be one that withdraws water where more than 50% of the water is used as cooling water, i.e., where the primary purpose for the structure is to withdraw cooling water.

Regardless of whether the applicability threshold is 50% or 25%, or some number in between, though, EPA needs to provide clearer and more practical guidance on how to determine if the threshold is met. Section 125.91(d) of the proposed rule discusses how one calculates whether 25% or more of water withdrawn is used for cooling water.
Unfortunately, the language of the proposed rule would create serious implementation problems.

The proposed rule states that the 25% threshold "is met if any monthly average of cooling water over any 12 month period is 25 percent or more of the total water withdrawn." Besides the ambiguous language used, the primary problem with this approach is that it seems to suggest that a facility make a determination every month as to whether or not it is within the scope of the rule. Applicability of the Phase II rule is a very important determination with significant financial and other resource consequences. It is both unreasonable and impractical for the regulated entity, as well as the permitting authority,
to be expected to make this determination every month. Moreover, withdrawal rates may vary from month to month due to seasonal or process variables, and facilities should not be subject to the rule simply because cooling water use percentages may marginally exceed 25% (or other applicability threshold) in a given month.

We suggest instead that the rule require that the calculation be made once at the time the facility submits its application for renewal of its NPDES permit. At that time, the facility should review the previous 12 months of flow data or, alternatively, a representative 12-month period between permit renewals. If the total amount of cooling water used during
that period is 25% or more of the total flow for that period, then the facility would be subject to the Phase II rule. If not, the facility is not subject to the rule. This determination would be revisited each time a permit is renewed and would be based on the previous five years' worth of data.

This approach provides a high degree of certainty for both the facility and the permitting agency as to the basic question of whether a facility is subject to the rule. It also is comparable to the approach

EPA has taken for applying production-based effluent limitations guidelines, where application of the guidelines and calculation of mass effluent limitations based on production occurs at the time a permit is issued or renewed, not on an ongoing basis.

EPA Response

The 25% threshold in today's rule is to be measured on an annual average basis, for reasons set forth in the preamble.

Comment ID 316bEFR.035.003

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Permittees should have the option of meeting an actual flow threshold in lieu of the 50 MGD design flow threshold.

The proposed rule lists a design intake flow of 50 million gallons per day (MGD) as one of the criteria for applicability of the proposed Phase II regulations. In many cases, however, actual intake flow is below the design capacity. If a permittee is willing to accept permit limitations that restrict its actual water use to some level below 50 MGD, and thereby not be subject to the Phase II regulations, EPA should encourage such actions as a means of reducing the potential for entrainment and impingement, which the rule seeks to avoid.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.035.004

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

EPA should exempt emergency intakes.

The Coalition suggests that EPA exempt "emergency" intakes from the coverage of the Phase II rule. Due to drought conditions in some areas of the U.S., facilities may need to install emergency pipes and intakes upstream of the facility to avoid saltwater intrusion in the water intake zone. In some cases these intakes would be only temporary. In other cases, they might be permanent, but with use on an infrequent basis. EPA should exempt these temporary intakes or permanent intakes if or when operated a small percentage of the time. EPA could justify such an exemption on the de minimis nature of the amount of time of operation.

EPA Response

Please see response to comment 316bEFR.041.202.

Comment ID 316bEFR.035.005

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

In developing the Phase III regulations, EPA should assess whether minimal adverse environmental impact already exists.

The Coalition notes that section 316(b) of the CWA imposes requirements for "minimizing adverse environmental impact." Thus, if there are levels of entrainment or impingement below which there is no environmental significance, i.e., where there is no "adverse environmental impact," then no additional BTA requirements for CWIS are authorized or necessary under that provision. For this reason, if EPA decides to regulate CWIS for Phase II facilities under an approach similar to that required when promulgating effluent guidelines, EPA is not bound to use a similar approach in its Phase III rulemaking. In Phase III, which is applicable to manufacturing facilities and certain electric power facilities, EPA would be well within its statutory authority to find that requirements are not applicable to a facility's CWIS if the agency is unable in the first instance to determine that there is an adverse environmental impact from the operation of that intake. Indeed, EPA should make such a finding before imposing additional restrictions on a facility's CWIS under section 316(b).

The Coalition believes EPA should make a determination of adverse environmental impact the first inquiry before imposing particular technology requirements on Phase II facilities, as well. But even if EPA declines to do so here, that should not prevent EPA from making a determination of adverse environmental impact the first step in considering technology requirements for the smaller Phase III facilities.

EPA Response

The commenters remarks regarding the Phase II rule are beyond the scope of this rulemaking. In response to the commenter's remarks on Phase II of the rulemaking, see the preamble, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.035.006

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.05

Facilities not covered by today's proposal

Remove the proposed imposition of Best Professional Judgment requirements.

The proposed Phase II rule contains a provision that is certain to cause confusion and is potentially the source of regulatory uncertainty, controversy, and litigation. Proposed 40 C.F.R. § 125.90(c) states that: "Existing facilities that are not subject to this subpart [the Phase II rule] must meet requirements under section 316(b) of the CWA determined by
the Director on a case-by-case, best professional judgment (BPJ) basis." The apparent effect of this provision would be to subject any facility with an NPDES permit and withdrawal of any amount of surface water for cooling purposes to case-by-case section 316(b) BPJ determinations.

This provision unnecessarily blurs the distinction between Phase II and Phase III facilities. EPA appears to be directing permit writers to impose BPJ section 316(b) conditions on Phase III facilities (and even facilities with de minimis impacts or falling below the applicability thresholds in an eventual Phase III rule) before EPA promulgates the Phase III rule. The benefits and objectives of the phased rulemaking addressing different types of facilities in different rules would be contravened by including a provision in the Phase II rules that sweeps in all of the Phase III facilities as well.

The language in proposed section 125.90(c) is unnecessary. Although EPA claims that the authority for applying BPJ interpretations for purposes of section 316(b) requirements already exists, it has never included such a requirement in its regulations, including the 40 C.F.R. Part 125 Subpart A regulations on establishing BPJ permit limits. If EPA believes that its rules have always allowed imposition of case-by-case requirements for cooling water intake structures, then there is no need to modify the regulations now. By including express BPJ language in section 125.90(c) of the proposed Phase II rule, EPA seems to imply a greater need for BPJ requirements for Phase III intake structures now, when in fact the opposite is true: Phase III facilities will be addressed shortly in a new rulemaking, so it would be particularly inefficient and problematic to direct permit writers to begin issuing BPJ requirements for Phase III facilities that have been operating without any BPJ intake structure requirements for many years.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.035.007

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.0

Scope and Applicability of Proposed Rule

Moreover the proposed Phase II regulations give no guidance as to when BPJ permit conditions are required. In fact, proposed 40 C.F.R. § 125.90(c) could be interpreted to require that BPJ requirements under section 316(b) be included in every NPDES permit for any facility with a surface water intake structure where any portion of the water is used for cooling purposes. Likewise, EPA provides no guidance in the regulations or preamble as to how the permit writer should establish BPJ section 316(b) permit conditions. The absence of details or specific interpretive guidance on the applicability of BPJ requirements makes it impossible for industry to comment comprehensively or specifically on this proposal. Even more importantly, the lack of specificity would leave permit writers and permittees with the difficult and resource-intensive task of trying to develop and negotiate permit conditions in a regulatory vacuum.

EPA Response

See response to 316bEFR.063.021. In addition, EPA acknowledges that BPJ-based permits may potentially be more resource intensive than permits developed under nationally applicable standards, such as those established in the final rule, but notes that all past 316(b) permits were developed in this case-by-case manner.

Comment ID 316bEFR.035.008

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.0

Scope and Applicability of Proposed Rule

Industry has both legal and practical concerns about the concept of BPJ limitations on intake structures in general. We have previously communicated some of those concerns to EPA and plan to do so in greater detail in the Phase III rulemaking. Apart from these specific concerns with BPJ, however, there is no justification for EPA implying consideration of BPJ limits for Phase III facilities in the Phase II rule.

If a state permitting authority believes that an intake structure at a Phase III facility needs to be regulated before EPA promulgates the Phase III rule, and if that state has a state law that authorizes imposition of requirements on cooling water intake structures, then under Clean Water Act section 510 the state would be able to impose those more stringent requirements. States do not, however, have any authority to come up with their own case-by-case interpretation of the regulations EPA is developing under section 316(b). The BPJ language of the Phase II proposal incorrectly implies that they do.

Another aspect of BPJ authority provided by proposed 40 C.F.R. §125.94(e) is the provision to authorize the permit writer to: "establish more stringent requirements as best technology available (BTA) for minimizing adverse environmental impact" if the permit writer determines that compliance with the technology requirements of the Phase II rule "would not meet the requirements of other applicable Federal, State, or Tribal law." Again, this provision is both confusing and unnecessary. It makes no sense to suggest that a given set of technologies for minimizing adverse environmental impact from a cooling water intake structure constitutes BTA unless use of that technology would not meet the requirements of some other applicable law. While there may be some other law that requires imposition of more stringent conditions on a particular cooling water intake structure, those more stringent conditions would not be determinative of BTA; rather, they would be imposed by the other law as a requirement in addition to the BTA requirement of CWA section 316.

At a minimum, EPA should delete language suggesting that BTA may be dictated by other statutes, rather than the requirements of section 316(b) and EPA's implementing regulations. It would be preferable, however, to remove this provision altogether, which raises more questions than it answers and is not necessary for proper operation of the Phase II regulations.

EPA Response

See response to 316bEFR.063.021. In addition, EPA notes that this rule does not alter the existing State NPDES program authorization requirements. Under these requirements, with the promulgation of this rule, states authorized to administer the NPDES program must have or put in place sufficient authority and program requirements to ensure their State programs are at least as stringent as the federal program. Such authority includes the ability to develop BPJ-based permit conditions as provided in 125.90(b). Thus, States should have sufficient authority to implement this rule.

Finally, EPA has included 125.94(e) in the final rule, which allows a Director to require more stringent requirements as BTA if compliance with the rule's BTA requirements would not meet the requirements of applicable State and Tribal law or other Federal law. As discussed in the proposed rule at 67 FR 17150-17151, this provision has been included in part because, although States already have authority to include more stringent provisions based on State law, such is not the case where EPA is the permitting authority.

Comment ID 316bEFR.035.009

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.05

Facilities not covered by today's proposal

COGENERATION DEFINITION AND EXCLUSION

EPA should specify in the Phase II regulations that the rule does not apply to facilities whose primary business activity is not power generation.

The proposed Phase II regulation includes criteria for applicability if the facility "both generates and transmits electric power, or generates electric power but sells it to another entity for transmission." Section IV of the preamble clarifies the above applicability criteria by stating, "Today's rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by co-generation." The Coalition supports this statement and recommends that EPA include this in the regulations to provide more clarity on the applicability of the Phase II Rule.

EPA Response

See response to 316bEFR.050.002. Also see 125.91(b).

Comment ID 316bEFR.035.010

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.06.02

Cogeneration facilities

In addition, the discussion in proposed 40 CFR § 125.91(b), concerning the determination of whether an electricity-generating facility that shares an intake structure with another facility meets the 50 MGD threshold, should not be limited to cogeneration facilities. There may be situations where an electric-generating facility that is not a cogenerator nevertheless shares an intake structure with a manufacturing facility. In that case, only the portion of the water that is withdrawn for the electric-generating facility, and not that used for the manufacturing process, should apply toward the 50 MGD threshold.

EPA Response

The Agency agrees with the comment. The Agency has removed the reference to cogeneration facilities from the cited definition.

Comment ID 316bEFR.035.011

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.06.02

Cogeneration facilities

The definition of cogeneration should not include the phrase "from the same fuel source."

Section 125.93 of the proposed rule includes the following definition for a cogeneration facility: "Cogeneration facility means a facility that operates equipment used to produce, from the same fuel source: electric energy used for industrial, commercial, and/or institutional purposes at one or more host facilities and/or for sale to another entity for transmission..." (Emphasis added). It is not clear what the phrase "from the same fuel source" means and what it adds to the definition. No clarification can be found in the preamble. Our concern is that the phrase could be interpreted to exclude legitimate
cogeneration units from the "cogeneration" classification and therefore subject them (and the host facility) to Phase II applicability as independent power generators. It is important to note the statement in the preamble that "Today's rule does not apply to facilities whose primary business activity is not power generation, such a manufacturing facilities that produce electricity by cogeneration." 67 Fed. Reg. 17135.

The definition also has implications for Phase III. A host facility and associated cogeneration facility typically have access to a variety of fuel sources, e.g., natural gas purchased from public and private suppliers, natural gas produced as part of host facility operations such as petroleum exploration/production, as well as fuel gases and fuel oils produced during host manufacturing operations such as petroleum refining. For example, a host facility might use internally generated fuel gas to produce some electricity for the facility, while the associated cogeneration facility might generate electricity by buying
natural gas for gas turbines. This practice could be considered to constitute using different "fuel sources" under the proposed definition even though the cogeneration facility is clearly integrated with the host facility. The accuracy of the definition is not diminished if the words "from the same fuel source" are deleted, and such deletion would in fact eliminate the possibility of unintended restrictions on the type of facilities defined as cogeneration units.

EPA Response

The Agency notes the comment and has removed the definition of "cogeneration" from the final rule.

Comment ID 316bEFR.035.012

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.03

Definition: Waters of the U.S.

THE RULE'S TREATMENT OF COOLING PONDS AND LAKES NEEDS TO BE CLARIFIED

Ponds created specifically for cooling are treatment systems and are excluded from the definition of "waters of the U.S."
Existing 40 C.F.R. § 122.2, exempts "waste treatment systems" from the definition of "waters of the United States" for NPDES purposes. The definition reads, in part, as follows:

Waters of the United States means:
(a)All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide…Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States... <FN 1>

Thus, thermal treatment systems, including ponds and lagoons designed to meet CWA requirements (which clearly includes cooling ponds), are specifically exempted from the NPDES permit requirement. <FN 2> Because a cooling pond is a part of a plant's treatment system, the make-up water intake point should be considered the jurisdictional intake for the purposes of section 316(b).

Footnotes

(1) This definition contains a clerical error, in that 40 CFR §423.11(m), which used to define "cooling pond" now defines "coal pile runoff."

(2) Such systems, if created in waters of the United States, were at one time brought back within the application of the other criteria in the definition by the restrictive provision at the end of the treatment system exemption; however, that restriction was suspended in 1980 and no longer has any legal effect. Cooling ponds "as defined in 40 CFR 423.11" also fall outside the treatment system exemption. But the rule containing
the definition of "cooling ponds" cited in that parenthetical, which served as the basis for that restriction, was set aside by the Court of Appeals in Appalachian Power Co. vs. Train, 566 F. 2d 451 (4th Cir. 1977). Thus, as a matter of law, the cooling pond exclusion from the treatment system exemption no longer has any force or effect.

EPA Response

See responses to 316bEFR.006.001 and 015.002.

Comment ID 316bEFR.035.013

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.07

Special definitions

Disturbingly, EPA's proposed definition of "once-through cooling water system," section 125.93, says that such systems sometimes use "ponds." This definition may give the wrong impression, since cooling "ponds" are clearly "treatment systems" instead of "waters of the United States."

In the preamble, EPA says that it "interprets 40 C.F.R. §122.2 to give permit writers discretion to regulate cooling ponds as 'waters of the United States' where cooling ponds meet the definition of 'waters of the United States.'" To the best of our knowledge, EPA has never issued any such interpretation on a national basis, and the only EPA memorandum on point of which we are aware says that the reference to cooling ponds in section 122.2 may be interpreted as having no legal force or effect, thereby taking cooling ponds wholly outside the ambit of the definition. Letter from Robert Perciasepe, Assistant Administrator of EPA's Office of Water, to W. Ray Cunningham, Director, Water Management Division (EPA Region IV)(December 13, 1993). In any case, for purposes of implementing section 316(b), we believe strongly that EPA should find that cooling ponds (and, as discussed below, other man-made impoundments created solely or primarily for supplying cooling water) are closed-cycle cooling systems and are not waters of the United States subject to section 316(b).

EPA Response

Whether source water is a "water of the United States" will be determined on a case-by-case basis. Please refer to EPA’s response to comment 316bEFR.032.015.

Comment ID 316bEFR.035.014

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.07

Special definitions

EPA should consider cooling lakes and reservoirs to be closed-cycle cooling systems.

As explained above, cooling "ponds" should be excluded from "waters of the U.S." Cooling "lakes," formed by damming rivers or streams that are waters of the U.S., should be treated the same way for section 316(b) purposes. EPA has long asserted broad authority to define waters of the U.S. and to include and exclude waters from the definition of "waters of the U.S." where necessary to achieve the purposes of the Clean Water Act, although this claimed authority has been narrowed in some ways by Solid Waste Agency of Northern Cook Co. v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001). As a matter of public policy, EPA should treat both cooling ponds and cooling lakes, built in whole or in part to supply cooling water, as closed-cycle cooling systems that achieve the requirements of section 316(b). <FN 3>

Footnotes

(3) The same can be said of some reservoirs, which typically are man-made, highly engineered systems that in some cases were constructed primarily to supply cooling water and heat treatment. For example, many reservoirs in Texas and other parts of the Southwest were built primarily or solely for this purpose. Thus, states should have the authority to deal with reservoirs just as they do cooling lakes or ponds and treat them as part of a closed-cycle system where the reservoir is constructed primarily for cooling water supply and thermal treatment.

EPA Response

Please refer to EPA's response to comment 316bEFR.032.015.

Comment ID 316bEFR.035.015

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling lakes do not need additional intake technology, both because minimizing "adverse environmental impact" was considered when the impoundment was constructed and because experience shows that adverse environmental impacts generally do not occur in cooling lakes, which usually have thriving populations. <FN 4>

Footnotes

(4) See generally B. Parkhurst and H. McLain, An Environmental Assessment of Cooling Reservoirs (Oak Ridge National Laboratory NUREG/CR-0514, December 1978).

EPA Response

See response to 316bEFR.006.001. In addition, the final rule does not “grandfather” any particular prior decisions regarding compliance with section 316(b) requirements, including at facilities that use “cooling lakes.” However, it does provide in part that facilities that have reduced their flow to levels commensurate with a close-cycle recirculating system are not required to further demonstrate compliance with applicable performance standards, as well as that facilities can demonstrate that their existing design and construction technologies, operational measures, and/or restoration measures meet applicable performance standards . With regard to impacts, the comment does not provide any data that demonstrates that adverse environmental impact does not occur in “cooling lakes.” Where such lakes are waters of the U.S. and this rule applies, the final rule establishes requirements to minimize adverse environmental impact.

Comment ID 316bEFR.035.016

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

It makes no sense to expose existing facilities to the possibility that they will have to construct additional fish protection technologies on impoundments designed and constructed to provide cooling water.Furthermore, EPA does not appear to have made any attempt to identify the number of facilities with cooling lakes or thermal treatment reservoirs that would be required to retrofit additional technologies or the costs and benefits of such additional controls. In fact, a review of information EPA provides suggests that EPA assumed that all or most of these facilities would not be required to retrofit any additional technologies or do any additional studies.

EPA Response

With respect to cooling ponds as waters of the U.S., please refer to the response to comment 316bEFR.006.001.

With respect to EPA's review of facilities with cooling ponds, please refer to the response to comment 316bEFR.041.082.

Comment ID 316bEFR.035.017

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

PERMIT REQUIREMENTS MUST ALLOW FOR THE TIME NEEDED TO COLLECT DATA, ANALYZE IT, AND DESIGN, INSTALL, AND TEST INTAKE TECHNOLOGY

Because of the unusual nature of section 316(b), it should be construed as a one-time only requirement – that is, that once "best technology available" is determined for a plant, installing and operating that technology ought to relieve the plant of further section 316(b) obligations for life. The "location, design, construction, and capacity" of the cooling water intake structures are matters of design and construction, not operation, and Congress could not have intended that power plants be in the business of redesigning, demolishing, and reconstructing key components of their physical plant every five or ten
years.

Taking into account section 316(b)'s uniqueness in the CWA scheme, the most appropriate way to apply it would be as the National Environmental Policy Act (NEPA) is applied to, for example, a construction permit: a one-time review designed to achieve minimal "adverse environmental impact" at a reasonable cost.

If, on the other hand, EPA holds to its proposal to implement the section 316(b) rule by requirements in NPDES permits (which have to be renewed every five years), then two important questions arise. First, how are new requirements of the rule to be implemented for the first time? Second, what effect is the new rule to have on subsequent permit renewals that must take place every five years over the 40- or 50-year life of a facility?

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.035.018

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

The application process requires certain steps to be completed, some of them time-consuming.

A permit application addressing section 316(b) will presumably have to be submitted 180 days before an existing permit expires. The 180 days is the time provided in the current permitting regulations between permit application and expiration of the permit to allow for agency review.

EPA's Information Collection Request (ICR) (DCN 4-0001) raises puzzling questions about EPA's intentions as to the initial implementation schedule. For example, on page 47, the ICR says that 350 of the 539 facilities are scheduled to have permits issued during the first three-year ICR period (9/2000-8/2004). It adds that:

These facilities [i.e., the 350] will be on an accelerated schedule and thus will receive their permits as scheduled. Since these are existing facilities, it is assumed that they will be able to draw on some existing data. In addition, EPA assumes that these facilities will have reopener clauses included in their permits to allow for the results for the Impingement Mortality and Entrainment Characterization Studies to be submitted after permit issuance and for the permits to be modified based on the results of these studies, if necessary. The remaining 189 facilities will not receive their initial permit renewals until after the ICR approval period, and thus will have the full three years to perform their Impingement Mortality and Entrainment Characterization Studies prior to receiving their initial permit renewals.

Although the above passage is not entirely clear, it does recognize the need to consider where a permittee is in the application process when the section 316(b) rule becomes final. For example, a permittee who has already submitted an application for permit renewal when the new rule comes out in the Federal Register should not have to go back and rewrite the application to satisfy the new rule. Likewise, a permittee who has only a few days or weeks remaining before the deadline for application cannot be expected to comply with the new regulation on the old permitting schedule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a complete discussion.

See also response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule. See also the preamble to the final rule.

Comment ID 316bEFR.035.019

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Moreover, EPA needs to evaluate the different amounts of time that will be required to determine under the new rule BTA for different sites. A best-case situation would be where a facility already has performed a section 316(b) demonstration, where the data are still representative of current conditions in the waterbody, and where no additional construction or modification of the intake structure or installation of screens will be required. Even then, a permittee still might require six months to analyze existing data to demonstrate compliance with the 80-95% impingement mortality reduction and 60-90% entrainment reduction and then to write up a permit application.

A different facility might need far more time. It could easily require two, three, or even more years of biological monitoring to collect the data needed to calculate the impingement mortality and entrainment for the baseline, determine what technology might be required, calculate the impingement mortality and entrainment reduction to be accomplished by the new technology, and write up all this information in a permit application. If part of the solution was to create or improve a wetland, even more time would be needed to find a suitable wetland site and prepare a plan for improving it, let alone for doing the work and monitoring its success.

EPA Response

EPA recognizes that preparing the required studies could take several years. EPA has attempted to accommodate this in today's rule. EPA also recognizes that a determination of BTA may take several years depending upon the site conditions and design and construction technology and/or restoration measure(s) selected. In today's final rule, EPA offers five compliance alternatives, including a site-specific determination of BTA, to provide maximum flexibility to the facility and Director and to speed permitting. See response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.035.020

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09

Permit applications/implementation schedule

The best way to implement the BTA requirements would be to impose a permit condition setting out a process for choosing BTA.

The best way to implement the section 316(b) rule would be to have the permittee, as part of its permit application package, propose a schedule for developing the data collection plan, getting approval from the Director, collecting and analyzing the data, using the data to assess technologies, and preparing the BTA recommendation. This process, once
approved by the permitting agency, would be written into the permit as a permit condition, as would be the physical implementation or installation of the BTA once it was selected.

The permit could require that once the technology was finally selected, it would be installed within a certain amount of time (which time limit would have to be chosen carefully, since at the time the permit was written the choice of technology would not yet be known). Alternatively, once the technology was chosen, the permit could be modified to require that it be installed and operated. This would allow permits to be issued faster and eliminate most of the timing problems.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a complete discussion. For a discussion of compliance issues, see the preamble to the final rule.

Comment ID 316bEFR.035.021

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Time must be built in for agency review.

In the schedule described above for gathering data and choosing BTA, time also must be allowed for the permitting agency (the Director) to review and approve the key steps. For example, the Director will need to approve the data collection program and also, later, the permittee's choice of technology. The section 316(b) rule should make clear that time for agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies, Director review time, and permit compliance issues in today's final rule. See response to comment 316bEFR.034.066.

Comment ID 316bEFR.035.022

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09

Permit applications/implementation schedule

A "grandfather" period is needed for permittees who are very near the application deadline.

If EPA does not adopt the above-suggested reasonable approach of prescribing a data collection and analysis schedule in the permit, it will have to be much more careful about thinking through the timing of the section 316(b) requirements in the future. For permittees who have applied already for a permit renewal when the section 316(b) rule becomes final, and are thus in the period of agency review of the application, the permittee should not have to redo its application because of the new rule. In such a case, the succeeding five-year permit term should be the time in which the permittee complies with the new rule.

Similarly, if the new rule becomes final when a permittee is very near the time when its renewal application is due (for example, between 365 and 180 days before his permit expires), it would be almost as unreasonable to require the permittee to adjust its application process to the new rule. The practical difficulties in preparing a permit application, especially if biological monitoring is needed, suggest that the new rule should not apply, until the succeeding permit term, to any permittee which has one year or less until its permit expires when the section 316(b) rule becomes final.

EPA Response

EPA agrees with this comment. EPA has clarified timing requirements for the submittal of required studies. See response to comment 316bEFR.034.066.

Comment ID 316bEFR.035.023

Author Name Roger Claff
Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09
Permit applications/implementation schedule

Time is needed to collect data and prepare the application.

Assuming a permittee is more than one year away from having its permit expire (that is, more than six months away from having to file a renewal application), then it might be reasonable to expect it to complete an application to comply with the new rule during the present permit term. But whether this is in fact possible depends on the permittee's situation. How section 316(b) applies is site-specific, and this is as true of scheduling as of biology.

If the permitting authority expects to approve a permit requirement for new section 316(b) technology, then it will have to have a good deal of information. Assuming that some change, such as new fine mesh or wedgewire screens, will be required to meet the 80-95% and 60-90% reduction criteria, then the applicant will have to provide, and the agency will have to review, several things. First, the permittee may have to collect biological data. In particular, if its present configuration is not a shoreline intake with no impingement or entrainment reduction controls, then the permittee may have to sample the density of entrainable eggs and larvae at the place where such a baseline intake structure would have been placed. It may have to collect these data at certain times of the year when eggs or larvae are present, such as the spawning season, and this monitoring may have to be done for several different species. Then the egg and larvae density data will be used, along with information about the volume or flow of the waterbody and the intake flow, to model the number of eggs and larvae entrained for the baseline, for the existing intake technology, and for any new intake technology that may be required. An analysis will have to be done for impingement as well. <FN 5>

The permittee then will have to calculate the impingement mortality and entrainment at the plant as it is now configured to determine whether the 80-95% and 60-90% criteria are met by the plant "as is." If not, the permittee must explore new technologies, such as installing wedgewire screens, fine mesh screens, or an aquatic filter barrier. The permittee then has to do an analysis to show that one or more new technologies would reduce impingement mortality by 80-95% and (except for lakes and a few other waterbodies) entrainment by 60-90%. This analysis might have to be done for a variety of technologies and combinations of technologies, and the permittee might choose to analyze restoration measures or operating restrictions as well. If the costs are too high, the permittee may opt to do a site-specific cost- or cost-benefit analysis of available technologies. The results then would have to be written into a permit application and the data presented in a format that allows the permit writer to review them.

Depending on the complexities of the site and the amount of data already available, preparing an application could take more than two years – at least two years to collect data and half a year to analyze the data and write a permit application. Even this 2½-year period might not be enough to compare alternative intake technologies and design a new set of screens, let alone plan a wetland restoration. For a facility that required all this work before an adequate application could be completed, it would be unreasonable to require a completed application less than 2½ years after the rule became final.

One solution would be to require a complete application in compliance with the new rule only for permittees whose permits are due to expire more than three years after the rule becomes final (thus allowing 2½ years to prepare the application before it is due). A shorter period could be provided if the application was not required to have the final
answer of what BTA to install, but rather to have a conceptual plan for gathering the biological data and designing the intake technology.

Thus, EPA could require a full-fledged application with proposed technology for permittees whose permits expired more than three years after the rule becomes final; require a more abbreviated, conceptual application with a plan for data collection and analysis for those with less than three years before their permit expires (that is, less than 2½ years before the application is due); and require no compliance with the new rule (until the following permit term) for those with only one year or less left to prepare an application for renewal (one year before expiration) when the rule becomes final. Thus:

Time Before Permit Expiration When Section 316(b) Rule Becomes Final

```
    1 year        1 year       1 year        6 months
|           |           |           |           |
|           |           |           |           |

                                 Application      Permit
                                     due          Expires

|---------|------------------------|---------------------------------|

Full           Abbreviated permit              No permit
application     application                  application due
due by          required, with               until next permit
"application    data collection                   term
due" date       plan
```

If a less ambitious, conceptual application was allowed for permittees in the middle group, they would have to satisfy the permit writer that they had an adequate plan for collecting data. The permit, when issued, would need to allow a reasonable compliance schedule for collecting the data, designing new screens or procuring an aquatic fabric filter barrier, installing the equipment, and testing it. This compliance schedule should take into account the seasons of the year in which the data might have to be collected, and should provide for doing construction, installation, and testing during planned outages so as to minimize the impact on electric power supply.

Footnotes

(5) There is a current shortage of trained larval taxonomists, especially those capable of identifying freshwater larvae. We believe there may be only 12-15 freshwater larval experts nationwide. Therefore, if many facilities need to perform studies requiring larval identification within a short period of years, there will be an extreme shortage of experts capable of performing this work.

EPA Response

For the reasons set forth in this comment, EPA is providing additional time for facilities to submit the required studies. See response to comment 316bEFR.034.066.

Comment ID 316bEFR.035.024

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Despite the need for a grandfather period, EPA should allow a facility to choose to comply with the new rule early.

Notwithstanding the timing requirements outlined above, some facility operators may prefer to meet the requirements of the new section 316(b) rule even though they are already well into the application process when the rule becomes final. EPA should permit such operators to choose to comply with the new rule earlier than required, rather than take advantage of any grandfather period that might be allowed. Although a grandfather period is definitely necessary, the rule should not require anyone to use it.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066. Facilities are free, however, to choose to submit the required information faster than the timeframes specified in the rule.

Comment ID 316bEFR.035.025

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Time is needed to install and test new equipment.

Even a permittee who has time to prepare a complete application by 180 days before its permit expires will need a compliance schedule after the permit is issued, if changes in the intake are needed to satisfy the new rule. It will need this in order to install and test the new screens or filter or fish return system. A compliance schedule should provide for
installing the new equipment during a regularly planned outage. If part of the solution is restoring a wetland or building a fish hatchery, of course, more time might be required. The rule should allow for this contingency.

EPA Response

For a discussion of the compliance alternatives authorized by today's rule, including the availability of a Technology Installation and Operation Plan with the Director's approval, see the preamble to today's rule.

Comment ID 316bEFR.035.026

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09

Permit applications/implementation schedule

It would not be reasonable to make the new rule immediately effective and rely on administrative consent orders while new technology is being installed.

Because so much time has passed since section 316(b) was originally enacted by Congress, there may be some inclination by EPA to make the technology requirements of the new rule immediately effective. Since this could put some facilities overnight in violation of the law, it could raise due process concerns. EPA might choose to use administrative orders as a stopgap measure; however, it would not be appropriate to make the requirement for BTA immediately effective and then use administrative consent orders to suspend enforcement until the technology could actually be installed. Nor is it necessary to do this. EPA has the authority to define "compliance" as an approved program or plan for collecting the necessary data and choosing and installing appropriate technology.

Section 316(b) says that "[a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." In this sense, section 316(b) is tied to the "standards" of section 301. (Since the present rulemaking is for "existing" facilities, the reference to "standards of performance for new sources" in section 306(b)(1)(B) does not apply.)

Section 301(b)(1)(A) provides that "best practicable control technology" and water quality standards-based limitations should have been achieved by July 1, 1977. "Best available technology" requirements for toxic pollutants are to have been achieved no later than 1981. Section 301(b)(2)(C), (D). Finally, sections 301(b)(2)(E) and (F) provide for compliance in no case later than March 31, 1989. Thus, the requirements of section 301 for "existing" facilities, according to Congress' original intent, are supposed to have been achieved by March 31, 1989.

Nevertheless, this cannot mean that the section 316(b) rule for existing facilities must be effective by that date, for the following reasons:

1. The statute does not say that the section 301 deadlines apply to section 316(b). The statute is (at best) ambiguous on the deadline for section 316(b), and EPA is entitled to interpret it in a reasonable way.

2. It is impossible to have immediate compliance with a rule that will require in many cases biological studies, analysis, design, and construction. Congress could not have intended that existing facilities comply with a complex new section 316(b) rule instantaneously.

3. It would be a denial of due process of law to require immediate compliance with a new rule that requires expensive and time-consuming construction.

Although linked to section 301, section 316(b) contains separate and distinct requirements and does not itself contain a deadline. "Best technology" under section 316(b) is different and distinct from, for example, "BAT" under section 301. The section 301 standards apply to the discharge of pollutants; section 316(b) regulates features of intake structures. All section 301 says is that section 301 standards "shall require" that section 316(b) be met; it does not say when.

Moreover, section 316(b) clearly requires, at least in some cases, significant construction. It is not possible to comply with regulations that require construction instantly upon promulgation of the regulations. It would be irrational to suppose that Congress intended instantaneous compliance, especially since in other sections of the Act, Congress painstakingly laid out schedules for phasing in new requirements.

Finally, it would violate due process to require instant compliance with a new rule that requires extensive analysis and construction. Due process requires that regulated entities have reasonable notice of legal requirements to which they will be subject. There can be no reasonable notice when a new requirement is made to apply instantly.

Throwing many facilities into noncompliance by imposing an immediate effective date, and addressing the problem by consent orders, would be highly inappropriate. Consent orders may carry the stigma of breaking the law and may not prevent citizen suits by third parties. EPA would do better simply to write a reasonable compliance schedule into the
rule and provide for compliance schedules in NPDES permits.

EPA Response

EPA agrees that section 316(b) leaves to EPA's discretion decisions regarding how compliance with the final rule will be determined and when. For a discussion of the five compliance alternatives authorized by today's rule and other compliance issues, see the preamble.

Comment ID 316bEFR.035.027

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09

Permit applications/implementation schedule

Reasonable compliance schedules are necessary to avoid disruption of the permitting process.

The above scheduling concerns are important because of fairness to permittees, but they are important also for practicality. If EPA were to make the new section 316(b) rule immediately applicable, it would lead to more rather than less delay in the NPDES permitting process. For one thing, the available consultants who can help with biological
monitoring and design of intake technology would undoubtedly be overworked and would have to put many permittees on waiting lists. Moreover, negotiations over consent orders might well bog down the permit process in some states. Undoubtedly the backlog of unprocessed NPDES permit applications would grow worse. Reasonable compliance schedules are a matter of administrative necessity as well as of fairness to permittees.

EPA Response

See response to comment 316bEFR.035.026.

Comment ID 316bEFR.035.028

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.03

Monitoring requirements

The time needed for compliance monitoring differs from site to site.

Since section 316(b) is different from either the water quality-based requirements of section 303 or the technology-based requirements of sections 301 and 306, and since EPA's performance standards are based on certain specific intake technologies that EPA has found to be effective (wedgewire screens, etc.), the most appropriate way to ensure compliance would be to require the permittee to install one of the selected technologies and then monitor simply to be sure that it was being maintained and operated correctly.

EPA Response

EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. Please see the preamble and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005 for an explanation of what constitutes compliance with today's performance requirements. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.035.029

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.02

Director's role in determining requirements

As EPA has constructed the rule, facilities may need to do impingement/entrainment compliance monitoring, but only as specified by their permitting authority. Proposed 40 C.F.R. § 125.96. This flexibility makes sense, since many facilities have been thoroughly studied and their regulators have adequate existing data regarding the performance of impingement/entrainment reduction equipment. Yet EPA also would require facilities subject to the rule to design and submit a two-year plan for compliance monitoring. Proposed 40 C.F.R. § 125.95(b)(7). This provision will, for all practical purposes, remove the flexibility provided in section 125.96, because most regulators will simply require that the submitted two-year plan be carried out, without considering whether such a plan is necessary in light of existing data or adequate to accurately assess the efficacy of the installed technologies.

EPA Response

EPA disagrees that the 2-year monitoring requirement removes flexibility set forth in § 125.96. However, the 2-year monitoring minimum may not be the case for all facilities (please see response to comment 316bEFR.307.007). As written, today's rule gives the Directors tremendous flexibility in setting monitoring requirements for their facilities, including which species and life stages to monitor, the total number of species, whether the organisms should be counted or weighed, whether taxonomic identification is required, and what the averaging period should be for determining compliance (for details please see EPA's response to comment 316bEFR.307.007). EPA has learned that the long-term success of a particular technology is determined by the monitoring, maintenance and adjustments made during the course of its deployment. Simply installing a technology or operational or restoration measure does not guarantee compliance with the performance standards, because the efficacy of a given technology or operational measure will be affected by ambient conditions and by operational adjustments made as part of the technology's ongoing use. EPA therefore believes at least two years of monitoring is needed to verify the full-scale performance of the proposed or already implemented design and construction technologies and of any operational and restoration measures. EPA therefore believes that it is necessary and appropriate for all facilities to demonstrate, during the federally mandated minimum time period set forth by today's rule, that the approved technologies or operational or restorative measures do in fact achieve the required reductions in impingement mortality and entrainment. The Director will use the verification monitoring to confirm that the facility is meeting the level of impingement mortality and entrainment reduction expected and that fish and shellfish are being maintained at the level expected (as required in § 125.94(b)). Technology Installation and Operation Plans are also available as mechanisms to demonstrate compliance, subject to the approval of the Director.

Comment ID 316bEFR.035.030

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.03

Monitoring requirements

To take another example, on larger river systems such as the Mississippi River and the Illinois River, it may take as many as ten years to effectively demonstrate that new technology has achieved reductions consistent with EPA's performance standards. This may indicate a need to perform source water sampling after the monitoring phase. This monitoring is costly and is subject to seasonal river variations. Monitoring may have to go on for years until such time that an improvement in impingement or entrainment can be demonstrated. In Midwest river systems that are subject to river flooding in the spring and summer, flooding may coincide with typical fish spawning periods. At such time environmental conditions would have more impact on entrainment than intake technology. It would be difficult to compare a reduction in entrainment or impingement numbers and take credit for doing so when environmental conditions, not newly installed technology, would be determinative.

By contrast, at some facilities, much less than two years of monitoring will be required. This would be the case, for example, if a plant had collected copious data already and if no change to the plant was required by the new rule. On the other hand, two to five years of monitoring might be required at some estuarine sites where fish populations vary widely from year to year.

EPA Response

EPA agrees that some facilities may need more extensive monitoring than others. Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.035.031

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.04

Determination of compliance

We recommend that after a verification monitoring period, the data should be analyzed to determine whether the newly installed technology is indeed achieving 80-95% reduction in impingement mortality and 60-90% reduction in entrainment. As long as the data showed performance within these ranges, the technology should be deemed to comply
with the rule. For example, if the entrainment reduction technology was predicted to reduce entrainment by 85% but in fact achieved only 80%, that should be sufficient.

Assuming the data showed performance within the ranges, then no further biological monitoring should be required. Instead, the permittee should be required thereafter simply to monitor and document that it continued to operate and maintain the technology.

If the initial monitoring showed that the technology was not achieving reductions with the performance standards, on the other hand, then there seems to be no fair alternative but to provide for a period of additional study to determine what went wrong and what should be done to fix it, including the replacement of the technology with something different, if necessary and if the cost is not excessive.

EPA Response

EPA agrees that any performance within specified ranges (80-95%; 60-90%) should count as compliance. EPA opted for performance ranges instead of specific compliance thresholds to allow both the permittee and the permitting authority a certain degree of flexibility in meeting the obligations under the final Phase II rule.□□

In response to the commenter's suggestion that once a facility demonstrates reduction in impingement mortality and entrainment rates to satisfy the performance standards it should not be required to conduct further biological monitoring, EPA disagrees. Please see EPA's response to comment 316bEFR.307.027 for a discussion of monitoring requirements.

EPA agrees that a facility that does not achieve the reductions specified by the performance standards may be required to optimize performance by installing additional design and construction technologies or implementing operational or restoration measures. The extent of these additional measures will be determined by a permitting Director, who will take all factors, including costs, into account.

Comment ID 316bEFR.035.032

Subject Matter Code 21.04

Determination of compliance

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Permit terms should use appropriate averaging times.

As already noted, the best solution to the compliance issue would be to require in the NPDES permit that the appropriately selected intake technology be installed and then maintained and operated properly. The alternative of requiring a permittee to prove periodically that it is entraining or impinging a specified percentage of fish would be highly variable, very expensive, technically unsound, and unfair.

If EPA retains its numeric performance standards, however, and a permittee has chosen a technology (wedgewire screen, fine mesh screen, or aquatic filter barrier) that it predicts will reduce entrainment (compared to the baseline) by 75%, thus meeting the entrainment performance standard, how should the permit requirement be written to implement its commitment to install and operate this technology?

Because of the variability of biological systems and the lack of control that a permittee has over fish and shellfish in the water, it would be unfair to write a permit term requiring the permittee to reduce entrainment by 75%, or, for that matter, to achieve any fixed numerical limit on the biomass or number of organisms entrained. Any performance within the specified ranges of 80-95% and 60-95% should count as compliance.

EPA Response

EPA agrees that today's final rule should include a "streamlining" alternative, and has therefore included the approved technology alternative, which is detailed at § 125.99. EPA disagrees, however, that it should not require any verification that a facility is meeting the applicable performance requirements or standards. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027.

EPA agrees that any performance within the specified ranges of 80-95% and 60-95% should count as compliance. EPA opted for performance ranges instead of specific compliance thresholds to allow both the permittee and the permitting authority a certain degree of flexibility in meeting the obligations under the final Phase II rule. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005.

Comment ID 316bEFR.035.033

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.09

Permit applications/implementation schedule

Over what period of time should the percentage reductions be calculated? As suggested above, the permittee would be required to monitor for a period of time, which would be two years or less for most plants and possibly up to 5 years for some estuarine plants. The averaging time for determining compliance should be the period of monitoring it, usually two to five years. Thus, if a plant were required to monitor for two years after installation of new technology and calculated that the technology reduced entrainment by 50% the first year and 70% the second year, for a two-year average of 60%, then it should be considered in compliance with section 316(b). Because of the natural fluctuation of aquatic populations, a short averaging time would be unfair.

But a longer averaging time can be unfair as well, in the following way. If the plant has monitored for two years and discovered only at the end of that time that it has not achieved the 60-90% reduction in entrainment, then it might, in theory, face two years' worth of penalties for "noncompliance." For the same reasons as cited above (the natural
variability of aquatic populations and the lack of control of the permittee), failure to meet the performance standards after several years of monitoring should not be considered a "violation." It should be a signal that additional study is needed, with a suitable compliance schedule for improving performance.

EPA Response

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

Comment ID 316bEFR.035.034

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

The above recommendation means that, once the permittee has demonstrated that its technology performed within the performance standard ranges, it would have only to maintain and operate the same technology for the life of the plant and would not have to make repeated demonstrations. This is a fairer proposal, given that section 316(b) is a construction-type requirement, that fish populations are highly variable and subject to many stresses besides cooling water intakes, and that the permittee has limited control over what animals approach its intake.

EPA Response

EPA disagrees that no monitoring should be required once the permit achieves the performance standards. Please see EPA's response to comment 316bEFR.307.027 and 316bEFR.021.007 for an explanation of EPA's monitoring requirements.

Comment ID 316bEFR.035.035

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

There is no need to perform a new section 316(b) analysis every five years

The Coalition takes strong exception to EPA's proposed rule suggesting that a "comprehensive reevaluation" of the section 316(b) demonstration be conducted every time a permit is renewed. Once a successful section 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be enough. At, a minimum, there should be no reconsideration for at least ten years, absent evidence that conditions have so changed that the aquatic community is threatened. After a successful demonstration of compliance with EPA's performance standards, at each later permit
renewal the permit writer should accept the initial demonstration, unless there have been significant changes in plant operations or adverse changes to the aquatic populations. A permittee could also certify that there have been no changes in the design or operation of the intake structure.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.035.036

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 7.02

Performance standards

CALCULATION BASELINE

The proposed rule should be revised so the "calculation baseline" is not the only surrogate measure for the threshold of adverse environmental impact; the rule should provide for use of alternative performance standards [e.g., expanding section 125.94 (c) beyond just cost considerations] that allow demonstrating that the existing intake structure is not adversely impacting populations of aquatic life in the area.

The "calculation baseline" is used in the proposed rule essentially as a threshold for determining when adverse environmental impact begins.   It calls for an "estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-though cooling water system and with no impingement and/or entrainment reduction controls." (proposed section 125.93). We are not aware of any scientifically supportable way to make this estimate, particularly at an existing facility site where the populations and ecosystem have acclimated to the presence of the existing intake structure. Performance standards based on the calculation baseline are essentially making the performance standard a volume reduction requirement based on reducing intake capacity to that of a cooling tower system.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.035.037

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 21.04

Determination of compliance

EPA SHOULD INCLUDE BYPASS AND UPSET PROVISIONS IN THE 316(b) RULES

EPA should include bypass and upset provisions in all three phases of the section 316(b) regulations, comparable to the bypass and upset provisions in 40 C.F.R. § 122.41(m) and (n). The problem is that those provisions address diversion "of waste streams from any portion of a treatment facility" and "noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee," respectively. Because of this wording, it is not clear that the bypass and upset defenses will be available for section 316(b)-based NPDES permit conditions.

The rationale for including bypass and upset provisions in the section 316(b) regulations is very similar to the reasons for which those provisions are included in the NPDES regulations with respect to wastewater discharges and wastewater treatment technology. Technology-based standards should recognize that the technology is not capable of performing flawlessly, regardless of how well-designed and -operated the system is. At least two federal courts of appeals have recognized that technology-based effluent limitations that fail to account for this reality are not in accordance with law. Marathon Oil Co. v. EPA, 564 F.2d 1253, 1272-74 (9th Cir. 1977); FMC Corp. v Train, 539 F.2d 973 (4th Cir. 1976). Promulgation of cooling water intake structure technology requirements without providing that bypass and upset situations will not be violations would likewise render the section 316(b) regulations unlawful.

For example, if the screens are fouled so as to jeopardize plant operation, the permittee should be allowed to bypass them until they can be cleaned. Similarly, if, due to emergency conditions, water levels in a reservoir are reduced to the point where technologies are inoperative, bypassing to permit continued operation should be allowed. Such exceptional bypasses should be allowed only for short periods of time, until the emergency has passed and the permittee has had time to restore the intake technology to proper operation.

EPA Response

Please see EPA's response to comment 316bEFR.034.017.

Comment ID 316bEFR.035.038

Author Name Roger Claff

Organization Cooling Water Intake Structures Coalition

Subject Matter Code 8.03

Proposed standards for Great Lakes

GREAT LAKES

The Great Lakes should not be included in proposed section 125.94 (b) (3). The Great Lakes are proposed to be included in the most stringent performance standard. The preamble says that this is done because "EPA believes the Great Lakes are a unique system that should be protected to a greater extent than other lakes and reservoirs." (Preamble Page 17141). EPA has failed to define the unique aspects and justify what aspects require more protection than for other lakes and reservoirs, especially with regard to CWIS. The size, volume, aquatic life population sizes and variety, and opportunity for fish to avoid intake structures seem to make the Great Lakes candidates for less concern than other water bodies regarding impact of impingement and entrainment from cooling water intake systems, not more.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Sharon Neal

On Behalf Of:

Exelon Corporation

Author ID Number:

316bEFR.036

Notes

EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.036.001

Author Name Sharon Neal

Organization Exelon Corporation

Subject Matter Code 1.01

Comment period

Exelon appreciates this opportunity to comment on USEPA's proposed rule to implement Section 316(b) of the CWA for existing facilities. Exelon supports the comments prepared by the Utility Water Act Group (UWAG) and those by the Edison Electric Institute (EEI).

EPA Response

EPA thanks Exelon Corporation for its comments. EPA has responded to comments submitted by Utility Water Act Group and the Edison Electric Institute in the preamble and response to comment document.

Comment ID 316bEFR.036.002

Author Name Sharon Neal
Organization Exelon Corporation

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

There are many electric generating facilities that have already proven to their state regulatory agencies that they are not creating adverse environmental impact (AEI) or that they have already installed the appropriate level of technology (BTA). Exelon strongly supports the position that, where a facility already has performed a Section 316(b) demonstration before the new 316(b) Rule is promulgated and has shown to the satisfaction of its regulatory agency that the facility complies with Section 316(b), or where the agency has confidence that fish populations are not being harmed by the impingement and entrainment impacts of a facility, the state regulatory agency should be given the flexibility to conclude, after a new review of existing information, that no further changes to the facility's intake activities are required.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.036.003

Author Name Sharon Neal

Organization Exelon Corporation

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

As part of an appropriate site-specific approach, USEPA should adopt a definition of AEI, the requirement for which flows directly from the language of the Clean Water Act's Section 316(b). This definition should provide that the loss of a single fish, a single egg, or even a large number of them, need not be AEI. Instead, AEI occurs when the loss of fish or other organisms is felt at the population or community level, when the loss is so great that it adversely affects the structure or function of the aquatic community. Exelon strongly concurs with UWAG's detailed discussion of this point in Comment III, B, 1.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.036.004

Author Name Sharon Neal

Organization Exelon Corporation

Subject Matter Code 3.03

Definition: Waters of the U.S.

USEPA's regulation, 40 C.F.R. 122.2, exempts waste treatment systems from the definition of waters of the United States. This regulation provides that [w]aste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States. The parenthetical was set aside by the Court of Appeals in Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977). Thus, as a matter of law, waste treatment systems are not waters of the United States, and the cooling pond exclusion from the waste treatment system exemption no longer has any force or effect.

A cooling pond is a waste treatment system, made part of a plant's closed cycle cooling system, designed to allow the plant to comply with the CWA's thermal requirements. Pursuant to the above quoted regulatory language, such a cooling pond is carved out from the defined "waters of the United States." USEPA's 316(b) rule, as finalized, should not contradict or blur this point.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.036.005

Author Name Sharon Neal
Organization Exelon Corporation

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Exelon is a strong advocate of restoration as a feasible, reasonable, and an environmentally correct alternative that can significantly contribute to the enhancement of a fishery and other aquatic life. Restorations should be offered as means for Section 316(b) compliance. States should be given ample flexibility in their treatment and recognition of the environmental benefits of such projects. Restorations can demonstrate measurable results and are also well received by the general public and regulatory agencies. By example, fish stocking as a restorative effort is currently practiced by Exelon's Quad Cities Station as a means to offset fish impingement. Biological monitoring and trending of standing crop estimates in the Mississippi River pools, which are stocked by Exelon, have demonstrated a 30% recruitment in certain game species resulting from these stocking efforts. The Illinois Department of Natural Resources and Iowa Department of Natural Resources have acknowledged this remarkable accomplishment and continue to be strong supporters of the fish-stocking program on the Mississippi River.

Exelon's Shad Restoration Project currently under way on the Susquehanna River is another example of a successful restoration project. During the 2001 International Shad Conference, Pennsylvania's Susquehanna River was recognized as the site that had demonstrated the most dramatic restoration of American shad, the largest member of the herring family. The same year, a record number of American shad had safely passed through the fish-lift facilities at Exelon Power's Conowingo Hydroelectric Station on their annual migratory run, the most in the history of the restoration program.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. All restoration measures must meet the requirements described in the final rule, including those in sections 125.95 and 125.95. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the role of the permitting authority, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.036.006

Author Name Sharon Neal

Organization Exelon Corporation

Subject Matter Code 9.0

Costs

USEPA justifies one of its central assumptions (that new facility capital costs are adequate surrogates for existing facility costs) based on several assumptions. USEPA's assumptions, as applied to nuclear power plant operations and the suggested utilization of "significant portions of conduit systems," presumably while the plant remains in operation, are inconsistent with nuclear power plant operations. They are also inconsistent with the utilities' out-of-service and modification design process, which would govern the installation of upgraded intakes, traveling screens and the like. Anything that would alter or impact the flow of safety related service water or non-essential service water systems would require an equipment outage and would possibly have to be completed during a unit outage. Since unit outages are now mostly scheduled on an 18-month or 24-month frequency, extension of these scheduled outage timelines would result in serious financial impacts to a utility, which are not recognized by USEPA. Although USEPA does acknowledge that piping modifications could be significant, it does not appropriately address the significant costs of additional unit downtime to perform the modifications.

EPA Response

Although the commenter may have been correct in referring to cooling tower costs for the proposal and NODA, for the final rule analysis, the technologies and costs of their installation were developed specifically for existing facility implementation. Secondly, the assumption about utilization of existing conduit systems is most applicable to the case of cooling towers and generally does not apply to the technologies forming the basis of the final rule.

On the matter of construction downtimes, the Agency has accounted for unscheduled outages in the economic analysis of the final rule when they would apply. The commenter is incorrect in stating the opposite case.

Comment ID 316bEFR.036.007

Author Name Sharon Neal

Organization Exelon Corporation

Subject Matter Code 21.09

Permit applications/implementation schedule

USEPA's 316(b) Rules should appropriately recognize and accommodate the substantial time and resources required to implement the numerous proposed 316(b) requirements. Specifically, ample time should be allowed for utilities to design, seek and obtain agency approval for, test and conduct baseline source water studies and entrainment and impingement characterization studies. Subsequently, adequate compliance schedules should allow time for all of the involved entities, e.g., utilities, regulatory agencies, environmental consultants, and engineering design and construction companies, to coordinate and perform their necessary activities for 316(b) implementation. In order to accomplish these numerous steps, two full NPDES permit renewal periods may be required: the first for designing and conducting the threshold studies; and the second for responding to the studies results and providing a timeline for implementation of any new intake technologies or procedures.

EPA Response

For a discussion of the timing for submitting the required studies and other issues relating to demonstrating compliance, please see the preamble to the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jack Hill

On Behalf Of:

Lansing Board of Water & Light

Author ID Number:

316bEFR.037

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.037.001

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 22.06

UMRA/Impacts on local governments

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that my utility finds particularly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities that are owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.037.002

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 17.08

Option: UWAG's recommended approach

The Lansing Board of Water & Light supports the technical and legal comments submitted to the EPA from the Utility Water Act Group (UWAG), the Large Public Power Council/American Public Power Association (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the author's support of other comments.

Comment ID 316bEFR.037.003

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA should be complimented for considering a variety of alternative approaches to the regulation. The Lansing Board of Water & Light is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that may affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology election.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.037.004

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the water bodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

The final 316(b) regulation also allows a site-specific determination of best technology available for minimizing adverse environmental impact on the grounds that costs are significantly greater than the benefits of complying with the otherwise applicable requirements. For detail see the preamble to the final 316(b) Phase II regulation. See also EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.037.005

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. The Lansing Board of Water & Light has a good working relationship with the state and believes in deferring, where possible, to the state regulators.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule. This rule preserves an important role to be played by the State Directors.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.037.006

Author Name Jack Hill

Organization Lansing Board of Water & Light

Subject Matter Code 22.06

UMRA/Impacts on local governments

However, the EPA has underestimated the impact of these proposed regulations on public power systems. The Lansing Board of Water & Light believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

One aspect of these regulations that will fall disproportionately on public power systems is the geographic location of their facilities. By their very nature, public power systems are located within the geographic bounds of the local government they serve. This causes a number of public power facilities to be virtually landlocked and unable to obtain any of the additional land that may be required to install the required control systems. On the other hand, IOUs are not limited as to where they can locate a facility and often have hundreds of acres available for construction of additional control facilities.

The Lansing Board of Water & Light agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements in coordination with the utilities to ensure reliable grid operations.

The Lansing Board of Water & Light is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. The EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases-particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

EPA disagrees with the commenter the space constraints might cause disproportionate impacts on public power systems. The technologies upon which EPA based the requirements of the final rule will not require acquisition or use of additional land for facilities complying with the rule. Unlike the potential case of cooling tower construction at existing power facilities, the addition and/or retrofit of screening, design, and control technologies does not involve large land footprints for the technology nor its construction. In the case that some technologies may have a significant footprint, these are generally aquatic in nature (such as barrier net systems).

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Peter Duncan

On Behalf Of:

NY State Dept of Environmental Conservation, Office of Natural Resources

Author ID Number:

316bEFR.038

Comment ID 316bEFR.038.001

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

We support the promulgation of nationally-applicable minimum standards. This ensures fair competition among generators and other facilities with cooling water intake structures both across and within states.

EPA Response

Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.038.002

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

We support the provisions which afford the generator flexibility in selecting the technology or operational measures that reduce impingement mortality and entrainment.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.038.003

Subject Matter Code 7.02
Performance standards

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

We support the proposal for a theoretical baseline impact to be calculated as a shoreline intake with no impingement/entrainment controls. This would fairly credit existing facilities for the mitigative measures they implemented prior to the effective date of the proposed regulations.

EPA Response

EPA appreciates the comment.

Comment ID 316bEFR.038.004

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 5.0

Char. of Industries Potentially Subject to Prop. Rule

We support these Phase II rules (with the changes recommended below) because, on a national basis, they affect 57 per cent of existing power generating stations and 99.04 per cent of the total flow withdrawn by existing steam-electric power generating facilities.

EPA Response

EPA appreciates the comment. No response is required.

Comment ID 316bEFR.038.005

Subject Matter Code 2.03

Purpose of Rule (General, incl. bckgrd., history)

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

We support and agree with EPA's recognition that the primary focus for Phase II performance standards for existing facilities is the goal of reducing specifically aquatic impacts, and fish mortality.

EPA Response

EPA appreciates the support of the New York Department of Environmental Conservation.

Comment ID 316bEFR.038.006

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 17.05

Option: I&E reduction without regard to WB type

New York's Preferred Alternative - We prefer your "Impingement Mortality and Entrainment Controls Everywhere" (as presented on pages 17158-17159 in Section VI(B)(4)) alternative to EPA's Preferred Alternative. We strongly recommend that EPA adopt this alternative because it "levels the playing field" for all generating companies and because it offers flexibility. The generators would be fully aware of what is required to meet the performance requirements of proposed Section 125.94(b)(3). EPA would establish the required level of performance but generators would be free to select any or a combination of techniques to achieve the performance level. This is the simplest alternative to implement and your analysis found that it provides the highest benefit to cost ratio (3.74:1). An additional advantage is that companies and regulators could put their staff and monetary resources into reducing impacts instead of into studies and rebuttals. This alternative also responds to what EPA has asked comment on: the 'extreme burden' on State agencies which cost/benefit and site specific determinations have imposed, over these past years on state agencies. Finally, we agree with EPA's statement that "This alternative would establish clear performance-based requirements that are simpler and easier to implement than those proposed and are based on the use of available technologies to reduce adverse environmental impact. Such an alternative would be consistent with the focus on use of best technology required under Section 316(b)."

EPA Response

EPA disagrees that the "Impingement Mortality and Entrainment Controls Everywhere" is a better alternative than today's final rule. For EPA's rationale for rejecting that option, please refer to the final rule preamble in the section entitled Impingement Mortality and Entrainment Controls Everywhere.

Comment ID 316bEFR.038.007

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA's Preferred Alternative - While parts of "EPA's Preferred Alternative"have very positive elements, we see a number of potentially serious problems. As proposed, a facility would select one of three different Methods to establish the best technology available (BTA) for minimizing adverse environmental impact:

Method 1. The facility owner demonstrates compliance with the new rules.

Method 2. The facility owner implements additional technologies, and operational or restoration measures.

Method 3. The facility owner demonstrates that the cost of compliance would be significantly greater than either the EPA estimate of costs, or the site-specific value of the benefits.

EPA Response

The commenter has characterized the proposed rule; no response is necessary for that portion of the comment. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.038.008

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01.01

Option 1--Demonstrate existing BTA

Method 1 is straightforward and we support it. Closed-cycle recirculating facilities would be deemed in compliance. For purposes of regulatory and scientific certainty, a demonstration of compliance at other facilities should require at least one year of impingement and entrainment study in order to document compliance. We recommend that additional studies be conducted at least one year in each five year permit term (except for facilities equipped with closed cycle systems) to verify compliance.

EPA Response

EPA agrees that facilities with closed-cycle recirculating cooling systems are considered to be in compliance with the performance standards. Please refer to § 124.94(a)(1) for further information.

With regard to monitoring requirements, please refer to the preamble and other responses in this comment response document.

Comment ID 316bEFR.038.009

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

We support the concept in Method 2 of reducing impacts by adding technology and measuring the results against the standard. We believe, though, that the sampling proposed is insufficient and would yield erroneous or incomplete results. We recommend that collections for impingement should be performed for a 24-hour period at lease once per week for 52 consecutive weeks. Collections for entrainment should be performed at intervals no greater than 6 hours apart over a 24-hour period at least once per week though periods when spawning occurs in the affected water body. Method 2 appears to require that, at a minimum, an impingement and entrainment monitoring program be conducted “before” and “after” mitigative measures have been implemented to determine levels of impact. We support the proposed components of a “Comprehensive Demonstration Study” to be conducted for existing facilities. Finally, as with Method 1, we suggest that facilities be required to reevaluate impingement and entrainment impacts during one year of each five-year permit period.

EPA Response

Please refer to preamble for a discussion of the framework of today's rule. EPA appreciates the commenter's support of the regulatory approach in the proposal, and notes that the final rule uses a similar approach.

With respect to the monitoring requirements, please see the preamble to the final rule, and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005.

Comment ID 316bEFR.038.010

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.02

Performance standards

We support the different thresholds of protection for different water bodies, as EPA has proposed, and the flexibility for a Director to select a level of protection within a finite range. We agree with the proposed target ranges of reducing impingement mortality by 80 to 95 per cent, and entrainment by 60 to 90 per cent; this approach recognizes that levels achievable from closed cycle cooling vary depending on the salinity of the waterbody.

EPA Response

EPA appreciates the comment.

Comment ID 316bEFR.038.011

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01.03

Option 3--Site-specific determination

.Our concern is greatest with Method 3. We believe it could effectively negate the value of the entire Phase II rule[.]

EPA Response

Please refer to the response to comment 316bEFR.202.002 for more information regarding the effects of a site-specific alternative on the burden to states.

Comment ID 316bEFR.038.012

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Lowering the standard from "costs wholly disproportionate to benefits" to the much less stringent "costs significantly greater than site specific benefits" is unacceptably problematic. The former criterion has been applied to these Phase II and all other facilities since the 1970's and is supported by a substantial body of case law, permit decisions and legal opinions.

EPA Response

See response to 316bEFR.006.003. EPA expects that a similar body of decisions and precedents can be developed for the standard in this rule.

Comment ID 316bEFR.038.013

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

State fish and wildlife resources would be at risk if the lower standard were used; in New York, the aquatic organisms impacted by plant intakes belong to the State (Environmental Conservation Law §11-0105). Rather than the widely-accepted "polluter pays" approach, the EPA-proposed rule weighs a polluter's cost against a monetized value of fish and wildlife resources it does not own and to which it has no entitlement.

EPA Response

EPA explains its basis for the site-specific BTA determination provisions in the rule in section VII of the preamble to the final rule. As indicated in 125.90(d) and 125.94(e), States remain free to impose more stringent requirements as they deem appropriate.

Comment ID 316bEFR.038.014

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

The value or "benefit" of State fish and wildlife resources is difficult to quantify. Whereas the costs of mitigative measures are easy to quantify using familiar accounting techniques, the task of placing an accurate dollar value on aquatic resource impacts is rife with ecological and economic challenges; there is no widely-accepted methodology. In contrast, by maintaining the conventional "costs wholly disproportionate to benefits" analysis, generators would have to look at the incremental cost of controls in light of the dollars they make selling electricity.

EPA Response

EPA agrees with the commenter that the value or "benefit" of State fish and wildlife resources is difficult to quantify, and that the cost of mitigative measures is easy to quantify in comparison to valuing the benefits to aquatic resources.

The commenter defines the "costs wholly disproportionate to benefits" as comparing the incremental cost of controls to the revenue or profits received from electricity sales. Traditionally, however, the wholly disproportionate cost test is based on comparing the costs of implementing a regulation or option with the ecological benefits associated with stopping the losses. EPA analyzed a cost to revenue measure for all facilities as part of the cost impact analysis in Part B of the final EBA (DCN #6-0002).

Comment ID 316bEFR.038.015

Subject Matter Code 21.08

Burden on permitting agencies (general)

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Method 3 would generate numerous studies which could impose a substantial review burden on state agencies. As cited in your discussion, Salem Nuclear Generating Station's permit application comprised 36 volumes supported by 137 additional volumes of technical and reference materials. Clearly, a significant effort would be required to meaningfully scrutinize so much information. Furthermore, state water quality and natural resource agencies would frequently need to retain the specialized expertise needed for review of the more arcane studies. Once again, EPA recognizes this extreme burden and we agree.

EPA Response

EPA agrees that a site-specific alternative may be burdensome on Directors and has added several efficiencies in today's final rule to speed permitting and reduce burden. Please see response to comment 316bEFR.034.005 for a full discussion.

Comment ID 316bEFR.038.016

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Method 3 appears to provide an unfair competitive advantage to old, inefficient, high impact facilities. In the competitive wholesale electric power market if a biased cost/benefit analysis would enable a facility avoid or reduce the costs needed to achieve standards, it could sell its electricity more cheaply than newer, more efficient, compliant facilities that have internalized the cost of impingement and entrainment protection. This market advantage could be a strong disincentive to comply under Method 1 or Method 2, and would penalize new power plants regulated under the Phase I rule. Such an outcome would not serve the purposes of the Clean Water Act, nor would it serve the interests of cleaner air and more efficient use of fossil fuels. Plants that cannot satisfy Method 1 or Method 2 should be: 1) repowered to modern technology; 2) decommissioned as having outlived their usefulness; or 3) operated at less than EPA's proposed 15 per cent capacity to qualify for that exemption.

EPA Response

EPA recognizes that existing facilities are subject to less stringent requirements than new facilities. This is justified by the record in this case and is consistent with Congress' decision--in connection with effluent limitations guidelines and standards--to allow EPA to treat new and existing facilities differently.

EPA disagrees that an older facility selecting the site-specific alternative will have an economic advantage over a newer existing facility. If both facilities demonstrate that they meet the performance standards, then both will have approximately the same compliance costs. If a newer existing facility is truly more efficient, then it is more likely to meet the performance standards and be subject to fewer requirements, and therefore have lower costs.

EPA disagrees that the Phase II regulations should dictate operational or market-level decisions such as plant closures or levels of operation. Today's final rule establishes national requirements and does not attempt to make facility-specific determinations. EPA does note, however, that a State may choose to impose more stringent standards.

Comment ID 316bEFR.038.017

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

We are also concerned about the provision in EPA's Preferred Alternative (described in Method 2, as well) that would allow for restoration in lieu of controls to avoid and minimize impingement and entrainment impacts. We believe that restoration is appropriate only within the widely-used stepwise approach whereby every effort is made to first avoid and then minimize impacts through technology-based measures on intake design, location, construction, and capacity. Restoration should be used only to address truly unavoidable impacts.

EPA Response

For a discussion of the requirement to consider design and construction technologies and operational measures before choosing restoration measures, see EPA's response to comment 316bEFR.033.005.

Comment ID 316bEFR.038.018

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

"Restoration" includes habitat creation, habitat restoration, or stocking organisms. Any approved restoration plan should be designed to promote natural propagation and survival of indigenous species which have been impacted by plant operations. In addition, restoration should be viewed as a temporary measure to allow the facility to continue to operate until suitable in-plant solutions can be devised or the facility is decommissioned.

Stocking to replace organisms killed or injured should be avoided. First, the aquatic resource diversity is high. In the case of New York's Hudson River, for example, more than 100 species are at risk to power plant intakes. Also, artificial propagation is difficult. Our experience with a striped bass hatchery on the Hudson River is that it never reached its target level of production, and the target was still a small fraction of the striped bass killed by plant intakes. Further confounding issues are genetics, disease, and intraspecific competition with naturally-spawned fish.

Finally, there are practical limitations to restoration, too. In many systems, the space and/or hydrology are unavailable for meaningful restoration. Creating another Hudson River or another Great Lake would be impracticable.

EPA Response

EPA agrees that promotion of natural propagation and survival of indigenous species that have been impacted by a cooling water intake structure is a worthy trait to include in a restoration measure.

For a discussion of the requirement to consider design and construction technologies and operational measures before choosing restoration measures, see EPA's response to comment 316bEFR.033.005.

Permit applicants and permitting authorities should carefully consider the true effectiveness of a proposed restoration measure. Some restoration measures may be effective for some locations and not for others. For a discussion of the roles and responsibilities of the permitting authorities and the permit applicants in the choice of restoration measures, see EPA's response to comment 316bEFR.060.026.

EPA acknowledges that space or hydrological limitations may limit the feasibility of restoration measures for some locations.

Comment ID 316bEFR.038.019

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 17.08

Option: UWAG's recommended approach

Site-Specific Alternative - We do not endorse "site-specific alternative" approaches as defined in the proposed rule, especially the one proposed by UWAG (the Utility Water Act Group). We believe it would cancel the benefit of having a national standard; it appears to offer less protection than the 1977 draft guidance in current use. The intensity of sampling and study necessary to detect a 1 per cent or 5 per cent population change with certainty, and to be able to attribute that impact to an individual plant, would be exceedingly costly and perhaps technically impossible in most instances.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.038.020

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

We also disagree with the definition of "adverse environmental impact" as proposed by UWAG. We consider any impingement or entrainment to constitute an adverse environmental impact. Considering impacts only when they can be observed on a population level could allow irreversible damages to fish stocks.

EPA Response

EPA agrees with this commenter that adverse environmental impact can be considered at the individual level, and not limited to just community and population level effects. Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.038.021

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 18.01.04

RFC: Alternative definition of "AEI"

We do support the "Alternative Definition" as presented at (2) on Page 17163 because it considers numerous components of an aquatic community.

EPA Response

EPA has rejected the "alternative definition" as written in the proposal and has elected not to define adverse environmental impact. Please see the response to comment 316bEFR.011.041 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule.

Comment ID 316bEFR.038.022

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 19.0

Dry Cooling

Dry Cooling - Although dry cooling may be the best technology at some facilities, we agree that retrofitting all existing plants with dry cooling should not be the standard because of 1) the massive cost and loss of efficiency in converting water-cooled plants to dry cooling, and 2) the other non-aquatic environmental impacts that dry cooling technology can impose.

EPA Response

The Agency does not consider dry cooling to be a viable technology in the context of the existing facility rule. See response to comment 316b.022.002.

Comment ID 316bEFR.038.023

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Performance Level - We agree that the equivalent of "closed-cycle cooling everywhere" as defined in the proposed rule should not be the standard. The levels of performance are comparable to those we impose. The range of levels permits a wider variety of systems to be used, and would have a lesser impact on electric generation, especially in tidal rivers, estuaries, bays, and oceans.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.038.024

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Capacity Factor - We support EPA's proposed exemption for facilities with low capacity but have two reservations; we are concerned that the 15 per cent capacity (55 days per year) factor exemption threshold is too high . First, the time of year the plant is running could coincide with a peak impingement or entrainment period. For example, in New York City, peak capacity is usually needed during the summer; this is when bay anchovy, an important forage species, spawns. Data suggest that 55 days of operation in July or August could entrain very significant proportions of larval and juvenile anchovy populations.

We have a similar concern at facilities with multiple generating units. Since each unit can operate independently, there is a potential for significant impacts resulting from this exemption. A facility with several obsolete units that seldom run and one efficient, newer unit that runs a high percentage of the time could qualify for this 15 per cent capacity factor exemption. As above, this circumstance would pose a problem if the high-use unit were operating during the peak impingement/entrainment season. In any case, the total capacity for a facility should only be based upon those units that have valid air emission permits and valid NPDES or SPDES permits.

EPA Response

For discussion of the level of the threshold see response to comment 316b.EFR.330.032, 316b.EFR.041.238, and DCN 6-3586.

Regarding the commenter's concern over facility-wide versus intake/unit specific definitions of capacity utilization rate, the Agency notes that it has adopted the definition for the final rule that bases the calculation of capacity utilization rate on the generating unit to intake basis (that is, if a generating unit and intake can be directly linked, then the capacity factor threshold applies to that intake only). Hence, the commenter's concerns have been met.

Comment ID 316bEFR.038.025

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Freshwater Rivers - We support EPA's proposal that on fresh water rivers, facilities that use 5 per cent or less of the mean annual flow would have to reduce impingement mortality, but not entrainment, and those using more than 5 per cent would have to reduce both. We feel that this criterion should not be any larger than 5 per cent for the exclusion from entrainment protection. On one New York river we examined, 5 per cent of mean annual flow equated to approximately 25 per cent of median August flow, with August being our average low-flow month. Thus, this level is still a substantial proportion of the river's flow in low flow months, and would be an even higher proportion in dry years. In such dry years a facility with coarse screens would entrain a greater percentage of small fish.

EPA Response

EPA notes the comment. The Agency has maintained this provision in the final rule.

Comment ID 316bEFR.038.026

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Mortality Credits - We have concerns about the concept of trading fish and wildlife mortality credits among facilities. First, we do not support trading mortality credits on a national basis. Such a system would appear to violate state sovereign rights over fish and wildlife resources and would compromise our capacity to manage these resources. Also, we do not support trading based on the biomass of the organisms killed. For example, the loss of a two-pound common bullhead cannot be compared in any meaningful way to the loss of two pounds of endangered short-nosed sturgeon eggs or fry. In addition to the huge difference in the number of organisms per unit of weight, these species vary markedly with respect to survival rates, mean age of reproduction, narrowness of habitat requirements, abundance, and susceptibility to extirpation.

EPA Response

Also, see response to 316bEFR.077.052 for the discussion on the appropriate unit for trading.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas W. Richards

On Behalf Of:

Fort Pierce Utilities Authority

Author ID Number:

316bEFR.039

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.039.001

Author Name Thomas W. Richards

Organization Fort Pierce Utilities Authority

Subject Matter Code 22.06

UMRA/Impacts on local governments

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that my utility finds particularly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities are owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.039.002

Author Name Thomas W. Richards

Organization Fort Pierce Utilities Authority

Subject Matter Code 17.08

Option: UWAG's recommended approach

Fort Pierce Utilities Authority endorses the technical and legal comments submitted to the EPA from Utility Water Act Group (UWAG), Large Public Power Council/American Public Power Association (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the commenter's support for these other comments.

Comment ID 316bEFR.039.003

Author Name Thomas W. Richards

Organization Fort Pierce Utilities Authority

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA should be complimented for considering a variety of alternative approaches to the regulation. Fort Pierce Utilities Authority is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.039.004

Author Name Thomas W. Richards

Organization Fort Pierce Utilities Authority

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted bythe projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the water bodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.039.005

Author Name Thomas W. Richards
Organization Fort Pierce Utilities Authority

Subject Matter Code 7.01.03
Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. Name of utility has a good working relationship with the state and believes in deferring, where possible, to the state regulators.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.039.006

Author Name Thomas W. Richards

Organization Fort Pierce Utilities Authority

Subject Matter Code 22.06

UMRA/Impacts on local governments

Criticism: the EPA has underestimated the impact on public powersystems. FPUA believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

FPUA agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements with coordination with states to ensure reliable grid operations.

FPUA is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. The EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year.

If not timed wisely, the region's customers could face unexpected utility bill increases-particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

For a response to comments on implementation of new 316(b) requirements, please refer to comment 316bEFR.028.007 in subject matter code 21.09.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Joyce Livingstone

On Behalf Of:

Dominion Environmental

Author ID Number:

316bEFR.040

Comment ID 316bEFR.040.001

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Dominion strongly supports the concept that 316(b) approval authority should remain with the state permitting agencies. State agencies are best equipped from prior 316(b) activity to effectively implement the program. In addition, Dominion urges EPA to expand the rule to allow continued reliance on technically sound 316(b) decisions (and 316(b) State programs) that were made in the past.

EPA Response

In today's final rule, EPA has allowed approval of State programs that meet rule requirements at 125.90(d). See response to 316bEFR.023.001 for additional detail on State program approval.

As stated in the preamble to today's final rule, EPA recognizes the intensive effort that many facilities may have conducted in preparing studies for BTA determinations. However, EPA disagrees that existing BTA determinations should remain valid under today's final rule. Historical BTA decisions may be based on physical, chemical or biological conditions which are no longer relevant at the site, or be less stringent than the performance standards set forth by today's final rule. A goal of today's rule is to establish requirements for the best technology available for minimizing adverse environmental impacts. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities. Data from existing BTA determinations may be used to support the development of required studies in preparation of the permit application if they are reflective of current conditions at the facility. It is incumbent upon the facility to provide the rationale for using such data.

Comment ID 316bEFR.040.002

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Dominion strongly supports EPA's rejection of alternatives that would have required some or all existing facilities to install closed-cycle cooling systems (that is, cooling towers or ponds).

EPA Response

The final rule is not based (in whole or in part) on retrofitting closed-cycle cooling systems. As such, the comment has been met.

Comment ID 316bEFR.040.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Joyce Livingstone

Organization Dominion Environmental

Dominion strongly supports EPA's recognition that a site-specific alternative approach is needed to establish intake requirements at sites where the costs of intake technologies are excessive, or where meeting the performance standards with the technologies is not practicable.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.040.004

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Encourage the use of existing data to minimize rule's cost impact.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities
C. Site-Specific Based Options Under Consideration
1. Sample Site-Specific Rule (p. 17159-17160)

EPA also invites comment on site-specific approaches for determining the best technology available for minimizing adverse environmental impact at existing facilities.

125.94 (a) (2) A previously conducted section 316(b) demonstration may be used to determine whether the location, design, construction and capacity of the facility's cooling water intake structure reflect best technology available for minimizing adverse environmental impact if it reflects current biological conditions in the water body and the current location and design of the cooling water intake structure. A previously conducted section 316(b) demonstration generally would reflect current conditions or circumstances if:

(i) The previous section 316(b) demonstration used data collection and analytical methods consistent with guidance or requirements of the permitting agency and/or the Administrator;

(ii) The available evidence shows that there have been no significant changes in the populations of critical aquatic species; and

(iii) The owner or operator can show there have been no significant changes in the location, design, construction, and capacity of the facility's cooling water intake structure that would lead to a greater adverse environmental impact.

DOMINION COMMENTS: If a facility has data showing that there is: (1) minimal entrainment and impingement and no discernable harm to the aquatic community, or (2) the environmental impact of entrainment and impingement is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its likely benefits, then there should be no need for either further intake evaluation or installation of additional intake technology. A provision should be added to the rule to allow a facility to make a justification that one of the conditions has been met and thus a 316(b) study is not required.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

The rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.040.005

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Successful state 316(b) programs should be continued.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

Section 125.96 Will Alternative State Requirements and Methodologies for Determining the Best Technology Available for Minimizing Adverse Environmental Impact Be Recognized? (p.17160)

Notwithstanding any other provisions of this subpart, if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under this subpart, the Administrator shall approve such alternative regulatory requirements.

DOMINION COMMENTS: In the proposed rule, EPA proposes to allow States to continue to use "alternative regulatory requirements" they have adopted, if they can show these requirements are functionally equivalent to the new federal rule - that is, if within each relevant watershed they would result in environmental performance that is comparable to the reductions in impingement mortality and entrainment that would be achieved under EPA's proposed 125.94 (67 Fed. Reg. 17,180 col. 1-2).

EPA's proposal appears to require that a State show that its program achieves the same percentage reductions in entrainment and impingement mortality as EPA's performance standards (60-90% and 80-95% respectively). But a successful State program may have focused on larger-scale effects, such as impacts on fish populations or the aquatic community, and the State may know that its program has successfully protected local aquatic communities but not necessarily be able to demonstrate that, for example, entrainment has been reduced by 60-90 percent. EPA should allow States to retain proven successful programs without having to force-fit them into EPA's new performance standards.

Many States have incorporated 316(b) into their water permit programs by adopting the federal 316(b) language and then writing regulations or guidance that references EPA's 1977 draft 316(b) guidance. If a State has complied with its administrative laws and procedure in developing and implementing its 316(b) program, the program should be eligible for consideration as functionally equivalent to proposed 125.94.

EPA Response

See response to 316bEFR.025.017.

Comment ID 316bEFR.040.006

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Site specific determination of Best Technology Available is preferred.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

4. Site-Specific Determination of Best Technology Available (p. 17145)

Under today's proposed rule, the owner or operator of an Phase II existing facility may demonstrate to the Director that a site-specific determination of best technology available is appropriate for the cooling water intake structures at that facility if the owner or operator can meet one of the two cost tests specified under. 125.94(c)(1).

DOMINION COMMENTS: Dominion strongly supports EPA's recognition that a site-specific alternative approach is needed to establish intake requirements at sites where the costs of intake technologies are excessive, or where meeting the performance standards with the technologies is not practicable.

The process of designing impingement and entrainment monitoring programs and selecting impact assessment methodologies is inherently site-specific. Site-specific factors are very important in determining the best approach to minimize adverse CWIS effects. Technologies that work at one location are frequently found not to work at another. The only way to accurately and appropriately select best technology available is on a site-specific basis. Site-specificity maximizes the ability to achieve the most environmentally effective and cost-effective reductions in adverse environmental impact.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.040.007

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 10.06.01
RFC: Incorp. costs/benefits without burden on Dir.

Streamline the workload for evaluating site-specific applications.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

13. Cost Benefit Test (p. 17153)

EPA is also concerned about the potential for members of the public who object to the authority's site-specific determinations to raise challenges that must be resolved in administrative appeals that can be very lengthy and burdensome, followed in some cases by judicial challenges. An ongoing State study of permitting workloads estimates that appeals of NPDES permits issued to major facilities require 40 hours to resolve in a simple case and up to 240 hours for a very complex permit. EPA Region 1 estimates that one year is required to resolve a complex administrative appeal, involving significant amounts of technical and legal resources. Should the permit appeal be followed by a judicial challenge, EPA Region 1 estimates an additional two years or more of significant investment of technical and legal resources in one decision, with additional time and resources needed if the initial judicial decision is appealed. Again, however, EPA notes that these burdens may be small compared to the potential costs of complying with presumptive performance standards. EPA invites comments on ways to incorporate site-specific consideration of costs and benefits without undue burden on the Director. In particular, EPA invites comment on decision factors and criteria for weighing and balancing these factors that could be included in regulation or guidance that would streamline the workload for evaluating site-specific applications and minimize the potential for legal challenges.

B. Other Technology-Based Options Under Consideration

3. The Utility Water Act Group (UWAG) Approach (p. 17162)

The Utility Water Act Group (UWAG), an association of more than 100 individual electric utility companies and three national trade associations of electric utilities, provided EPA with a recommended site-specific regulatory framework, entitled "316(b) Decision Principles for Existing Facilities." UWAG's recommended approach for decision-making under section 316(b) includes the following components:

A definition of Adverse Environmental Impact;

Use of Representative Indicator Species (RIS) for the assessment of adverse environmental impact;

Making decisions under section 316(b) that complement, but do not duplicate, other Federal, state, and local regulatory programs;

Use of de minimis criteria to exempt small cooling water users that pose no appreciable risk of causing adverse environmental impact because only a small amount of cooling water is withdrawn from a water body at a location that does not require special protection;

Determination of adverse environmental impact or its absence using the facility's choice of three methods, either alone or in combination: (1) Use of previously conducted section 316(b) demonstrations that are still valid in light of current circumstances; (2) use of ecological risk assessment by means of demonstration of no appreciable risk of adverse environmental impact using conservative decision criteria; or (3) assessment of risk using a structured decision making process consistent with EPA's Ecological Risk Assessment Guidelines;

A maximize net benefits approach for selecting the best technology available for minimizing adverse environmental impact;

At the option of the permittee, recognition of voluntary enhancements such as fish stocking or habitat improvements; and

Providing data or information with NPDES permit renewal applications if new information shows that previously conducted section 316(b) demonstrations are no longer scientifically valid.

DOMINION COMMENTS: Dominion supports UWAG's 316(b) Decision Principles, because it will provide technical, legal and policy tools that will ultimately streamline the workload for evaluating site-specific applications.

EPA is concerned that site-specific decisions on environmental impact will require burdensome time and effort by permitting agencies and therefore proposes to simplify the 316(b) decision process by setting a numerical criterion. However EPA's criterion merely prescribes a reduction in the number of individual animals lost and thus fails to address the complexities of aquatic communities.

Without question, State and federal regulators face resource constraints. EPA's proposal makes the goal (60-90% reduction, for example) more numerically precise, to be sure. But proving that the goal is met will require permit writers to consider the effects of the same site-specific factors that have always been considered. Most of the burden of implementing a site-specific approach, conducted in accordance with a clear and consistent decision-making process like that described in UWAG's 316(b) Decision Principles, would fall on regulated facilities, not regulators. Dominion is prepared to perform studies reasonably necessary to allow scientifically and environmentally sound 316(b) decisions. A streamlined process will provide the technical, legal, and policy tools for decision-making that were lacking in the past and as a result minimize the burden on EPA and states.

EPA Response

EPA did not adopt the UWAG’s 316(b) Decision Principles for Existing Facilities or the other similar site-specific approaches considered in the proposed rule. EPA believes that each of these site-specific options would have resulted in higher administrative burdens being imposed on applicants and permit writers relative to the final rule. See section VII of the preamble to the final rule for discussion on why EPA is not adopting these site-specific alternatives.

EPA agrees aquatic communities are complex. See Comment ID 316EFR.025.018 for additional information. EPA has determined that reducing impacts by cooling water intake structures by reducing the numbers of organisms impinged and entrained is appropriate. These reductions will reduce stress on fish populations which EPA believes is the intention of section 316(b). See preamble today's rule for a discussion regarding why EPA chose impingement and entrainment. This approach provides certainty about permitting requirements and streamlines, and thus speeds, the issuance of permits. Focusing this rule’s performance standards on reducing impingement mortality and entrainment is also consistent with NPDES programmatic goals.

Comment ID 316bEFR.040.008

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 18.01.01
UWAG definition of "adverse environmental impact"

EPA should adequately define adverse environmental impact.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

5. Discussion of Site-Specific Approach Issues and Associated Questions for Comment

a. Determination of Adverse Environmental Impact

(3) Discussion of UWAG Recommendation for Determining Adverse Environmental Impact

(p. 17163)

UWAG offers the following definition: Adverse environmental impact is a reduction in one or more representative indicator species (RIS) 61 that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure.

DOMINION COMMENTS: Section 316(b) cannot be implemented effectively unless there is a definition of "adverse environmental impact." "Adverse environmental impact" cannot mean harm to a single fish or a single egg; it must mean harm at the population or community level. Dominion supports UWAG's recommended definition of adverse environmental impact: Adverse environmental impact is a reduction in one or more representative indicator species that (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) this negative impact is attributable to the operation of the cooling water intake structure.

At many electric generating facilities, there is already a high degree of confidence that the facility is not creating adverse environmental impact or has already installed BTA. Examples would include (1) where a facility already has performed a 316(b) demonstration before the new 316(b) rule is promulgated and has shown to the satisfaction of its regulatory agency that the facility complies with 316(b), or (2) where operating experience and knowledge of the local fishery provide regulatory authorities with confidence that fish populations are not being harmed by impingement and/or entrainment.

The statute calls for minimizing environmental impact, not eliminating entrainment and impingement mortality, so technologies should be evaluated accordingly. Fisheries should be viewed as a resource that can be managed and sustained. EPA should recognize that some losses of individual fish are not harmful to the fishery resource as a whole and that there is no reason to view losses caused by cooling water intake structures as fundamentally different from losses caused by any other human activity or natural occurrence. Great losses occur as a result of commercial fishing industry, and a rebound of striped bass populations has been witnessed upon initiation of a fishing moratorium.

EPA's 316(b) rule should use the lessons of fisheries management science. If the impact of a facility's CWIS is in the range of impacts known by fisheries managers to be within normal variation or not of concern to the viability of the fishery, the facility is not creating adverse environmental impact

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.040.009

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA should define the term minimal as it pertains to entrainment and impingement losses and adverse environmental impact.

Regulatory Reference: Preamble V. Environmental Impacts Associated With Cooling Water Intake Structures

A. Facility Examples (p. 17137)

In some cases, the number of organisms impinged and entrained by a facility can be substantial and in other examples impingement and entrainment may be minimal due to historical impacts from anthropogenic activities such as stream or river channelization.

A. Facility Examples (p. 17138)

At this facility, fish impingement and entrainment by cooling water intakes were found to be minimal.

VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

13. Cost Benefit Test (p. 17153)

EPA notes that at some sites, impingement and entrainment losses are minimal.

DOMINION COMMENTS: Dominion proposes that the rule include a definition for the term "minimal" since the term is often used in discussions of environmental impacts, entrainment and impingement losses (mortality) and adverse environmental impact (this is consistent with the previous comment - EPA should adequately define adverse environmental impact).

Minimal = SMALL = Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource, i.e. population structure.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.040.010

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 21.09
Permit applications/implementation schedule

The rule should be implemented through permit requirements.

Regulatory Reference: Preamble VII. Implementation

B. What Information Must I Submit to the Director When I Apply for My Reissued NPDES Permit?

4. Comprehensive Demonstration Study

a. Proposal for Information Collection (p.17175)

The proposed rule does not specify particular timing requirements for your information collection proposal, but does require review and approval of the proposal by the Director. In general, EPA expects that it would be submitted well in advance of the other permit application materials, so that if the Director determined that additional information was needed to support the application, the facility would have time to collect this information, including additional monitoring as appropriate.

DOMINION COMMENTS: The permittee, as part of its permit application package, should be allowed to propose a schedule for developing the data collection plan, to get the plan approved by the state's permitting authority, to collect and analyze the data, to use the data to assess technologies, and to prepare the BTA recommendation. After being reviewed and approved by the state's permitting agency, this process would be written as a permit condition.

Once the data are collected and the BTA selection has been made, the permit would be modified. The 316(b) rule should make it clear that reasonable time for state agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066.

Comment ID 316bEFR.040.011

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Joyce Livingstone

Organization Dominion Environmental

Reasonable compliance schedules are necessary.

Regulatory Reference: Preamble VII. Implementation

C. How Would the Director Determine the Appropriate Cooling Water Intake Structure Requirements? (p. 17178)

If the Director determines that the Comprehensive Demonstration Study submitted does not demonstrate that the technologies, operational measures, and supplemental restoration measures employed would achieve compliance with the applicable performance standards, the Director may issue a permit requiring such compliance. If such studies are approved and a permit is issued but the Director later determines, based on the results of subsequent monitoring, that the technologies, operational measures, and supplemental restoration measures did not meet the rule standards, the Director could require the existing facility to implement additional technologies and operational measures as necessary to meet the rule requirements. In general, this would occur at the next renewal of the permit. The Director would also review the facility's Technology Verification Plan for post-operational monitoring to demonstrate that the technologies are performing as predicted.

DOMINION COMMENTS: If EPA were to make the new 316(b) rule immediately applicable, it would lead to even more delay in the NPDES permitting process than currently exists. The available consultants skilled in biological monitoring and intake technology design undoubtedly would be overwhelmed with work and would have to put many licensees on waiting lists. Negotiations over consent orders might bog down the permit process in some States, and the backlog of unprocessed NPDES permit applications would grow worse. Reasonable compliance schedules are a matter of administrative necessity as well as of fairness to state regulators and permittees.

The permittee, as part of its permit application package, should be allowed to propose a schedule for developing the data collection plan, to get the plan approved by the state's permitting authority, to collect and analyze the data, to use the data to assess technologies, and to prepare the BTA recommendation. After being reviewed and approved by the state's permitting agency, this process would be written as a permit condition.

EPA Response

For several reasons, including those identified in this and other comments, EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066. In today's final rule, EPA has provided tremendous flexibility to facilities and Directors by offering five compliance alternatives, including a site-specific determination of BTA, which will assist in offsetting any permit backlog issues.

Comment ID 316bEFR.040.012

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 21.09
Permit applications/implementation schedule

Permits should have technology upset and bypass provisions.

Regulatory Reference: Preamble VII. Implementation

E. How Would Compliance Be Determined? (p. 17180)

This proposed rule would be implemented by the Director placing conditions consistent with this proposed rule in NPDES permits. To demonstrate compliance, the proposed rule would require that the following information be submitted to the Director:

Data submitted with the NPDES permit application to show that the facility is in compliance with location, design, construction, and capacity requirements;

Compliance monitoring data and records as prescribed by the Director. Proposed 125.97 would require existing facilities to keep records and report compliance monitoring data in a yearly status report. In addition, Directors may perform their own compliance inspections as deemed appropriate (see CFR 122.41).

DOMINION COMMENTS: The permit should have a provision analogous to EPA's upset and bypass provisions in the NPDES permit regulations to allow an intake technology to be temporarily bypassed if necessary for plant operation. For example, if the screens are fouled so as to jeopardize plant operation, the permittee should be allowed to bypass them until they can be cleared. Similarly, if because of emergency conditions water levels in a reservoir are reduced to the point where technologies are inoperative, bypassing to allow continued operation should be allowed. Such exceptional bypasses should be allowed only for short periods of time, until the emergency has passed and the permittee has had time to restore the intake technology to proper operation. As for any exceptional event, the permittee would be required to report the circumstances of the upset or bypass to the state permitting authority in a timely manner.

EPA Response

See response to comment 316bEFR.034.017.

Comment ID 316bEFR.040.013

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 21.09

Permit applications/implementation schedule

Permits should be grandfathered if they are due to expire very near the application deadline.

Regulatory Reference: Preamble VII. Implementation

A. When Does the Proposed Rule Become Effective? (p. 17173)

Phase II existing facilities subject to today's proposed rule would need to comply with the Subpart J requirements when an NPDES permit containing requirements consistent with Subpart J is issued to the facility. See proposed 125.92. Under existing NPDES program regulations, this would occur when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued.

DOMINION COMMENTS: For a facility whose permit renewal application is undergoing agency review when the 316(b) rule becomes effective, the permittee should not have to resubmit its application. In such a case, the subsequent permit renewal process should trigger the permittee's compliance with the new rule requirements.

Similarly, if the new rule becomes effective when a permittee is very near the time when its renewal application is due (for example, between 365 and 180 days before the permit expires), it would be almost as unreasonable to require the permittee to adjust its application process in midstream. The practical difficulties in preparing a permit application, especially if biological monitoring is needed, suggest that the new rule should not apply until the succeeding permit term, to any permittee that has one year or less until its permit expires when the rule takes effect.

EPA Response

See response to comments 316bEFR.021.006 and 316bEFR.035.019.

Comment ID 316bEFR.040.014

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Restoration measures could be employed in lieu of, or in combination with other measures.

Regulatory Reference: Subpart J Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

125.94 How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?

(d) Restoration Measures. (p. 17221-17222)

In lieu of, or in combination with, reducing impingement mortality and entrainment by implementing design and construction technologies or operational measures to comply with the performance standards specified in paragraph (b) of this section or the Director's determination pursuant to paragraph (c) of this section, you may, with the Director's approval, employ restoration measures that will result in increases in fish and shellfish in the watershed. You must demonstrate to the Director that you are maintaining the fish and shellfish within the waterbody, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures to meet that portion of the requirements of paragraphs (b) or (c) of this section that you are meeting through restoration. Your demonstration must address species that the Director, in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by your cooling water intake structure, identifies as species of concern.

DOMINION COMMENTS: Dominion supports allowing permittees, on a voluntary basis, to employ restoration measures in lieu of, or in combination with other technologies or operational measures that will result in increases in fish and shellfish species of concern in the watershed. We support the idea of providing improvements to populations using proven technologies and/or strategies, if they are warranted.

EPA Response

For a discussion of the use of restoration measures in lieu of design and construction technologies and operational measures, see EPA's response to comment 316bEFR.041.209.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.040.015

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

5. What Is the Role of Restoration Under Today's Preferred Option? (p. 17146)

EPA also seeks comment on the most appropriate spatial scale under which restoration efforts should be allowed should restoration measures be limited to the waterbody at which a facility's intakes are sited, or should they be implemented on a broader scale, such as at the watershed or State boundary level.

DOMINION COMMENTS: Dominion supports expanded state-wide and even interstate watershed spatial boundaries for restoration projects. This approach appropriately provides the flexibility to locate a restoration project in an area that may provide greater overall environmental benefit and/or enhance an ecosystem that may benefit more than the area in the near proximity of a facility's intakes.

EPA Response

No provision in the final rule prevents implementation of restoration measures in a state other than the one in which a cooling water intake structure is located so long as the restoration measures meet all requirements as described in the final rule. For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.040.016

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 11.07

RFC: Restoration above BTA level

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

5. What Is the Role of Restoration Under Today's Preferred Option? (p. 17147)

EPA recognizes that substantial information exists regarding wetlands mitigation and restoration. For example, tools and procedures exist to assess wetlands in the context of section 404 of the Clean Water Act. However, restoration of other aquatic systems such as estuaries is complex and continues to evolve. EPA seeks comment on how it may measure the success or failure of restoration activities given the high degree of uncertainty associated with many areas of this developing science and that many of these activities do not produce measurable results for many months or years after they are implemented. For these reasons, EPA requests comment on whether to require that a facility using restoration measures restore more fish and shellfish than the number subjected to impingement mortality or entrainment. EPA believes that restoring or mitigating above the level that reflects best technology available for minimizing adverse environmental impact (e.g., restocking higher numbers of fish than those impinged or entrained by facility intakes or restoring aquatic system acreages at ratios greater than one-to-one) would help build a margin of safety, particularly when the uncertainties associated with a particular restoration activity are known to be high.

The concept of compensatory mitigation ratios being greater than one-to-one is found in other programs. For example, under the CWA section 404 program no set mitigation ratio exists, however, current policies require no net loss of aquatic resources on a programmatic basis. The permitting authority often requires permit applicants to provide more than one-to-one mitigation on an acreage basis to address the time lapse between when the permitted destruction of wetlands takes place and when the newly restored or created wetlands are in place and ecologically functioning. The permit may also require more than one-to-one replacement to reflect the fact that mitigation is often only partially successful. Alternatively, in circumstances where there is a high confidence that the mitigation will be ecologically successful, the restoration/ creation has already been completed prior to permitted impacts, or when the replacement wetlands will be of greater ecological value than those they are replacing, the permitting authority may require less than one-to-one replacement.

DOMINION COMMENTS: Dominion does not support a requirement to restore populations above the level of BTA. However, a facility should receive credit if the restoration effort achieves this status during the verification monitoring period and should become eligible to negotiate for reduced monitoring.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to satisfy the requirements of the final rule, see EPA's responses to comments 316bEFR.060.026 and 316bEFR.212.001.

Comment ID 316bEFR.040.017

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 21.05
Role of States and Tribes (alt./equiv. programs)

Approval authority should remain with the state permitting agencies.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

11. State or Tribal Alternative Requirements That Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed (p.17151-17152)

In 125.90, today's proposal includes an alternative where an authorized State or Tribe may choose to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions in impingement mortality and entrainment that would otherwise be achieved under 125.94. If a State or Tribe can successfully make this demonstration, the Administrator is to approve the State or Tribe's alternative regulatory requirements. EPA is proposing that such alternative requirements achieve comparable performance at the watershed level, rather than at larger geographic scales or at the individual facility-level, to allow States and Tribes greater flexibility and, potentially, greater efficiency in efforts to prevent or compensate for impingement mortality and entrainment losses, while still coordinating those efforts within defined ecological boundaries where the increased impacts are directly offset by controls or restoration efforts. Requiring performance level assessment to take place at the watershed level ensures that facility mitigation efforts take the overall health of the waterbody in the target watershed into account. The Agency requests comment on all aspects of this approach, including the appropriate definition of watershed.

EPA also recognizes that States sometimes assign higher priority to protecting some waters over others. This may be due to the exceptional environmental, historic, or cultural value of some waters, or conversely to a concern with multiple stresses already occurring in a watershed. It could also be based on the presence of individual species of particular commercial, recreational, or ecological importance. For these reasons, States with alternative requirements might choose to provide more protection that would be achieved under 125.94 in some watersheds and less protection in others. Under current language in proposed 125.90, States could not use such an approach because they would not be able to demonstrate comparable environmental performance within each watershed. EPA requests comment on whether it should instead allow States to demonstrate comparable environmental performance at the State level, thus allowing States the flexibility to focus protection on priority watersheds. The standard provided in proposed 125.90 for evaluating alternate State requirements is "environmental performance that is comparable to the reductions that would otherwise be achieved under 125.94." EPA recognizes that it may not always be possible to determine precisely the reductions in impingement and entrainment associated with either 125.94 or the alternate State requirements, particularly at the watershed level or State-wide. Furthermore, alternate State requirements may provide additional environmental benefits, beyond impingement and entrainment reductions, that the State may wish to factor into its comparability demonstration. However, in making this demonstration, the State should make a reasonable effort to estimate impingement and entrainment reductions that would occur under 125.94 and under its alternate requirements, and should clearly identify any other environmental benefits it is taking into account and explain how their comparability to impingement and entrainment reduction under 125.94 is being evaluated. EPA invites comment on the most appropriate scale at which to define a watershed to reflect the variability of the nature of the ecosystems impacted by cooling water intake structures within a State or Tribal area and on methods for ensuring ecological comparability within watershed-level assessments. EPA also invites comment on whether defined watershed boundaries for the purpose of section 316(b) programs should lie entirely within the political boundaries of a Tribe or State unless adjoining States and/or Tribes jointly propose to establish alternative regulatory requirements for shared watersheds.

DOMINION COMMENTS: Dominion supports giving state agencies the flexibility to focus their protection effort on priority watersheds. States also should be allowed to demonstrate overall comparable environmental performance at the State level instead of at the watershed level.

Streamlined decision-making is inextricably linked with preserving state authority. Where a state has already made a careful determination of the best technology available for a particular intake, a change in the state's decision is warranted only if there has been a significant change in circumstance since the determination was made.

EPA Response

Please see response to comment 316bEFR.025.017 for a discussion of State program approval rationale and response to comment 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

EPA believes that the watershed level is a manageable unit of study; the watershed level was selected to ensure protection of ecological resources within a hydrologic unit and for consistency with NPDES permitting efforts that place controls at the watershed level. EPA believes that measuring at a State level may not accurately reflect impingement and entrainment impacts since a State is a much larger unit of measurement. A State or Tribal section 316(b) regulatory program should also consider reductions in impingement mortality and entrainment at the relevant watershed level.

Comment ID 316bEFR.040.018

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 7.02
Performance standards

EPA should clarify the definition of calculation baseline.

Regulatory Reference: Subpart J Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

125.93 What special definitions apply to this subpart? (p. 17220)

Calculation baseline means an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls.

DOMINION COMMENTS: EPA should clarify the definition of calculation baseline by assuming that the baseline plant is equipped with standard 3/8-inch mesh screens and the hypothetical baseline intake has the similar cooling water requirements as the actual facility.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.040.019

Subject Matter Code 7.02
Performance standards

Author Name Joyce Livingstone
Organization Dominion Environmental

The methods of measuring the calculation baseline should be redefined.

Regulatory Reference: Preamble VII. Implementation

B. What Information Must I Submit to the Director When I Apply for My Reissued NPDES Permit?

4. Comprehensive Demonstration Study

(d) Design and Construction Technology Plan (p. 17176)

Reductions in impingement mortality and entrainment from this calculation baseline as a result of any design and construction technologies already implemented at your facility would be added to the reductions expected to be achieved by any additional design and construction technologies that would be implemented in order to determine compliance with the performance standards. Facilities that recirculate a portion of their flow may take into account the reduction in impingement mortality and entrainment associated with the reduction in flow when determining the net reduction associated with existing technology and operational measures. This estimate must include a site-specific evaluation of the suitability of the technology(ies) based on the species that are found at the site, and/or operational measures and may be determined based on representative studies (i.e., studies that have been conducted at cooling water intake structures located in the same waterbody type with similar biological characteristics) and/or site-specific technology prototype studies. If your facility already has some existing impingement mortality and entrainment controls, you would need to estimate the calculation baseline. This calculation baseline could be estimated by evaluating existing data from a facility nearby without impingement and/or entrainment control technology (if relevant) or by evaluating the abundance of organisms in the source waterbody in the vicinity of the intake structure that may be susceptible to impingement and/or entrainment.

DOMINION COMMENTS: The preamble to the proposed rule says that the calculation baseline could be estimated by evaluating existing data from a nearby facility. This method should be written into the rule itself with some clarification. The representative facility need not necessarily be "nearby" or even on the same waterbody. A permittee should be able to use fish or larval abundance data from power plant locations similar to its own to estimate how much impingement mortality and entrainment would occur with no reduction controls. Also, a permittee should be allowed to do upstream studies in an area near the intake to predict baseline impingement mortality and entrainment.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.040.020

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

316(b) should be a one-time only requirement.

Regulatory Reference: Subpart J-Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

125.98 As the Director, what must I do to comply with the requirements of this subpart?

Permit Application. (p. 17224)

As the Director, you must review materials submitted by the applicant under 40 CFR 122.21(r) and 125.95 before each permit renewal or reissuance.

(1) After receiving the permit application from the owner or operator of a Phase II existing facility, the Director must determine which of the standards specified in 125.94 to apply to the facility. In addition, the Director must review materials to determinecompliance with the applicable standards.

(2) At each permit renewal, the Director must review the application materials and monitoring data to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit.

DOMINION COMMENTS: Once best technology available is determined for a plant, installing and operating that technology ought to relieve the plant of further 316(b) obligations unless or until the plant is significantly modified. The location, design, construction, and capacity of the cooling water intake structures are matters of design and construction, not operation. Congress could not have intended that power plants be in the business of redesigning, demolishing, and reconstructing their physical plant every five or ten years. The most appropriate way to apply 316(b) would a one-time review designed to achieve minimal adverse environmental impact at a reasonable cost.

EPA's proposed rule suggests a comprehensive reevaluatio of the 316(b) demonstration every time a permit is renewed. Once a successful 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be sufficient. Dominion suggests that 125.98(a)(2) be changed as follows: "Unless there have been significant changes in plant operations or adverse changes to the aquatic population, after a successful demonstration of compliance with EPA's performance standards, at each subsequent permit renewal the permit writer should accept the initial demonstration."

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.040.021

Author Name Joyce Livingstone

Organization Dominion Environmental

Subject Matter Code 21.03

Monitoring requirements

Compliance monitoring should verify BTA efficiency.

Regulatory Reference: Preamble VII. Implementation

D. What Would I Be Required To Monitor? (p. 17179)

Proposed 125.96 provides that Phase II existing facilities would have to perform monitoring to demonstrate compliance with the requirements of 125.94 as prescribed by the Director. In establishing such monitoring requirements, the Director should consider the need for biological monitoring data, including impingement and entrainment sampling data sufficient to assess the presence, abundance, life stages, and mortality (including eggs, larvae, juveniles, and adults) of aquatic organisms (fish and shellfish) impinged or entrained during operation of the cooling water intake structure. These data could be used by the Director in developing permit conditions to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit. The Director should ensure, where appropriate, that any required sampling would allow for the detection of any annual, seasonal, and diel variations in the species and numbers of individuals that are impinged or entrained. The Director should also consider if a reduced frequency in biological monitoring may be justified over time if the supporting data show that the technologies are consistently performing as projected under all operating and environmental conditions and less frequent monitoring would still allow for the detection of any future performance fluctuations. The Director should further consider whether weekly visual or remote or similar inspections should be required to ensure that any technologies that have been implemented to reduce impingement mortality or entrainment are being maintained and operated in a manner that ensures that they function as designed. Monitoring requirements could be imposed on Phase II existing facilities that have been deemed to meet the performance standard in 125.94(b)(1) to the extent consistent with the provisions of the NPDES program.

DOMINION COMMENTS: Dominion recommends that after a verification monitoring period, the data should be analyzed to determine whether the newly installed technology is indeed achieving the projected 80-95% reduction in impingement mortality and 60-90% reduction in entrainment. As long as the data shows performance within these ranges, the technology should be deemed to comply with the rule. Assuming the data showed performance within the ranges given, then biological monitoring requirements should be significantly reduced. Thereafter, the permittee should be required only to monitor and document that it continues to operate and maintain the technology.

On the other hand, if the initial monitoring showed that the technology was not meeting the performance standards, then a period of additional study should be provided to determine why projected reduction targets are not being met and what should be done to fix it. Once the permittee had demonstrated that the technology performed within the performance standard ranges, it would have only to maintain and operate the same technology for the life of the plant and would not have to make repeated demonstrations. This is a reasonable proposal, given that 316(b) is a construction-oriented requirement and that fish populations are highly variable and subject to many stresses other than cooling water intakes.

EPA Response

Please see EPA's responses to comments 316bEFR.074.023 and 316bEFR.021.007.

Comment ID 316bEFR.040.022

Author Name Joyce Livingstone
Organization Dominion Environmental

Subject Matter Code 21.03
Monitoring requirements

Two years of verification monitoring could be shortened.

Regulatory Reference: Subpart J Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

125.95 As an owner or operator of a Phase II existing facility, what must I collect and submit when I apply for my reissued NPDES permit?

(b) Comprehensive Demonstration Study

(7) Verification Monitoring Plan. (p. 17178)

You must include in the Study a plan to conduct, at a minimum, two years of monitoring to verify the full-scale performance of the proposed or implemented technologies, operational measures, or restoration measures. The verification study must begin once the technologies, operational measures, and restoration measures are implemented and continue for a period of time that is sufficient to demonstrate that the facility is reducing the level of impingement and entrainment to the levels documented pursuant to paragraphs (b)(4)(iii), (b)(5)(ii), and/or (b)(6)(iii)(B) of this section. The plan must describe the frequency of monitoring and the parameters to be monitored and the basis for determining the parameters and the frequency and duration for monitoring. The plan must also describe the information to be included in a yearly status report to the Director. The Director will use the verification monitoring to confirm that you are meeting the applicable requirements of 125.94.

DOMINION COMMENTS: A two-year period of verification monitoring is excessive and unnecessary. If a plant had already collected abundant data and no change to the plant was required by the new rule, then this period should be shortened to a maximum of one year or waived.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.040.023

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Author Name Joyce Livingstone

Organization Dominion Environmental

Dominion suggests assigning a three-level standard of significance to the definition of adverse environmental impact - SMALL, MODERATE or LARGE - used by the Nuclear Regulatory Commission to evaluate environmental issues and developed using the Council on Environmental Quality guidelines.

SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource, i.e. population structure.

MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

If a facility had determined that impingement or entrainment losses are SMALL or MODERATE, the facility should be eligible for a site-specific determination of best available technology independent of whether either of the cost tests for site-specific determination have been met.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. In addition, EPA does not believe it is necessary to redefine the terms "small", "moderate", or "large" to relate to environmental impact.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Hunton & Williams

On Behalf Of:

obo Utility Water Act Group

Author ID Number:

316bEFR.041

Notes

EPRI (316bEFR.074)

Comment ID 316bEFR.041.001

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code SUP

General statement of support

EPA's proposed rule for applying § 316(b) of the Clean Water Act to "existing" facilities is based on two "performance standards," which EPA says reflect the reduction in impingement mortality and entrainment achievable by certain intake technologies (wedgewire screens, fine mesh screens, fish returns, and aquatic fabric filter barriers) that EPA considers the "best technology available" (BTA). Where they apply, these performance standards call for reducing impingement mortality by 80-95% and reducing entrainment by 60-90% in comparison to a "baseline."

This proposed rule has some merit. For one thing, it recognizes that the technologies EPA has identified can be effective in reducing impingement mortality and entrainment but that no single technology will be the "best available" in all cases. In this conclusion, EPA is correct; the technologies named above may meet EPA's performance standards at some sites, though not all.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.041.002

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code OPP

General Statement of Opposition

There are, however, at least four problems with the proposed rule. First, it does not go far enough to accommodate site-specific features and local species that must be considered in § 316(b) decisions. Second, although the rule needs a provision allowing for relief from the performance standards where the cost of complying would be excessive, EPA's test of having the costs be "significantly greater" than benefits or than the costs EPA considered has no basis in the discipline of economics. Third, EPA has overestimated the "benefits" of all the regulatory alternatives it considered. Fourth, the numerical performance standards themselves, if made into enforceable requirements in NPDES permits, may create uncertainty and unfairness as operators try continually to prove percentage reductions in impingement mortality and entrainment in the face of natural fluctuations in fish populations.

Moreover, the rule still lacks a definition of the statutory term "adverse environmental impact." It is the lack of such a definition, which should focus on population-level impacts, that has led EPA to assume, by implication, that any impingement mortality and any entrainment is adverse.

Despite these shortcomings, the proposed rule will be workable if the alternative for a site-specific analysis in case of excessive costs is sensibly crafted and certain refinements are made. EPA proposes to allow a site-specific analysis of best technology available if the costs of meeting the performance standards are "significantly greater than" either the benefits of complying or the costs that EPA considered. There is no rational basis for this test in the economic literature, and the alternative "wholly disproportionate" test is even worse.

UWAG proposes in these comments that the correct test of what technology is BTA for a site is the technology that maximizes "net benefits" (that is, benefits minus costs). This is the only standard that is supported by economic theory. However, if EPA retains the numerical performance standards with a site-specific exception for excessive costs, the exception might be triggered (and a site-specific analysis allowed) when the cost of installing and operating the technology exceeds the benefit (all discounted to present value) by any amount. In this way, no additional technology would be required if it would make society worse off overall – if, that is, the incremental cost of the technology exceeded the benefits.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.041.003

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code OPP

General Statement of Opposition

UWAG continues to believe that its own "Decision Principles" (Appendix 1) are the best way to implement § 316(b). The UWAG Decision Principles provide several conservative rules of thumb for determining quickly, where they apply, that a facility's intake does not adversely impact the aquatic environment. Where these simple rules are not enough, the UWAG Decision Principles propose a more detailed decision process based on EPA's Ecological Risk Assessment Guidelines.

However, in case EPA insists on retaining its performance standards, UWAG also suggests in these comments ways in which the proposed performance standards should be improved, mostly by adding alternatives to EPA's proposal. One of UWAG's recommendations would allow a permittee to install the most cost-effective of EPA's approved intake technologies (wedgewire screens, fine mesh screens, an aquatic fabric filter system, or a traveling screen with fish return system). After installing the technology, the permittee would have to monitor only the proper installation, operation, and maintenance of the technology rather than percentage reductions in fish impinged or entrained.

UWAG also recommends modifying EPA's proposal to encourage States to continue successful State programs and to take advantage of knowledge already collected about facilities. Where a facility already has made a successful § 316(b) demonstration based on sound scientific and technical information and nothing important has changed, or where experience at a facility shows that impingement mortality and entrainment are small and regulatory authorities or resource agencies have accumulated enough knowledge about the waterbody to be confident that entrainment and impingement are not causing an adverse impact, EPA should allow (even encourage) them to rely on this knowledge.

Finally, these comments show that EPA is correct not to designate wet cooling towers (let alone dry cooling) as "best technology available," since (1) the cost of such a requirement would be enormous – greater even than EPA estimates – and (2) EPA has no authority to require cooling towers, because they are not "cooling water intake structures" (CWISs).

In a nutshell, UWAG is recommending in these comments one of two alternatives. The preferred approach is a site-specific one along the lines of UWAG's Decision Principles (or the PSEG alternative). The second-best solution consists of several additions to EPA's proposal along the following lines:

Two Alternatives

[see hard copy for diagram]

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.041.004

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.03

Available I&E technologies

EPA'S PROPOSAL WOULD REQUIRE PERCENTAGE REDUCTIONS IN IMPINGEMENT MORTALITY AND, AT MANY SITES, ENTRAINMENT, COMPARED TO A "BASELINE"

In the preamble to the proposal, EPA says that it considered several options for site-specific implementation of § 316(b), including a proposal by UWAG, but rejected them for a more technology-based approach with specific performance standards based on two factors: plant flow and source waterbody type. 67 Fed. Reg. 17,159 col. 1. At the same time, EPA rejected – correctly, in UWAG's view – alternatives that would have required some or all existing facilities to install closed-cycle cooling systems (that is, cooling towers or impoundments). 67 Fed. Reg. 17,155 col. 1, 2.

Under EPA's proposal, the performance standards can be met by either (1) cooling towers (or ponds or similar methods of recirculation) (see 67 Fed. Reg. 17,130) or (2) 80-95% reduction in impingement mortality and, for many plants, 60-90% reduction in entrainment. The only plants that would not have the entrainment requirement would be facilities on lakes (other than the Great Lakes), facilities withdrawing 5% or less of the mean annual flow of a freshwater river or stream, and facilities with a capacity utilization rate less than 15%.

EPA bases its impingement mortality standard (80-95% reduction) on four technologies: (1) fine and wide mesh wedgewire screens; (2) aquatic filter barrier systems (sometimes called by the trade name "Gunderboom"); (3) barrier nets; and (4) modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems. 67 Fed. Reg. 17,142 col. 1. EPA bases its entrainment standard (60-90% reduction) on three technologies: (1) aquatic filter barrier systems, (2) fine mesh wedgewire screens, and (3) fine mesh traveling screens. Id. Selecting an appropriate technology or technologies for a given site would be site-specific and involve comparing the proposed technology to a "calculation baseline" reflecting the amount of impingement and entrainment that would occur if the facility had a shoreline intake and no impingement or entrainment reduction controls.

EPA's proposal allows permittees to use restoration measures (for example, creating or restoring a wetland or operating a fish hatchery) instead of, or along with, intake technologies if they can show that restoration measures will maintain fish and shellfish in the waterbody, including community structure and function, at a level of protection comparable to what could be met by intake technologies. 67 Fed. Reg. 17,146-48, proposed § 125.94(d), 67 Fed. Reg. 17,221-22, § 125.95(b)(5), 67 Fed. Reg. 17,223 col. 3. EPA's proposal also allows the permittee to obtain an alternative site-specific performance standard if he can demonstrate that the cost of compliance with the performance standards would be "significantly greater" than either the costs EPA considered or the benefits. EPA also proposes to allow alternative requirements where the Nuclear Regulatory Commission (NRC) determines that compliance with the rule would conflict with NRC-established safety requirements. Proposed § 125.94(f), 67 Fed. Reg. 17,222 col. 1.

Finally, EPA's proposal appears to require substantial engineering and biological studies, first studies to determine "baseline" conditions and select the "best available" technology and then monitoring during the permit term. Proposed § 125.95, 67 Fed. Reg. 17,222 col. 1. The proposed rule also establishes deadlines for permit applications and for achieving compliance with the rule.

With some qualifications, explained below, UWAG supports EPA's endorsement of intake technologies, such as wedgewire screens, fine mesh screens, aquatic filter barriers, and fish diversion or return systems, because EPA appears to recognize the following:

1. There are workable, protective intake technologies that can approach or meet EPA's performance standards at many appropriate sites and are more reasonable than wet cooling towers, dry cooling, or operating restrictions;

2. Performance and effectiveness of these technologies are determined by site-specific factors;

3. At some sites, these technologies can reduce impingement mortality and entrainment within the ranges EPA has identified and (at some subset of those sites) at a cost that is not excessive; and

4. At sites where the costs of these technologies are excessive, or where meeting the performance standards with the technologies is not practicable, an alternative is needed to establish different intake requirements on a site-specific basis. An alternative is offered by EPA's proposed "significantly greater" cost tests, though, as we explain below, the "significantly greater" standard itself has no rational basis in economics.

EPA Response

EPA agrees with the commenter's assessment of the availability and practicability of the many technologies used to minimize adverse environmental impacts associated with cooling water withdrawals. EPA also agrees that the determination of the most appropriate and cost-effective strategy for meeting the requirements of today's rule is best achieved on a facility-specific basis and has maintained this flexibility in today's final rule. EPA notes that today's rule also includes a site-specific alternative for meeting the requirements of today's rule based on cost-cost or cost-benefit considerations.

Comment ID 316bEFR.041.005

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

In particular, UWAG agrees that the rule should have an alternative, site-specific approach where achieving the performance standards is not feasible or the cost is excessive.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.041.006

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

However, UWAG also believes the rule should go further to allow the continued reliance on technically sound § 316(b) decisions (and § 316(b) State programs) that were made in the past, as explained in the next section of these comments, below.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.041.007

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Author Name Hunton & Williams
Organization obo Utility Water Act Group

THE RULE SHOULD CONTAIN A STREAMLINED ALTERNATIVE FOR FACILITIES THAT ALREADY HAVE PROVED THEY ARE NOT HARMING THE AQUATIC COMMUNITY

The rule will be significantly improved if it includes a streamlined process for approving a cooling water intake structure that already has been demonstrated to have the best technology available (BTA) or not to cause adverse environmental impact (AEI). In general, there are two situations where this is true:

1. Where a facility already has performed satisfactory § 316(b) studies in the past and has shown to the satisfaction of its regulatory agency that the facility complies with § 316(b). This would include the case where an existing facility is modernized or largely replaced but the existing intake structure continues to be used, where previous § 316(b) studies have demonstrated that the structure satisfies § 316(b), and where the permittee can show that the modernized facility will have no greater flow or, for other reasons, will have no greater environmental impact than the original facility.

2. Where experience at the facility shows that impingement and entrainment are low and where knowledge of the local fishery gives regulatory authorities confidence that fish populations are not being harmed by impingement and entrainment. This includes cases where the permit writer has enough information to conclude that the cost of additional biological monitoring would not be justified by the benefits that would be gained by further study.

In such cases, the permitting agency should be allowed to conclude, after a fresh review of existing information but without additional monitoring, that no change to the present intake technology is required.

EPA Response

EPA has added several streamlining components to today's final rule. Please see EPA's response to comment 316bEFR.034.005 for details. EPA disagrees, however, that existing best technology available (BTA) determinations should be used to meet the requirements of today's final rule. For EPA's position on the use of existing BTA, please refer to the final rule preamble and EPA's response to comment 316bEFR.040.001. With regard to the second example, where a facility does not cause impingement mortality or entrainment of organisms to a level above that of the performance standards, EPA agrees that this might be the case under certain circumstances. For example, if a facility has reduced its intake capacity commensurate with that of closed cycle cooling, that facility would be considered in compliance and would be exempt from the performance standards (see § 125.94(a)(1)(i)). In addition, a facility might already meet the performance standards through technologies, operational measures, and/or restoration measures (see § 125.94(a)(2)). Such a facility would also be considered in compliance and would not be required to install additional technologies or utilize additional operational or restoration measures. In that case, the Director will make determinations as to how much monitoring would be needed.

Comment ID 316bEFR.041.008

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Where a Successful § 316(b) Demonstration Has Been Done Already, Its Conclusions Should Be Accepted if its Studies Were Scientifically Sound and Conditions Have Not Changed

If there already is a successful § 316(b) demonstration that meets acceptable minimum technical standards and that justifies an existing intake technology, then the regulatory agency should be empowered to reapprove the existing intake unless either (1) the plant or its operation has been altered so as to affect the previous determination or (2) there is evidence that the CWIS is contributing to a decline in the health of the aquatic community (or the population of some representative species). (In the chart above, we refer to this as "reapproving" an existing § 316(b) demonstration.) EPA might set criteria for deciding what past § 316(b) decisions are entitled to be reapproved; for example, a State decision that followed EPA's 1977 draft § 316(b) guidelines ordinarily should be accepted (absent changed circumstances).

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.041.009

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Successful State § 316(b) Programs Should Be Continued

As with individual § 316(b) demonstrations, so with entire State § 316(b) programs, if they are technically sound: EPA's § 316(b) rule should encourage the continuation of State programs that have been successful in assessing, preventing, or mitigating adverse environmental impact. In the proposed rule, EPA proposes to allow States to continue to use "alternative regulatory requirements" they have adopted, if they can show these requirements are "functionally equivalent" to the new federal rule – that is, if they would result in environmental performance in each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that would be achieved under EPA's proposed § 125.94 (67 Fed. Reg. 17,180 col. 1-2).

The concept of allowing successful State programs to continue is a good one, though EPA's proposal can be improved. In particular, EPA's proposal appears to require that a State show that its program achieves the same percentage reductions in entrainment and impingement mortality as EPA's performance standards (60-90% and 80-95%, respectively). But a good State program may have focused on larger-scale effects, such as impacts on fish populations (as indeed UWAG maintains they should). For that reason, the State may know that its program has successfully protected local aquatic populations but not necessarily be able to demonstrate that entrainment, for example, has been reduced by 60-90 percent. EPA should allow States to continue successful State programs without having to force-fit them into EPA's new performance standards.

Many States have incorporated § 316(b) into their water permit programs by adopting the federal § 316(b) language and then writing regulations or adopting guidance (which often references EPA's 1977 draft § 316(b) guidance). Such a program should be eligible for consideration as an alternative regulatory program that is "functionally equivalent" to proposed § 125.94. Also, it is appropriate to consider habitat restoration or enhancement projects undertaken as a result of § 316(b) permitting when evaluating whether a State program is functionally equivalent to the federal § 316(b) rules. In many instances, States have found that greater environmental benefits accrue from restoration or enhancement projects than from other regulatory approaches.

EPA Response

EPA recognizes that some States have worked diligently over the years to develop comprehensive 316(b) programs. However, EPA's goal under today's final rule is to set national minimum requirements for cooling water intake structures that reflect the best technology available for minimizing adverse environmental impact. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements and ultimately result in reducing impingement mortality and entrainment at these structures. In today's final rule, EPA has allowed approval of State programs that meet rule requirements at 125.90(d). The State or Tribe may use any methodology, including restoration, that it deems appropriate to achieve these levels. See response to 316bEFR.023.001 for additional detail.

Comment ID 316bEFR.041.010

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Where Entrainment and Impingement Impact Is Known to Be Minimal, Extensive Biological Studies Need Not Be Done

Likewise, if a facility has data showing (1) that there is so little entrainment and impingement that there is no appreciable harm to the aquatic community or (2) that the environmental impact of entrainment and impingement is of so little economic and environmental significance that the cost of a full § 316(b) study would be significantly greater than its likely benefits, then there should be no requirement for further intake evaluation or additional intake technology.

EPA Response

In today's final rule, a facility may request a site-specific determination of best technology available for minimizing adverse environmental impact based on a demonstration, to the Director that costs of compliance under alternatives (1) through (4) would be significantly greater than the benefits of complying with the applicable performance standards in § 125.94. This pertains only to the facility's costs of implementation, and not to the costs of the studies themselves. EPA disagrees that the cost-benefit analysis should pertain to the studies themselves, but has included this option in today's final rule to alleviate burden to facilities whose implementation costs would be significantly greater than the environmental benefits of complying with the rule (see § 125.94(a)(5)). EPA believes that the studies required by today's final rule are reasonable. Furthermore, EPA did consider the costs for data collection efforts by facilities. EPA's cost analyses are housed in the Information Collection Request (ICR) (see EPA's Phase II Final Rule, Docket OW-2002-0049, DCN 6-0001). For EPA's position on the commenter's first example, that the impingement mortality and entrainment impacts are less than those set forth by today's performance standards, please see EPA's response to comment 316bEFR.041.007.

Comment ID 316bEFR.041.011

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.08

Option: UWAG's recommended approach

EPA SHOULD ADOPT EITHER OF TWO SITE-SPECIFIC APPROACHES INSTEAD OF THE PROPOSED RULE

For years, EPA's draft § 316(b) guidance (and even its previous § 316(b) rules, which were suspended by the U.S. Court of Appeals for the Fourth Circuit on procedural grounds) required site-specific BTA determinations. Later, when EPA commenced the present § 316(b) rulemakings, UWAG urged the Agency to continue to take into account the site-specific factors that make entrainment and impingement impacts so variable from one site to another. See, e.g. UWAG 2000 Phase I Comments, pp. 12-15.

Consider, for example, nuclear power plants. Most nuclear units have unique features that make a generalized approach to § 316(b) difficult. The NRC in NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), has listed 92 environmental issues. Of these 92 issues, 69 are characterized as generic to all nuclear sites (Category 1), while 21 are designated as site-specific issues (Category 2). (Two issues are classified "Not Applicable.") The GEIS assigns the site-specific rating to the issues of "Entrainment of Fish and Shellfish" and "Impingement of Fish and Shellfish." Thus, the NRC recognizes that entrainment and impingement are site-specific issues.

Nothing has changed to make site-specific factors less important than when EPA wrote its 1977 draft guidelines. The public will be best served, then, if EPA adopts a § 316(b) rule focused on assessing site-specific factors that determine the impact of impingement and entrainment. Either of the proposals from UWAG and PSEG Services Corporation (PSEG) would do.<FN 2>

UWAG understands that EPA's proposed rule is itself "site-specific" in some respects: the calculation of the reduction in impingement mortality and entrainment necessarily takes site conditions into account to some extent, and the rule allows for site-specific analysis where costs are "significantly greater than" benefits or EPA's rulemaking cost estimates. Also, EPA's proposed rule shows some flexibility in that it sets ranges .<FN 3> of percentage reductions rather than single numbers and it recognizes more than one acceptable intake technology (wedgewire screens, aquatic fabric filter barrier systems, and fine mesh screens, for example). But UWAG submits that a better "site-specific" approach would be the UWAG Decision Principles or the PSEG proposal.

Footnotes

2 With respect to PSEG's proposal, we note, however, that UWAG does not endorse the use of a "wholly disproportionate" cost-benefit test. See Section XII to these comments, below.

3 EPA says that it is proposing ranges because of the uncertainty inherent in predicting the efficacy of a technology on a site-specific basis. 67 Fed. Reg. 17,141 col. 3. EPA anticipates that facilities will select technologies or operational measures to achieve the greatest cost-effective reduction possible within the range. 67 Fed. Reg. 17,142 col. 1.

EPA Response

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

Comment ID 316bEFR.041.012

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.08

Option: UWAG's recommended approach

Instead of its Own Proposal, EPA Should Adopt the UWAG or PSEG Proposals Which Offer a Consistent Process for Addressing Site-Specific Factors

EPA's proposed rule, summarized in Section I above, while meritorious in some respects, is not the best way to implement § 316(b). Instead, EPA should adopt either of the two site-specific approaches that have been proposed, one by UWAG and the other by PSEG. The general framework of both proposals offers a consistent process for assessing the features of a site, including the species of fish found there.

1. Impingement and Entrainment Are Determined by Factors that Vary from Site to Site

Assessing and then "minimizing" the environmental impact of entrainment and impingement depends on many site-specific features and varies from site to site. EPA has coped with this complexity in its proposal, first, by setting ranges (80-95% reduction of impingement mortality, 60-90% reduction of entrainment) instead of single-number standards and, second, by providing an alternative when the cost of meeting the standards would be "significantly greater" than either the benefits or the costs that EPA has estimated. The flexibility offered by these features is helpful.

But the performance standards, at least for impingement mortality, nevertheless apply (unless one of the cost tests is met) at every site, no matter what its physical characteristics or biology. This approach presumably serves the interests of regulatory agencies by making their job easier, but it does not reflect the best science. A better course would be to abandon the performance criteria in favor of a systematic process that would consider site-specific factors in the first place rather than ignoring them unless they were too costly. "Consistency" should lie in setting a consistent process for assessing a site, not in a one-size-fits-all percent reduction range.

The degree of entrainment and impingement by cooling water intake structures depends very much on site-specific factors: the shape of the shoreline, the location of the intake, the flow of the river or size and character of the estuary tidal prism, the time of year, the time of day, the species present at the site, and many more factors (Appendix 4). The evidence for this diversity is overwhelming, based on 30 years' experience with § 316(b) and a growing body of scientific literature. For example, impingement depends on the swimming speed of the fish at the site and the ability of fish to perceive the area in front of the intake as a danger zone and swim away. Entrainment impact depends on whether there are eggs and larvae present; on whether the eggs sink, float, adhere to surfaces, or are deposited in redds or nests; and on the fecundity of the species, the chance of encounter with the intake, and the life history of the species, which determines when the larvae are vulnerable to entrainment..<FN 4>

Beyond factors that address the degree of impingement and entrainment is the question of whether impingement and entrainment losses are biologically significant. An ongoing study being conducted by Oak Ridge National Laboratory (ORNL) on behalf of the Electric Power Research Institute (EPRI) surveyed multiple Texas and Tennessee reservoirs and attempted to find a relationship between reservoir withdrawals and species composition or abundance..<FN 5>   ORNL's analysis showed no relationship between intake rate and fish population responses at reservoir withdrawal rates of 1 to 5,200 MGD. Examples from other waterbody types also demonstrate that impingement and entrainment losses have not caused long-term population declines. EPRI. 2001. Electronic Proceedings of Workshop: Connecticut River Ecological Study Workshop - Re-Visiting the Impacts of a Power Plant. EPRI Workshop at University of Connecticut Marine Laboratory, Avery Point, CT, November 15-16, 2001. EPRI CD #1006900, Palo Alto, CA.

Facilities that use cooling water are sited on different types of waterbodies, each with its own physical characteristics (flow, substrate, and shoreline) and its own variety of plants and animals. Similar facilities on the same reach of a river can have different impacts, depending on how the intake is designed and where it is placed relative to where the fish breed and how they behave. See Wisniewski, J. 2000, Power Plants & Aquatic Resources: Issues and Assessments. D. A. Dixon, D. E. Bailey, C. Jordan, J. R. Wright, Jr., and K. D. Zammit (guest eds.), J. Envtl. Sci. & Pol'y Vol. 3, Supplement 1. EPRI 1000767 (1998-99 EPRI Workshops).

Likewise, the feasibility, effectiveness, environmental impacts, and cost of technologies to reduce CWIS impacts vary from site to site. Some technologies (barrier nets, for example) cannot be used where there are strong currents, ice, or floating debris. See EPRI, Fish Protection at Cooling Water Intakes: Status Report (TR□114013 December 1999) (EPRI Fish Protection Report), pp. 2-21 to 2-22. Wedgewire screens require a screen slot size small enough to block the smallest lifestage to be affected, low through-slot velocity, an ambient current cross-flow to carry organisms and debris around and away from the screen, and an environment where there is not too much biofouling and siltation. Id., at 2-5; see also UWAG 2000 Phase I Comments, pp. 21-25, 36-39.

To complicate the analysis further, intake technologies may have negative impacts on navigation or even on habitat. For example, some types of screens in some waterways may interfere with boating. These and other site-specific factors need to be considered in making § 316(b) decisions.

2. Congress and EPA Have Recognized the Importance of Site-Specific Factors

a. Congress Intended § 316(b) to Be Implemented Site-by-Site

Congress was aware of the site-specific nature of impact assessments for cooling water. The legislative history of the companion statute, § 316(a) governing thermal discharges, shows that the interest in national uniformity served by effluent limitations guidelines and new source performance standards for other pollutants was thought not to apply to heat. 118 Cong. Rec. 33,761 (1972), reprinted in Leg. Hist. at 263 (statement of Representative Don H. Clausen).

Moreover, it had been "persuasively shown during the hearings . . . that the appropriate type and level of control over thermal discharges varies [sic] substantially among different waters and regions of the country." 118 Cong. Rec. 33,761 (1972), reprinted in Leg. Hist. at 263. Thus, the Committee on Public Works concluded that regulations should be developed and the costs and benefits evaluated for thermal discharges on a case-by-case basis. See H.R. Rep. No. 911, 92nd Cong., 2nd Sess. 120, reprinted in Leg. Hist. at 807.

Ultimately, Congress treated heat like any other pollutant, subject to national uniform effluent limitations and standards of performance like other pollutants. But in § 316(a), a compromise was reached that reflected the House bill by allowing point sources to obtain case-by-case variances based on the "balanced, indigenous population" standard. This was intended to balance the effects of heat with the economic impacts of control technologies and to accommodate the need to regulate heat on a case-by-case basis. See Leg. Hist. at 267-68, 273-74.

The timing and placement of § 316(b) suggest that Congress regarded it as different from other purely technology-based requirements and intended it to be applied taking into account site-specific environmental impacts. See Anderson and Gotting (2001). Part of the rationale for case-by-case regulation of heat – that the nature of electric power generating stations permits easy identification and enforcement – applies to § 316(b) as well.

b. EPA Originally Called for Site-specific § 316(b) Decisions

EPA recognized the site-specificity of § 316(b) decisions very early. EPA's draft 1977 guidance for § 316(b) says "[t]he exact point at which adverse aquatic impact occurs at any given plant site or waterbody segment is highly speculative and can only be estimated on a case-by-case basis by considering the species involved, magnitude of the losses, years of intake operation remaining, ability to reduce losses, etc." (emphasis added). U.S. EPA, Office of Water Enforcement, Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500 at 11 (Draft May 1, 1977) (1977 316(b) Guidance).

Similarly, in the preamble to its 1976 regulations, EPA said that many factors determine when AEI is occurring, and all of them need to be considered:

Section 316(b) requires that the best technology available be used to minimize adverse environmental impacts. As noted in the Development Document, there are many factors that should be considered when determining whether an adverse environmental impact exists or is likely to exist. The factors noted by the commenters are among those to be considered. All pertinent factors, rather than reliance on a single factor, should receive adequate consideration.
41 Fed. Reg. 17,387, 17,389 col. 1 (Apr. 26, 1976) (emphasis added). These observations in 1976 and 1977 are as true today as when they were made.

3. EPA Should Stay with its Original Understanding that Site-Specific Factors Are Crucial

Yet, in the proposed rule of April 9 (presaged by the Phase I rule for new facilities, published December 18, 2001), EPA changes its approach, concluding that a uniform national technology-based criterion is needed. At the heart of this change appear to be two ideas. First, EPA evidently believes that every cooling water facility must "do something" to reduce environmental impact (compared to a "baseline") even if it does not need to.

Second, EPA is too much influenced by a desire to make the regulator's job simpler. As the April 9 proposal makes clear, EPA is worried that site-specific decisions on environmental impact will require time and effort by permitting agencies. EPA, therefore, tries to simplify the § 316(b) decision by setting a numerical criterion, not one addressed to the complexities of aquatic populations but merely a prescribed reduction in the number or mass of individual animals lost.

UWAG members are well aware of the resource constraints State and federal regulators face. But even on EPA's own terms, the appeal of the proposed rule to administrative convenience is illusory. The record does not establish that a well-conceived site-specific rule (as distinguished from past experience with no rule at all) would consume large amounts of agency time and manpower. Nor is it obvious that reviewing a site-specific analysis according to UWAG's Decision Principles would take more resources than reviewing a demonstration that a new intake technology will reduce impingement mortality by 80-95% and entrainment by 60-90% compared to a hypothetical baseline. EPA's proposal makes the goal (60-90% reduction, for example) more numerically precise, to be sure. But proving that the goal is met will require permit writers to consider the effects of the same site-specific factors that have always been considered. Indeed, some appreciable amount of site-specific analysis would be required for any reasonable, sustainable rule EPA might develop.

In any event, most of the burden of implementing a site-specific approach, conducted in accordance with a clear and consistent decisionmaking process (like that described in UWAG's Decision Principles) would fall on regulated facilities, not regulators. UWAG members are prepared to collect information and perform studies reasonably necessary to allow scientifically and environmentally sound § 316(b) decisions. Such a process would supply the technical, legal, and policy tools for decisionmaking that may have been lacking in the past. It is the absence of EPA-approved tools, not the site-specific nature of the decisionmaking process, that caused a few States to spend significant resources on a few § 316(b) decisions in the past.

Footnotes

4 In its Case Study Analysis (DCN:4-0003), EPA attempts to characterize the impacts of CWIS by waterbody type. See Case Study Analysis, chapter A8. This chapter essentially reproduces the same flawed analysis EPA offered to support its proposed Phase I rule. As UWAG showed in its comments on the Phase I rule, that analysis wholly fails to demonstrate EPA's claims about the "dire" effects of existing CWISs. In fact, if anything, it showed how very site-specific, and often, in a larger context, insignificant, such effects really are.

5 EPRI. 2002. Impacts of Intake Flow Rate on Fish Populations and Communities. DRAFT Report prepared for EPRI by Oak Ridge National Laboratory and appended (Appendix E) to EPRI's Comments on EPA's Phase II Rule, August 7, 2002. EPRI Report 1005178, Palo Alto, CA (EPRI 2002a).

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.041.013

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.08

Option: UWAG's recommended approach

The UWAG Site-Specific Proposal Is Preferable to EPA's Proposed Rule

Either UWAG's or PSEG's proposal,.<FN 6> both of them driven by the fact of site diversity rather than by administrative convenience, would be a better approach. EPA also offers for comment its own sample site-specific rule. 67 Fed. Reg. 17,159-61. UWAG agrees with many aspects of that sample rule, such as allowing use of relevant existing data, allowing continued use of past determinations as long as circumstances have not changed, considering net environmental effects, including energy effects, allowing voluntary restoration measures as an alternative to technology deployments, and recognizing existing State programs. But UWAG does not agree with those aspects of the sample rule that (1) focus on minimizing impingement and entrainment (albeit on mortality in each case), without regard to the environmental and social importance of such effects, (2) authorize States to set more stringent requirements, (3) imply that permit writers could impose operating limits, and (4) appear to require the permit writer to revisit its § 316(b) decision at the end of each permit term.

UWAG's proposal for applying § 316(b) to existing facilities, stated as "Decision Principles," is Appendix 1 to these comments..<FN 7> The UWAG Decision Principles incorporate the following ideas.

Footnotes

6 While these comments do not directly address PSEG's proposal, UWAG finds the proposal commendable in its emphasis on site-specificity and its workable regulatory framework, although we do not subscribe to the "wholly disproportionate" cost-benefit test.

7 In describing UWAG's Decision Principles, EPA says that UWAG recommended a number of conservative "decision criteria" for judging whether adverse environmental impact will occur. 67 Fed. Reg. 17,163. To the contrary, the screening criteria proposed in UWAG's Decision Principles are highly conservative and, even if not met, would not necessarily indicate a risk of AEI.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.041.014

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

EPA Should Define "Adverse Environmental Impact" to Emphasize Population-Level Effects

EPA should adopt a definition of "adverse environmental impact" (AEI), or at least state what AEI is not. In particular, the loss of a single fish or a single egg, or even a large number of them, need not cause AEI. Instead, AEI occurs when the loss of fish or other organisms causes declines, at the population level, so great as to adversely affect the sustainability of the population or its social, economic, or ecological function. An appropriate definition <FN 8> of AEI would recognize that, as a matter of basic biology, losses (indeed very large losses) occur naturally even without a CWIS and have little or no effect on the health of aquatic populations. Moreover, an appropriate definition would recognize that some losses have little or no effect on the public's use and enjoyment of aquatic resources.

Instead of defining AEI to focus on population-level effects, EPA focuses (for entrainment) simply on reducing the absolute number or mass of organisms entrained. But, as UWAG's Phase I comments showed, raw numbers of fish eggs, larvae, juveniles, and adults entrained or impinged are not an adequate basis for establishing environmental "impact" (UWAG 2000 Phase I Comments, p. 162).

For some fish species a single female may spawn a million or more eggs per year, and billions or trillions of eggs may be spawned by the population as a whole (id. 160). Several hundred tons of impinged alewives or bay anchovy represent very small numbers compared to the population of these abundant forage species (id.).

For example, UWAG's Phase I comments showed that independent estimates of alewife in Lake Michigan suggested that there were 0.5-2.7 billion mature female alewife in the lake during the study period. Alewife in the Great Lakes typically produce around 11,000 to 22,000 eggs per year; to be very conservative, we can use the lower figure of 11,000. Thus, the egg production in Lake Michigan should be between 5,500 and 29,000 billion (55-290 trillion) eggs per year. So even if we were to assume that only one in a thousand eggs survived to be cropped by entrainment, 150 million larvae entrained each year would represent a mortality of only 0.5 to 2.70% a year. This low pre-compensatory mortality would have almost no effect on a species such as alewife that has a high compensatory reserve (id. 171).

Consider also threadfin shad, of which 1.37 million was the largest number reported impinged by the Cumberland steam plant on the Barkley Reservoir in Tennessee. This amounted to an impingement rate of only 1%, suggesting strongly that there was no meaningful "adverse" impact.

Estimating the compensatory reserve of threadfin shad to be 17.1, UWAG's consultant calculated that impingement of 1.37 million organisms resulted in an estimated reduction of 0.06% for impingement of this species. Even if one assumed that the rate of impingement was greatly underestimated and actually was 5% and that the compensatory reserve was much lower, the equilibrium spawner abundance would decline by only 1.2%, even assuming that all impingement occurred pre-compensation, when the population effect would be greatest. If all impingement occurred post-compensation, then the estimate of reduction in mean spawner biomass would be slightly less than 1%. In either case, it is highly unlikely that the level of impingement cited could have had any "adverse" impact on the population's ability to sustain itself and, indeed, to thrive (id. 166).

Footnotes

8 UWAG recommends this definition:

Adverse environmental impact is a reduction in one or more representative indicator species that (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to the operation of the cooling water intake structure.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.041.015

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.02

Fish Population Modeling

The Rule Should Recognize that Density Dependence Mitigates Losses of Fish

As noted by Myers (Appendix 5 to these comments) and Rose et al. 2001, the concept of density dependence is fundamental to understanding and managing biological resources. For any biological population to persist, reductions in population size caused by natural environmental fluctuations must result in increased survival, growth, or fecundity of the remaining individuals. Density dependence has been well-studied in both terrestrial and aquatic systems. The compensatory response to reductions in population size is the key factor that permits fish populations to sustain themselves despite enormous natural mortality for early life stages and even intensive harvesting of adults (see Appendix 5).

a. Long-term Surveys Have Demonstrated Density Dependence

Long-term surveys have demonstrated density dependence in a variety of marine, estuarine, and freshwater fish species (see Appendix 5). Field experiments in which fish population sizes are manipulated artificially also have been used to demonstrate density dependence. Id. Appendix 5 contains a table of about 50 recent studies demonstrating specific mechanisms responsible for density dependence in a variety of fish species. Most of these studies have been published in the last ten years.

b. The National Research Council Acknowledges Density Dependence

The National Research Council (National Research Council 1998, p. 44) has recognized the importance of density dependence for modern fisheries management:

Many species appear to have strongly compensatory [spawner-recruit] relationships; that is, per capita recruitment increases significantly as stock size decreases. Reference levels are now more commonly based on a % [SSBPR], but the percentage is often specified by analogy with other stocks or by using the results [of comparisons among other biological reference points]. A knowledge of the compensatory capacity of the stock is necessary to define the most appropriate [biological reference points] for a stock. Even without such knowledge, however, a conservative % [SSBPR] still can be selected.

(Citation omitted.) Spawner-recruit relationships of the type discussed by the National Research Council are used to manage two of the estuarine-dependent fish species, striped bass and weakfish, listed in Tables 11-10 (annual entrainment in estuaries) and 11-11 (annual impingement in estuaries) of EPA's Economic and Engineering Analyses (EEA) for the § 316(b) Phase I rulemaking. Methods discussed by the National Research Council can be used to incorporate the concept of density dependence in management strategies for species for which spawner-recruit data are not available.

Fisheries scientists have demonstrated the importance of density dependence for ensuring the continued persistence of fish populations, and fisheries managers routinely consider it when establishing harvesting regulations. Density dependence also should be considered when calculating the environmental impact of entrainment and impingement.

c. Experience at Power Plants Shows Density Dependence at Work

Density dependence helps to explain why there are several sites where long-term monitoring demonstrates negligible effects from large once-through facilities (e.g., Connecticut Yankee and the mid-Hudson power plants), where density dependence and other mechanisms clearly are operating to mitigate individual losses..<FN 9>

In short, entrainment and impingement may not be “adverse” to the aquatic ecosystem as a whole where density-dependent factors allow remaining fish to grow larger and reproduce more effectively. Moreover, entrainment and impingement may not be “adverse” where (i) a population has been shown to reproduce at high and stable levels over a long period of time despite entrainment and impingement (e.g., alewives or gizzard shad in the Great Lakes), (ii) the losses are of weakened or diseased organisms that are affected by other stressors and would not have survived anyway, (iii) the primary species affected are nuisance or exotic species, or (iv) the losses help achieve other fishery management goals (for example, where cropping one abundant species makes it possible for a less resilient but nevertheless valued species to thrive or otherwise increases diversity).

Footnotes

9 For example, intake volume at the Cayuga (CGS) and Wabash River Generating (WRS) Stations each exceed 10% of the Wabash River’s annual flow, well above the 5% cutoff suggested by EPA’s proposed rule. Without taking survival into account, annual egg/larvae losses in the late 1980s were estimated to be 27 million at CGS and 108 million at WRS. Section 316(b) assessments at both facilities concluded that the impacts to fish populations were negligible (EA 1988, EA 1989). This position is supported by long-term (30 years’) community-level monitoring, which demonstrates that fish populations in the Wabash River are as good as or better than when monitoring began in the late 1960s (Gammon 1998).

Another example is the Muskingum River, where community-level studies show that the areas near both the Muskingum River and Conesville Power Plants fully attain biocriteria goals designed to measure attainment or nonattainment of the designated aquatic life use (Seegert 2002). Similarly, the Ohio River Ecological Research Program has demonstrated that, in general, conditions upstream and downstream of each plant studied are similar, and conditions over the past 20 years have generally improved, which is the opposite of what one would expect if impingement and entrainment losses were adversely affecting fish populations. (EA 2001).

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.041.016

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.02

Fish Population Modeling

The § 316(b) Rule Should Be Based on Fisheries Management Science

EPA's § 316(b) rule should use the lessons of fisheries management science. The use of concepts like spawner-recruit relationships are mentioned above, and UWAG's 2000 Phase I Comments contain a more detailed discussion of the tools and concepts used by fisheries managers. If the impact of a facility is in the range of impacts known by fisheries managers to be within normal variation or not of concern to the viability of the fishery, it is not creating AEI.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.041.017

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.06

Option: Site-specific determination of BTA

The § 316(b) Rule Should Allow Risk Assessment

Risk assessments, which are included specifically in UWAG's proposal, should play a role in some § 316(b) determinations. That is why UWAG's proposed decisionmaking process includes as one option a process based on EPA's 1998 Guidelines for Ecological Risk Assessment. This process would identify explicit measurement endpoints and criteria for assessing AEI before studies were conducted. If the studies showed that predetermined endpoints had not been exceeded, then the proposed intake structure would be considered not to cause AEI. If one or more endpoints had been exceeded, the facility would identify alternatives for BTA or restoration projects to eliminate AEI. EPRI's recent report Evaluating the Effects of Power Plant Operations on Aquatic Communities (EPRI Report 100758 July 2002) (EPRI 2002b) offers one "ecological risk assessment framework" for § 316(b) demonstrations.

This does not mean that a full-fledged risk analysis is necessary in every case. Where preexisting data show that a facility is not creating AEI or where the facility is willing to commit to a highly protective intake technology (such as the ones on which EPA bases its proposal),.<FN 10> then the BTA decision should be straightforward. But permittees should be allowed to use ecological risk assessment – as to which EPA itself has produced guidance in which it presumably has confidence – to prove what technology is "best" for a site under § 316(b).

Under the risk assessment approach, the burden of producing information on which a decision can be made would fall on the permittee. Permittees have an incentive, after all, to produce enough data and present it clearly so as to enable the permitting agency to make an expeditious decision. Thus, State permit writers should not fear that their own budgets would suffer as the result of such an approach.

Footnotes

10 Simply installing one of the approved technologies, such as wedgewire screens, is the essence of the simpler alternative approach that UWAG recommends in section VI below.

EPA Response

The rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.041.018

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.06

Option: Site-specific determination of BTA

EPA's Reasons for Rejecting a More Site-Specific AEI Approach Are Unfounded

EPA appears to have two reasons for choosing performance standards requiring percentage reductions in impingement mortality and entrainment rather than a more site-specific approach:

1. its fear that a site-specific approach will have "inconsistent results" from one site to another and

2. its fear that a site-specific approach will impose too great a burden on State and federal permit writers (see, e.g., 67 Fed. Reg. 17,153 col. 1).

Both of these concerns are unfounded.

By "consistency," EPA may mean "uniformity." Full "consistency" in this sense is neither desirable nor achievable for intake controls, because the choice of technology, the cost, and the environmental results will vary greatly, even under EPA's proposed approach. (Even cooling towers have different costs and different environmental impacts from site to site.) But consistency can be achieved by implementing a process for determining BTA on a site-specific basis.

EPA says it is concerned that a more site-specific approach to § 316(b) would cost too much time and manpower for agencies. But EPA cannot reasonably assume that a site-specific alternative based on a clear and consistent decisionmaking process would have as high a cost as a few States say they incur now. The difference is that those costs were incurred in the absence of a rule and with only minimal guidance and mere draft guidance at that. Lack of guidance produces fear of litigation, which in turn produces excessive paperwork and the inability to select and focus on the most important details.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.041.019

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

AS EPA CORRECTLY RECOGNIZES, COOLING TOWERS CANNOT BE JUSTIFIED AS A NATIONAL STANDARD

EPA considered alternatives that would require closed-cycle cooling (cooling towers) at all or many existing facilities. EPA reached the correct conclusion that cooling towers are too costly to be justified as "best technology available."

As EPA says, "[c]onverting to a different type of cooling water system . . . is significantly more expensive than the technologies on which the proposed performance standards are based (generally by a factor of 10 or greater) and significantly more expensive than designing new facilities to run on recirculating systems." 67 Fed. Reg. 17,154 col. 3. EPA did not select closed-cycle, recirculating cooling systems as the best technology available for existing facilities because of the "generally high cost of such conversions." 67 Fed. Reg. 17,155 col. 1-2. EPA estimates that capital costs for individual high-flow plants to convert to wet towers generally ranged from 130 to 200 million dollars, with annual operating cots in the range of 4 to 20 million dollars. 67 Fed. Reg. 17,155 col. 2.

EPA reached this conclusion even though, as these comments will show, it assumed that entrainment and impingement from steam electric plants would be higher than is likely, that reducing these effects would result in major biological, social, and economic benefits that in fact are unlikely to occur, and that the costs (economic and otherwise) of retrofitting cooling towers would be lower than they actually would be.

EPA Response

EPA has not based the final rule on cooling tower retrofit technologies. As such, the comment supports this decision for the final rule.

Comment ID 316bEFR.041.020

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA Underestimates the Costs of Cooling Towers

EPA's estimate of the costs of retrofitting existing facilities with cooling towers is far too low. EPA's analysis of costs is in its Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (DCN:4-0004) (Phase II TDD), which in turn relies heavily on information developed for the § 316(b) rule for new facilities. See Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities (EPA-821-R01-036) (Phase I TDD)..<FN 11>

It appears that EPA took its Phase I estimates of the capital costs of installing cooling towers at new facilities (which were based on a number of factors,.<FN 12> including an assumed design approach temperature of 10°F that EPA derived for newer facilities constructed between 1998-2000);.<FN 13> scaled by circulating water flow; multiplied these "national average" capital costs by a "state-specific capital cost factor" (which for 40 of the 50 states drove the "national average" capital costs down anywhere from .03% to 25% (Phase II TDD 2-24-2-25)); and then multiplied the result by a factor of 1.2 (for which no foundation or explanation is provided), which is intended to account for the higher cost of retrofitting an existing facility. Finally, according to the Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (Phase II EBA) at B1-4, EPA applied a 10% contingency factor to this result,.<FN 14> though no explanation of this 10% factor or how it was derived appears in the Phase II TDD.

Footnotes

11 UWAG commented extensively on the assumptions EPA made in the draft version of the Phase I TDD. EPA addressed some, but not all, of our comments. Where relevant, we will address flaws in the assumptions EPA made for both new and existing facility retrofit costs.

12 EPA also assumed that redwood would be used for cooling towers for fossil units and concrete for nuclear units. The difference in cost between redwood and concrete is about 25%. For redwood towers, the new facility ("Greenfield" facility) cost is about $50/gpm. When adjusted for retrofit costs, this becomes $60/gpm.

13 For purposes of assessing its national estimates, EPA compared those estimates to the actual retrofit costs incurred by three existing facilities, which it says compared favorably (within 25% or less) except that the design approach for the three facilities exceeds 10 degrees F. Phase II TDD at 2-22. This illustrates the importance of EPA's approach assumption.

14 The explanations of EPA's cost methodology in the Phase II TDD and the Phase II EBA provide somewhat contradictory descriptions of the order in which these factors were applied. Compare Phase II EBA at B1-4 with Phase II TDD at 2-27, 2-28, 2-32, 2-33. Obviously, if EPA scaled its retrofit factor up or down by applying the state-specific cost factor to it, it reflects the assumption that these "retrofit" costs also will vary regionally. Because EPA has not explained how it derived its retrofit factor, we cannot assess this assumption.

EPA Response

No response to this comment is necessary because it simply restates EPA's methodology at proposal.

Comment ID 316bEFR.041.021

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The 20% Retrofit Factor Is Unjustified

EPA estimates retrofit costs by raising the capital cost of cooling towers at new facilities by 20 percent for “activity necessary to convert cooling systems.” Phase II TDD, p. 2-28. Where upgrading of cooling water intake structures and screens also was deemed necessary, EPA developed estimates of those capital costs and applied a 30% retrofit factor to them. Id. This “retrofit factor” is offered with no apparent supporting data.

More than that, the 20% factor seems questionable in concept. It assumes that the cost of retrofitting is a function of the size of the tower – the larger the tower, the greater the difference between retrofitting it and building it as part of a new facility. And yet, as the discussion below points out, the cost of retrofitting depends far more on features of the site and the existing facility (how long the piping run between the tower and the condenser, for instance) than on the size of the tower.

There is reason to believe the 20 percent retrofit factor underestimates retrofit-related costs in many cases. In an EPRI study called Cooling System Retrofit Cost Analysis, Dr. John Maulbetsch.<FN 15> points out that very high retrofit factors will be encountered at many facilities. Dr. Maulbetsch makes the following points:

-Site-specific retrofit cost studies show a high degree of variability from costs based on commonly accepted scaling methods. Cooling tower cost estimating methods are often based on the use of dollar-per-gpm rule of thumb. This approach is used by tower vendors, A&E firms, and experienced users and is based almost entirely on the field’s experience with tower construction at new sites. EPA used this approach as well. It, therefore, can be reasonably assumed that the variability in careful engineering estimates of site-specific retrofit costs (documented later in Dr. Maulbetsch’s report) is due to differences in the degree of difficulty associated with the retrofit aspects of each project. (Site-specific features that can increase costs are discussed in the next section of these comments.)

-It is also reasonable to assume that the lower bound of these costs is associated with the “easiest” retrofit cases, which would correspond most closely to a new facility project free of the interferences encountered at most existing facilities. The lower bound of the case data corresponds reasonably well with the “greenfield” cost estimating rules proposed by EPA, while the mid-range of the data is 40 to 60 percent higher, with many cases ranging to a factor of 2 to 4 times more expensive.

-Discussions were held with project managers at sites where actual construction projects similar to cooling system retrofits either were underway or had been estimated in detail for potential future site modifications. In all cases, the cost increments associated with constraints imposed on the project by the complexities of construction at an existing site were claimed to be significantly greater than 20 percent, with estimates ranging from 50 percent to 100 percent. This range is reasonably consistent with what might be inferred from the case data that Dr. Maulbetsch discusses in his report. The reasons given for the incremental costs included many that apparently were not included (or at least not specifically identified) in EPA’s discussion of its 20 percent retrofit cost factor.

Using a percentage increase to account for retrofit costs may be useful as a simplifying assumption, but it cannot account for site-specific factors that make retrofits different from constructing cooling towers at a greenfield site.

Footnotes

15 Among other things, Dr. Maulbetsch analyzed the Stone & Webster study in Appendix 6 to these comments and also an earlier analysis by Washington Group International, also appended to these comments.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.022

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA Underestimates the Engineering Problems of Retrofitting Tower

Many site-specific problems increase the cost of retrofitting cooling towers at existing facilities. For the most part, EPA has not counted these costs.

EPA justifies one of its central assumptions (that new facility capital costs are adequate surrogates for existing facility costs) based on several further assumptions, or "principles":

-recirculating systems can be connected to the existing condensers and operated successfully under a variety of conditions (though not all);

-condenser flows generally do not change due to the conversions;

-significant portions of the condenser conduit systems can be used for the recirculating tower systems;

-existing cooling water pumps generally would be replaced with new circulating water pumps, or else booster pumps would be installed to increase the pumping energy of the circulating system;

-the existing intake structures can be used for supplying make-up water to the recirculating towers (though demolition and replacement of the intake pumps may be necessary);

-pumping distances from tower systems to condensers can be significant, but existing piping runs, in some cases, can be used to reduce the amount of new circulating piping installed;

-tower structures can be constructed onsite before connection to the existing conduit system; and

-modification and branching of circulating piping are necessary for connecting the recirculating system to the existing conduits and for providing make-up water to the towers.

Several of these assumptions are unrealistic. For example, the assumption that recirculating systems can be connected to existing condensers and operated successfully under a variety of conditions does not account for several factors that will affect the practicability of such retrofits, including availability of suitable terrain and ability of the condenser to accommodate the higher pumping pressures typical of a closed-cycle system. So even if the new and old systems could be tied together and operated in theory, other factors would make that difficult or impossible in some cases. EPA's assumptions that significant portions of existing condenser conduit systems can be reused, that existing intake structures can be reused to supply make-up water, and that tower structures can be constructed onsite before connecting them to the existing conduit system (presumably while the plant remains in operation) also are unrealistic for many facilities.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.023

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Nuclear Units Present Special Problems

EPA's assumptions are especially inappropriate as applied to nuclear power plants. Nuclear plants (especially those where service water systems, which are safety-related, would be affected) may have no choice but to build an entirely new intake structure to be sure that intake flow is never compromised. They may incur significant additional costs to address safety and security concerns, as well as the cost of safety reviews.

The suggested use of "significant portions of conduit systems," presumably while the plant remains in operation, is completely inconsistent with nuclear power plant operations. It is also inconsistent with utilities' out-of-service and modification design process, which would govern the installation of upgraded intakes and traveling screens. Anything that would alter or affect the flow of safety-related service water or nonessential service water systems at a nuclear unit would require an equipment outage and might have to be completed during a unit outage.

Unit outages are mostly scheduled on an 18-month or 24-month frequency, and extending these scheduled outage timelines would have serious financial impacts on power producers,.<FN 16> which EPA has not recognized in its analysis. EPA does acknowledge that piping modifications could be significant, but it does not address the costs of additional unit downtime to perform the modifications.

All in all, there are at least three reasons to think that EPA has underestimated the outage time that would be required for cooling tower retrofits. First, all the information UWAG presents in these comments on the technical challenges and costs of retrofitting cooling towers suggests that the task is highly complex and time-consuming. Second, the limited data EPA has collected regarding the outage period associated with retrofitting cooling towers shows that outage periods are likely to be highly variable and, in some cases, quite long (i.e., ranging from 83 hours for the Jeffries Plant (a relatively small two-unit fossil-fueled plant) to 10 months for the Palisades Nuclear Generating Plant. These are values that EPA unfairly dismisses, but they are far more likely to be representative of a complex retrofit scenario than the one-month period EPA assumed. See Phase II TDD Chap. 4. Third, inquiries made by EEI to engineering experts with extensive experience in this field suggest that, for a fairly simple retrofit, two months would be a more reasonable estimate, while for more complicated situations three to four month outages would be the minimum expected.

As an example of the kinds of technical problems that retrofitting cooling towers could cause, consider the St. Lucie Nuclear Plant. Its Final Safety Analysis Report states that St. Lucie Units 1 and 2 use two independent water sources and a common discharge canal for the ultimate heat sink (UHS). The design of the UHS complies with Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants." In the unlikely event of a loss of the intake, a second independent source of water is available from the Indian River Lagoon. By NRC Technical Specification requirements, the UHS must be operable at all times.

At St. Lucie, the number and size of large-diameter conduits that would be necessary to connect the discharge canal, cooling towers, and intake canal for a retrofit would be significant. Although it is hard to estimate the exact distances without a site-specific conceptual design, it is safe to say that retrofitting towers leaves less routing flexibility than construction at new facilities and pressures the designer to "settle for less" in trying to use some of the existing features for intake and discharge.

Any large construction project at an operating nuclear power plant is undesirable, and building cooling towers and modifying the associated piping are no exception. The post-September 11 security measures (which become more stringent almost daily) make this type of construction even more difficult than it used to be.

Footnotes

16 Over the past decade, power producers have labored to reduce the duration of scheduled outages, particularly nuclear refueling outages. According to the Nuclear Energy Institute, the median duration of nuclear refueling outages in 2000 was 35 days. See NEI, http:/www.nei.org/index.

EPA Response

The Agency agrees that nuclear units present special problems for retrofitting cooling towers. The Agency examined the only known case of a cooling tower retrofit at a nuclear plant at the Palisades station and found that this case an extended plant shutdown (of up to ten months) for completion of the retrofit. As such, the Agency estimated for the NODA that retrofits of cooling towers at nuclear plants would extend up to a net outage of 7 months.

Regarding the need for construction downtimes for retrofit of intake structures at nuclear plants, the Agency has considered and quantified unscheduled construction outages of complying facilities for some intake modifications in the final rule. As such, the commenter's concerns on the subject of intake modifications and downtimes have been met. In addition, the Agency accounts for the expected increased cost of technology modifications at nuclear facilities through capital and O&M cost multipliers. Each of these factors are discussed further in the Technical Development Document. The Agency has considered the nuclear safety considerations of retrofitting any type of technology to a nuclear plant in the final rule. The Agency considered extra safety costs in the capital and O&M costs of the final rule (in large part due to site safety). In addition, Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Demolishing Old Piping and Connecting the New Towers to the Old System Raise the Costs

Besides not including in its capital cost estimates any costs for excavation, backfill, or other civil costs from intake piping modification (Phase II TDD 2.32), EPA may not have included the cost of demolishing old piping and other structures. Also, depending on how the retrofit handles technical matters like changes in the water pressure in the cooling system, there could be changes to condenser flow, significant changes to piping from the intake structure to the new closed-cycle system, and substantial pumping distances.

EPA also trivializes the tie-in of the new system to the old system. Cooling system engineers estimate this would take up to six months to complete, which amounts to a considerable loss of generation. They say that a retrofit would be complicated by the physical layout of the plant, the required modification to the low water pressure system at the existing plant, and the lack of space for towers near the plant.

A number of cost factors need to be considered. First, disposing of blowdown is not always a minor task. That aside, on a site-specific basis, one must consider the following:

1. Is there sufficient freshwater available or can the site deal with the impact of particulate air pollutants (PM10) from salt drift if seawater cooling towers are the only solution? At some sites, no freshwater is available, and the drift issue may be insurmountable.

2. If freshwater is available, how will the blowdown be managed? Costly treatment facilities (typically $8-10 million for a 600 MW combined cycle gas facility) and costly salt cake disposal (the cost depending largely on the presence of contaminants that can complicate disposal) can be a problem.

3. What modifications to pumps and piping will have to be made to adapt a once-through CWIS to wet cooling? The pumps likely will be far too large to work and may be in an unsuitable location, and the cooling line size likely will be incompatible. For example, adapting a new 1000 MW combined-cycle facility to an existing once-through CWIS at Moss Landing, California, required over $40 million in improvements for the same type of cooling system.

EPA says that it excluded the cost of new or refurbished make-up pumps from its capital cost estimates. Apparently it did so on the assumption that, in most cases, the existing make-up pumps could be reused (and, in any case, the estimated cost of such pumps is small, according to EPA). See Phase II TDD at 2-32. Yet on p. 2-16 of the Phase II TDD, EPA acknowledges that demolition and replacement of intake pumps may be necessary in some cases.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.025

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Saltwater Retrofits Are Especially Costly

Among the alternatives EPA has considered are requiring cooling towers at all existing facilities or at all facilities on saltwater. These alternatives would be unreasonably costly, much higher than the costs of cooling towers for new facilities would suggest. For example, the approximate costs for wet cooling towers at two greenfield sites in the West, one at Avenal, California, and one at New Olympia, Washington, are in the range of $4-5 million, but the installed cost of wet cooling at Morro Bay (currently using a once-through seawater cooling system) would be more like $7-9 million, and even this does not account for a very costly noise abatement package that would be required to meet the local noise ordinance, potentially adding $3 million or more to the $7-9 million. (All these costs are for gas-fired, duct-fired, combined-cycle facilities of approximately 600 MW.) Another cost, especially in the West, is the potentially significant cost to secure the water or water rights and then to treat the water to a quality that allows multiple cycles through the cooling towers. See UWAG Phase I Reopening of NODA Comments, pp. 3-4.

EPA Response

For a discussion of cooling tower costs, see response to comment 316b.EFR.208.002.

EPA notes that its cost development for the cooling water intake technologies (i.e., non-cooling tower technologies) included as the basis for the final rule includes separate and well researched costs that account for the construction of intake technology retrofits suitable to salt water environments.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Excavation, Backfill, and Civil Costs Will Be Incurred

EPA says it neglected to include in its capital cost estimate any costs for excavation, backfill, and other civil costs from intake piping modification, which it concedes could be significant. Phase II TDD at 2-32. (Because of the physical layout of some stations, little of the circulating water system may be available for closed-cycle cooling.) While EPA says it intends to correct this omission in the final analysis, that will not allow UWAG an opportunity to comment. EPA has indicated that it intends to prepare a “Notice of Data Availability” (NODA) to make available information not included with the proposed rule. UWAG requests that any further analysis of this issue be included in the Phase II NODA.

EPA Response

See response to comment 316b.EFR.208.002.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Operation and Maintenance Costs Would Be Higher than EPA Supposes

As for operation and maintenance (O&M) costs, EPA assumed that such costs would be no higher than for a new facility. This is so even though EPA considered auxiliary power (that is, power required to run the pumps and fans that are part of the cooling system) as O&M costs and, in the Phase II EBA, acknowledges that auxiliary power needs will increase after a retrofit. Nevertheless, EPA appears to have assumed that auxiliary power costs would be the same for new facilities with towers and existing facilities required to retrofit them. See Phase II EBA at B1-4, B1-6, B1-7; Phase II TDD, 2-22 through 2-24, Ch. 5.4. EPA then reduced its O&M costs by $0.03/kWh, which reflects the cost the Agency assumed the facility would have incurred even if it had retained a once-through system.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.028

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Energy Penalties from Cooling Towers Would Be Significant

EPA also attempted to assess the cost of energy penalties associated with turbine back pressure, which EPA says could significantly affect net plant capacity. Phase II TDD Ch.5.3. See also Phase II TDD 5-31 through 5-34. In the end, however, EPA assumed that turbine backpressure for a retrofitted plant would be the same as for a new facility with cooling towers. Clearly, this assumption is erroneous.

EPA estimates an annual energy penalty cost from retrofitting cooling towers of $364 million. Dr. Maulbetsch, using an estimated 1 percent energy penalty applied to the 350,000 MW from EPA's cost analysis and assuming a 50 percent capacity factor and an average full cost of $2.50 per million Btu, calculates an annual energy penalty cost of about $700 million. This is about twice EPA's estimate, which Dr. Maulbetsch, in light of the considerable uncertainties and approximations, considers reasonable agreement.

Shaw Stone & Webster, Inc. (Stone & Webster) estimates that cooling towers reduce the efficiency of power plants by about 1 percent (annual average) and 2-4 percent during peak summer conditions. This means that requiring cooling towers everywhere would require about 20 new 400-MW power plants to replace the generation losses due to cooling towers in summer (Appendix 6).

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.029

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Environmental Restrictions Would Raise Costs at Many Sites

EPA also claims to have examined the non-water quality impacts associated with cooling tower retrofits, but it made no effort to include these impacts in its economic analyses (Phase II TDD, Ch. 6). In many cases, EPA's assessment apparently led it to conclude that the likely effects of cooling towers, including effects from increases in air emissions, water consumption, salt drift, noise, aviation hazards, land use, and solid waste disposal, would be minimal. UWAG believes that EPA's analysis is flawed in many respects.

In States that have NEPA-type laws, non-water impacts easily can make it impossible for a project to comply with the law, or at least require costly mitigation. This is likely to be the case at Morro Bay, California, where an attempt to require dry cooling likely will be defeated by land use, visual, and noise impacts associated with dry cooling that cannot be mitigated to an insignificant level. Salt drift alone, because it would violate PM10 emissions requirements for which PM10 offsets are not available, would prevent the project from using saltwater cooling towers.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.030

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Environmentally Sensitive Areas Increase Costs

Some possible locations for cooling towers are in environmentally sensitive areas. For example, an area that otherwise is feasible for towers at the St. Lucie Nuclear Plant is a protected mangrove swamp. Since the NRC has concluded that the entrainment and impingement of fish and shellfish at St. Lucie have an insignificant impact on the fisheries near the site, <FN 17> there would be no net environmental benefit in destroying acres of mangroves to accommodate cooling towers. Facts such as these support the need for a site-specific analysis to determine BTA under § 316(b).

The existing intake structures at St. Lucie might, it is true, be useful for supplying makeup water for wet saltwater cooling towers. However, the only entrained (or "entrapped") organisms that inhabit the one mile-plus intake canal that have received attention at St. Lucie have been sea turtles. The turtles are most at risk when water flows are low in the intake pipes (between the velocity caps in the ocean and the headwall). Without a strong current, the turtles will enter the velocity cap and not be carried along. If they linger in the pipe too long (as may occur with reduced flow with a cooling tower) they may drown, because they cannot surface for air.

Careful analysis would be necessary before deciding how best to use the existing velocity caps at St. Lucie if cooling towers were required. Flow rates required for make-up water and discharge from a wet saltwater cooling tower would need to be studied. Harm to sea turtles could be an unintended consequence of requiring cooling towers.

Footnotes

17 NRC 1982.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.031

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

EPA Has Overestimated the Benefits of Cooling Towers

In addition to underestimating the costs of wet cooling towers, EPA has overestimated their benefits. EPA appears to have calculated the reduced impact of towers by assuming that a tower will reduce the flow of a once-through cooling system by a certain percentage, starting with the open-cycle system's design flow rather than its actual flow. But, since actual open-cycle cooling systems often will operate below their design flow, the actual, real-world reduction in flow will be less than EPA assumes. See e.g., TDD p. 2.39 (Figure 2-1). That is, EPA assumes that an open-cycle cooling system would be withdrawing the maximum amount of water it was designed to use, rather than the lesser amount it would actually use, and counts as a "benefit" of cooling towers a percentage reduction from that larger number (which EPA does not specify, saying only that it assumes maximum effectiveness) (see Phase II EBA, p. C1-6). Because the make-up requirement for the cooling tower would not be reduced proportionately with the reduction from design to actual flow for the open-cycle system that is being compared, this approach is likely to overestimate the reduction in flow, and thus the assumed reduction in entrainment and impingement, attributable to cooling towers.

Moreover, EPA assumes that a reduction in flow results in a proportional reduction in entrainment and impingement impact. This assumption, although it has often been used in the past, seems highly questionable in light of the EPRI draft report finding a lack of correlation between flow and impact.<FN 18>

Footnotes

18 EPRI 2002a.

EPA Response

Please see response to comment 316bEFR.206.022 for a discussion of why EPA has not adopted cooling towers (or closed-cycle cooling) as a component of today's final rule.

Comment ID 316bEFR.041.032

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

UWAG's Analysis of Retrofit Costs Shows that EPA's Estimates Are Too Low

To determine the reasonableness of EPA's estimates of the costs of retrofitting wet cooling towers to existing facilities, UWAG's consultants at Stone & Webster conducted an independent analysis. (This analysis is Appendix 6 to these comments.) It covers over 1,000 units.

Stone & Webster's cost estimates use several cooling tower retrofit case studies developed for existing generating units. The units addressed by the case studies have several advantages that make it relatively easy to retrofit cooling towers: sufficient land close to the condenser/circulating water system, no noise abatement requirements, and the ability to use the existing circulating piping in the closed-cycle system without reinforcement. The result is that the Stone & Webster cost estimates are conservative "low end" costs for cooling tower retrofit projects, assuming that such retrofits would even be feasible.

Stone & Webster find that the total cooling tower retrofit costs for the population of over 1,000 units are approximately $25 to $28 billion in 2002 dollars. Operation and maintenance costs (including energy penalties) are $5 to $12 million in 2002 dollars per year. These O&M estimates come from utility experience at several nuclear plants, and the actual costs for other plants may vary depending on size, water source, electricity prices, and design.

In Section 3 of Appendix 6, Stone & Webster summarizes the complications that can increase the cost of retrofitting cooling towers. For example, most of the piping and components of existing circulating water systems are concrete and supported on (or embedded in) reinforced concrete foundations. Removing existing plant equipment likely would be required to afford access for demolition of existing piping and major thrust blocks (concrete pipe supports) so as to facilitate installing new circulating water system piping to and from the cooling towers. Preliminary engineering evaluations for two conventional natural draft towers at one facility, for example, suggest that the retrofit at that site would require excavating more than 250,000 cubic yards of soil and installing more than four miles of seven-foot-diameter pipe as just one phase of the project.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.033

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA Lacks Legal Authority to Require Cooling Towers

UWAG supports EPA's decision not to require cooling towers for existing facilities, and indeed UWAG believes EPA lacks the legal authority to do so. Even if the costs of cooling towers were lower and their benefits higher, EPA could not, as a legal matter, require closed-cycle cooling under § 316(b). Congress has never given EPA authority to approve or require one type of cooling system over another. By its terms, § 316(b) addresses "intake structures," not cooling systems and not cooling water flow. Unless there is evidence to the contrary, Congress should be taken to mean what it says. UWAG's reasoning on this point is found in its 2000 Phase I Comments, pp. 25-28.

As Bill Anderson says in his article on § 316(b), much of the disagreement about the scope of § 316(b) focuses on the word "capacity." Anderson and Gotting (2001). Anderson concludes that Congress never intended § 316(b) to affect, directly or indirectly, the type of cooling system used at a particular steam-electric plant. Whereas Congress defined "effluent limitation" in § 502(11) to mean a "restriction . . . on quantities, rates, and concentrations of pollutants," in § 316(b) it used instead the word "capacity," which focuses on the physical intake structure rather than the flow of water through the plant. Thus, "capacity" means the size of the intake structure itself and refers to the fact that, for a given flow of water through the plant, the velocity at the intake can be decreased to protect fish by increasing the size of the intake structure. Id. at 36. Another way to think about the issue is by analogy to a drinking glass; the capacity (or volume) of the glass is the full amount it will hold, not whatever amount of water happens to be in it. Similarly, the capacity of a CWIS is its physical size, not the flow through it.

That Congress did not intend EPA to regulate the use of cooling water (that is, flow or volume) is made particularly apparent by Clean Water Act § 101(b), which says that it is the policy of the Congress to preserve and protect the "primary responsibilities and rights of States . . . to plan the development and use (including restoration, preservation, and enhancement) of land and water resources." 33 U.S.C. § 1251(b). More to the point, § 101(g) says that "[i]t is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired" by the Clean Water Act. 33 U.S.C. § 1251(g). And it is the policy of Congress that nothing in the Clean Water Act "shall be construed to supersede or abrogate rights to quantities of water which have been established by any State." Id. In PUD No. 1 of Jefferson County v. Washington Department of Ecology, 511 U.S. 700 (1994), Justice O'Connor allowed the State of Washington, using § 401 of the Clean Water Act, to impose a minimum instream flow requirement on a hydroelectric project licensed by the Federal Energy Regulatory Commission. Justice O'Connor found that § 101(g) (and § 510(2), providing that nothing in the Clean Water Act shall "be construed as impairing or in any manner affecting the right or jurisdiction of the States with respect to the waters . . . of such States," 33 U.S.C. § 1370), leaves the States their traditional authority to allocate water rights. Also, the SWANCC case tells us that the provisions of § 101 of the Clean Water Act are to be taken seriously. See Solid Waste Agency of Northern Cook Co. v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001).

In short, even if EPA wanted to require cooling towers (despite their high cost), it would not have legal authority to do so.

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 19.0

Dry Cooling

Dry Cooling Is Even Less Justifiable Than Wet Cooling Towers

UWAG also agrees with EPA that dry cooling cannot be justified as a national standard. If closed-cycle cooling (i.e., wet cooling towers) cannot be justified, as argued above, the case for dry cooling is even worse. Even for new facilities, EPA has concluded that dry cooling is too expensive to require on a nationwide basis. As UWAG's comments on the new facility rule pointed out, dry cooling is unreasonably costly and does not work well in some parts of the country.

As part of UWAG's 2000 Phase I Comments, UWAG's consultants performed an analysis of wet and dry cooling systems for combined-cycle power plants, attached to these comments as Appendix 7. This analysis shows how costly the widespread installation of dry cooling towers would be just at new combined-cycle plants.

Assuming that 100% of new combined-cycle capacity over the next 20 years will be constructed with either wet or dry cooling towers, the projected costs (all in July 1999 dollars with future values escalated with a 4% annual rate and present values determined with a 7% annual discount rate) are as follows:

Table 3. Summary of Projected Costs for Wet Cooling Systems

Geographic Group	Capital Costs ($ Millions)	Total O&M($ Millions)	Total Costs($ Millions)
1 - Northeastern U.S.	791.3	347.9	1,139.2
2 - Upper Central U.S.	605.6	237.9	842.5
3 - Southeastern U.S.	1,190.6	547.3	1,738.2
4 - Lower Central U.S.	1,020.1	506.9	1,527.0
5 - Western U.S.	774.3	344.5	1,118.8
Total U.S.	4,382.2	1,984.5	6,366.7

Table 4. Summary of Projected Costs for Dry Cooling Systems (2000-2020)

Geographic Group	Capital Costs ($ Millions)	Total O&M Costs($ Millions)	Total Costs ($ Millions)
1 - Northeastern U.S.	1,388.5	616.5	2,005.0
2 - Upper Central U.S.	1,064.2	422.9	1,487.1
3 - Southeastern U.S.	2,105.1	974.4	3,079.5
4 - Lower Central U.S.	1,813.3	902.9	2,716.2
5 - Western U.S.	1,348.7	608.8	1,957.5
Total U.S.	7,719.8	3,525.5	11,245.3

An estimate of the cost per megawatt can be derived by referring to the new capacity estimates in Tables C1 through C10 of Appendix 7 to these comments.

Regionally and nationally, the estimated capital and total O&M costs for dry cooling systems exceed those for wet cooling systems by about 75%. At $6.4 billion and $11.2 billion for wet and dry systems, respectively, the total costs are significant. If annualized at a 7% rate for the 20-year study period, the estimated national costs for wet and dry cooling systems at new combined-cycle power plants are $0.6 billion/year and over $1 billion/year, respectively.

The analysis in Appendix 7 reaches the following conclusions:

1. By almost any economic measure, a dry cooling system for a new facility costs about 75% more than an equivalent wet cooling system. The higher cost reflects two inherent characteristics of dry cooling: lower performance than wet cooling and greater sensitivity to climatic conditions. The efficiency of dry cooling depends on the ambient dry-bulb temperature at the site.

2. The importance of ambient dry-bulb temperature in determining the performance of a dry cooling system means climatic conditions are important. Therefore, depending on climatic conditions, certain locations in the country will have a higher probability of incurring larger dry cooling energy penalties.

3. Dry cooling systems have greater and more expensive energy penalties than wet cooling systems. The highest probability for incurring an energy penalty is during the warmest times of year, when the demand and the price for electric power are greatest.

4. Dry cooling systems use less water than wet cooling systems. But the unreliability of dry systems at times of peak power demand, as well as the excessive capital and O&M costs, makes closed-cycle cooling less desirable than wet cooling systems.

UWAG has not analyzed dry cooling costs for existing, as opposed to new, facilities. But it is certain the costs would be higher for existing facilities than the costs summarized in Appendix 7. It should be noted that for dry cooling systems it is difficult to estimate energy penalty costs due to hour-to-hour and day-to-day variations in ambient temperatures and the market price of electric power. A recent paper by Micheletti and Burns.<FN 19> points out that using daily averages for dry bulb temperatures and electricity price cannot account for extreme energy penalties that might occur briefly during the hottest times of the day.

Footnotes

19 Micheletti and Burns 2002.

EPA Response

The Agency does not consider dry cooling to be a viable technology for retrofitting an existing power plant cooling system, and as such agrees with the basic conclusion of the comment. See response to Comment ID 316bEFR022.002.

Comment ID 316bEFR.041.035

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Under the Proposed Rule, Permit Writers Could Not Require a Permittee to Consider Cooling Towers Among the Candidates for BTA

UWAG argues above that EPA lacks authority to require closed-cycle cooling, notwithstanding that it has included closed-cycle cooling as one means of satisfying the rule. It follows that a permit writer cannot require a permittee to consider cooling towers as a candidate for complying with the BTA requirement. It follows also that EPA's own determination is that closed-cycle cooling is not BTA.

What should happen, then, if a permittee analyzed each of the technologies on which EPA bases its performance standards (wedgewire screens etc.) and found that none of them would reduce impingement mortality by 80% at the site in question? In that event, the permittee would need to show that the costs of using the technologies to meet the performance standards exceeded either EPA's estimated costs or the benefits of using them, and then resort to a site-specific analysis of BTA. But the permittee would not be required to consider cooling towers as an option for meeting the performance standards before going to the site-specific analysis, nor as an alternative that had to be considered in the site-specific analysis.

EPA Response

The permittee would not be required to consider cooling towers as an option for meeting the performance standards before going to the site-specific analysis, nor as an alternative that had to be considered in the site-specific analysis. The reason for this fact is that EPA did not consider cooling towers retrofit projects in the cost analysis of the requirements of the final rule.

Comment ID 316bEFR.041.036

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA HAS OVERESTIMATED THE BENEFITS OF REDUCING IMPINGEMENT MORTALITY AND ENTRAINMENT

In its economic analysis of cooling towers, discussed above, EPA underestimates the cost of retrofitting, operating, and maintaining cooling towers. UWAG also believes that EPA also does not adequately take into account the “cost” of the energy penalty that cooling towers will exact. Electric power, after all, is a social “good” just as surely as fish are, and the benefit of producing electric power (or the cost of restricting its production) is no less important to society than, for example, the commercial fishing industry.

At the same time that EPA underestimates the cost of cooling towers, it overestimates the benefits of reducing entrainment and impingement. That overestimation is the subject of this section of these comments.

Throughout its economic analyses, EPA has overestimated both the number of fish likely to be impinged or entrained by Phase II facilities and the value of reducing losses of those fish. To estimate the benefits of reducing entrainment and impingement, EPA (1) developed loss estimates at each case study facility; used them to develop estimates of age-1 equivalents, foregone fishery yields, and foregone biomass production; then divided these estimates by flow to develop a loss/flow ratio; (2) for some waterbodies, applied the loss/flow ratio to other plants on the same watershed to develop a watershed-wide loss estimate; (3) used a variety of methods (the choice among which is usually not well explained) to estimate the economic value of the losses, then divided those by flow to develop a dollar/unit flow ratio; and (4) applied this ratio to various regulatory scenarios, assuming the reduction in losses would be directly proportional to reduction in flow for cooling towers and that reductions would be as specified for other technologies.

Although EPA says that its approved technologies will vary widely in performance, based on site-specific factors, and the Agency therefore proposes to express performance standards as a range, EPA apparently took the opposite tack in estimating the reductions in impingement mortality and entrainment that different regulatory alternatives would achieve. In the Phase II EBA, p. C1-6, EPA says that for purposes of estimating impingement and entrainment benefits, the Agency assumed that each technology would work at maximum effectiveness. EPA does not say exactly what that means, as a percentage for each technology, but the fact remains that EPA’s estimates will be high.

Appendices 8, 9, and 10 to these comments, prepared by nationally recognized fisheries biologists and resource economists, <FN 20> provide a detailed critique of the data and methods EPA used to assess the losses associated with once-through cooling, as well as the likely benefits of requiring cooling towers and various intake structure technologies. As these appendices demonstrate, EPA has vastly overestimated the extent of the entrainment and impingement losses caused by cooling water intakes nationwide, the implications of such losses for consumers and society at large, and the economic benefits of reducing losses.

Footnotes

20 Appendix 3 lists the professional qualifications of the experts who prepared reports for these comments.

EPA Response

EPA has decided not to base the requirements of the final rule on cooling tower technology. If the commenter's claim that EPA underestimated the costs associated with retrofitting, operating, and maintaining cooling towers prove to be true, then the outcome would serve reinforce and support the Agency's decision to not base the requirements of the final rule on this technology.

For a discussion of EPA's consideration of power losses, please refer to the responses to comments 316bEFR.072.209 and 316bEFR.072.301 in subject matter code 9.03.

In the appendices referenced by the commenter three main topics were covered: density dependence, entrainment survival, and the calculation of production foregone. For a discussion of EPA's assumptions about density dependence, please see response to Comment 316bEFR.025.015. For a discussion of EPA's conclusions about entrainment survival, please see response to Comment 316bEFR.306.506 and Chapter A7 of Part A of EPA's Regional Study Document for the Phase II rule. Regarding the calculation of production foregone, please see response to Comment 316bEFR.305.003.

Comment ID 316bEFR.041.037

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 6.01

Overview of I & E effects on organisms

Besides these appendices, recent EPRI studies support the conclusion that EPA's benefits estimates are too high. The ongoing study by the Oak Ridge National Laboratory funded by EPRI (EPRI 2002a) concludes that there does not seem to be a dose-response pattern between volume of water withdrawn and effects on fish populations. Where long-time series of data on the factors affecting fish productivity along with data on fish population dynamics are available, volumetric flow relationships have not ranked high as determining factors.

EPA Response

The commenter asserts that certain studies have indicated that there is no linkage between the volume of intake water and fish population dynamics. EPA acknowledges that many factors besides I&E can affect fish population dynamics. EPA's approach to the I&E assessment did not include attempts to model fish population dynamics; nor did it include attempts to determine the relative effects of I&E among all other factors contributing to their dynamics. EPA's approach focused on simple, direct estimates of the foregone yield associated with I&E losses to single cohorts only. See EPA's response to Comment 316bEFR.005.009 and Comment 316bEFR 025.015.

EPA does not understand the reasoning behind the commenter's assertion that EPA's benefits estimates are too high. The assertion appears to be unrelated to the observations about the results of study cited.

Regarding the underlying issue of EPA's method of estimating I&E based on intake flow, EPA notes that there are a number of alternative ways to estimate I&E rates, depending on the purpose of the analysis. Given that the goal of EPA's benefits analysis was to develop regional (not facility-specific) estimates of I&E, EPA believes that it was reasonable to assume that I&E rates are proportional to intake flow. This approach allowed EPA to estimate the relative magnitude of I&E for the nation as a whole despite significant data limitations, including a lack of data for many facilities in scope of the rule.

EPA maintains that, for the purpose of estimating a regional average or total I&E, it is reasonable to extrapolate I&E results from a sample of facilities in proportion to average flow. It is not necessary to have precise, facility-specific estimates for all facilities in a region for this purpose.

EPA notes that the assumption that I&E is proportional to flow is not unusual or inconsistent with other predictive studies, including those by industry. For example, a key assumption of the Spawning and Nursery Area of Consequence (SNAC) model (DCN # 6-2070) is that entrainment is proportional to cooling water withdrawal rates. The SNAC model has been used as a screening tool for assessing potential I&E impacts at Chesapeake Bay plants. As a first approximation, percent entrainment has been predicted on the basis of the ratio of cooling water flow to source water flow (DCN # 1-3027-BE).

Empirical studies also support EPA’s assumption. A study of power plants on the Great Lakes (DCN # 1-3034-BE) demonstrated an increasing relationship (on a log-log scale) between plant "size" (electric production in MWe) and impingement and entrainment. There is scatter in these relationships, not just because there is variation in the cooling water intake for different plants having similar electric production, but also because of the imprecision (sampling variability) inherent in the usual methods of estimating impingement and entrainment. These relationships are nonetheless strong. More recently, a study of plants from both the U.S. and Great Britain concluded that “pumping rate is considerably more important than locality and intake configuration in determining the number of fish impinged or entrained” (316bEFR.077, Comment 1.77 in W-00-32, 316(b) Phase II). EPA’s 1976 “Development Document for the Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact” (DCN 1-1056-TC) concluded that “reduction of cooling water intake volume (capacity) should, in most cases, reduce the number of organisms that are subject to entrainment in direct proportion to the fractional flow reduction.”

Comment ID 316bEFR.041.038

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.02

Fish Population Modeling

Another paper, prepared by Dr. Lawrence W. Barnthouse for EPRI, examines EPA's use of calculated entrainment and impingement losses at case study facilities to extrapolate to losses of age-1 equivalent fish and to losses of pounds of commercial and recreational fish, both for fish that are directly exploited as part of a fishery and for fish populations reduced by reductions in forage fish. The Barnthouse paper shows that EPA's failure to account for density dependence causes a significant overestimate of the likely effects, made even worse by other errors EPA made. EPRI 2002c.

EPA Response

Please see response to Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.041.039

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA Has Used Questionable Methodology to Extrapolate from Losses to Age-1 Equivalents and from Age-Equivalents to Pounds Lost to Commercial and Recreational Fisheries

EPA's methodology for evaluating entrainment and impingement is documented in Chapter 5 of the Case Study Report. It has four major components:

1. Estimating entrainment and impingement losses by life stage;

2. Extrapolating stage-specific losses to losses of age-1 equivalent fish;

3. Extrapolating age-equivalents of exploited fish species to pounds of fish lost to commercial and recreational fisheries; and

4. Extrapolating age-1 equivalents of forage fish to losses in production of commercial and recreational fish.

Dr. Barnthouse has reviewed this methodology, focusing on steps 2 through 4 (extrapolation of age- and stage-specific losses to estimates of reductions in recreational and commercial harvests). One potentially significant assumption in EPA's methodology is that no compensatory processes (e.g., density-dependent growth or survival processes) are operating in the modeled populations. A critique of EPA's justification for this assumption, which it propounds in

Chapter A6 of the Case Study Report, is addressed in Dr. Barnthouse's review.

1. EPA's Extrapolation of Age-equivalents of Exploited Fish Species to Pounds of Fish Lost to Commercial and Recreational Fisheries Is Unclear and Oversimplified

EPA's approach, at least in concept, is similar to approaches used in site-specific assessments, such as the 1999 NJPDES permit application for the Salem Generating Station. However, as discussed below, this approach ignores biological compensation and therefore provides upper-bound estimates on the number of age-1 equivalents lost due to entrainment and impingement. Several other significant uncertainties are inherent in EPA's methodology.

It is important to understand that a single female fish, as noted above, may spawn a million or more eggs a year. Carp, for example, produce approximately 100,000 fertilized eggs per kilogram of body weight, and females begin to spawn at 4 kilograms and can reach sizes of 20 kilograms. Thus the entrainment of 20 million eggs and larvae might represent the production of only 10 or 20 females for one year. And this is an underestimate, because many eggs and larvae will die before they are entrained, but many others will survive entrainment (UWAG 2000 Phase I Comments, p. 164). Under natural conditions, only a small fraction of the eggs produced survive to adulthood. Hence EPA's assumption that a loss of some small percentage of eggs or larvae is a substantial problem ignores the basic biology of natural fish populations.

EPA used a formula (Equation 1) to calculate early life stage survival rates when empirical data are unavailable: Seq = 2/fa, where Seq is the probability of survival from the egg to the expected age of spawning females. Equation 1 assumes (1) that the population being modeled is stable over time and (2) that survival is constant over the period between the spawning and adulthood. The first of these (the stability assumption) is reasonable as a first approximation, because, measured over long time spans, the average sizes of most populations are relatively constant.

The assumption of constancy over all life stages, on the other hand, clearly is an unreasonable oversimplification, because mortality of all life stages and ages of fish is size-dependent. Survival rates of early life stages are very low; survival rates increase with increasing size and age. It is not clear from Chapter 5 of the Case Study Report how EPA apportioned Seq among different life stages when more than one life stage was entrained or impinged.

Moreover, it is not even clear how EPA used Equation 1 to calculate survival rates. For example, consider the estimation of early life stage survival rates using Equation 1. The variable fa in Equation 1, the expected lifetime total egg production of a female recruit, is not directly measurable. It represents the number of eggs expected to be produced over the lifetime of a female fish that has just reached reproductive age, accounting for both the number of eggs produced by the fish at each subsequent age and the probability that the fish will survive to reach that age:

[see hard copy for equation]
where (Equation 2)

Si = fraction of fish surviving from the age at first reproduction to age i
Mi = number of eggs spawned by a female fish at age i
S1 =1.

Estimates of age-specific fecundity and survival are unavailable for many species, and, even within a species, different populations can have substantially different life histories. Uncertainty concerning values of age-specific fecundity and survival rates for adult fish translate, therefore, into uncertainties in lifetime egg production and early life stage survival. Again, it is not clear from Chapter 5 how EPA obtained the necessary age-specific fecundity and survival rates.

Given estimates of stage-specific survival rates, EPA calculates survival from the stage of entrainment or impingement to age 1 using the following equation:

[see hard copy for equation] (Equation 3)

Sj,1= cumulative survival from stage j until age 1
Sj = survival fraction from stage j to stage j+1
= adjusted Sj
jmax = the stage immediately prior to age 1

The adjusted survival fraction in Equation 3, S*j, also is a potentially significant source of error. This adjustment is included to account for the fact that typical entrained or impinged organisms already will have spent a certain amount of time in the life stage where they were entrained or impinged and so already will have survived some natural mortality. The probability that such fish would have survived to age 1 had they not been entrained or impinged is higher than it would have been had they been entrained or impinged on the first day of that life stage. Because of the adjustment, Sj* is always larger than Sj.

The adjustment formula assumes that fish are equally vulnerable throughout the entire duration of the life stage – that is, that the daily probability of entrainment or impingement is constant. If fish become progressively less vulnerable during a given life stage, because of growth, then the adjustment will produce estimates that are biased high, especially if the life stage is long in duration. Juvenile fish, for example, often are vulnerable to entrainment immediately after transformation from the larval stage (~20 mm in length for many species). However, juvenile fish grow very rapidly and, in many species, reach a length of 100 mm or greater by age 1. Beyond a length of ~40 mm, they may be too large to be entrained. In this circumstance, the actual average age of entrained juveniles would be much younger than assumed in EPA's model, so that EPA's extrapolation of the losses to age-1 equivalents would be inflated.

The importance of the two sources of uncertainty, early life stage survival rates and the survival rate adjustment factor, are illustrated in Figure 1 in Dr. Barnthouse's review. As in most of the case studies modeled by EPA, the "juvenile" period (i.e., the period from transformation to the juvenile life stage and the end of the first year of life) is divided into two substages, called "juvenile 1" (J1) and "juvenile 2" (J2). Figure 1 plots the number of age-1 equivalents lost per 10,000 entrained J1 fish. Figure 1 assumes a survival rate of 40% for J2 fish, similar to values for striped bass and weakfish used in the Delaware Estuary case study. A range of values is used for J1 fish, from about 4% to 12%. These values span the range of values assumed for various fish species in EPA's case studies.

For a typical range of 5-10% J1 survival, EPA's methodology produces a range of 381-727 equivalent one-year-olds per 10,000 entrained J1 fish. If juveniles were susceptible to entrainment only at the beginning of the J1 stage, however, then the same 10,000 losses would equate to only 200-400 age-1 equivalents.

These uncertainties translate directly into uncertainties concerning the magnitude of reduced harvests caused by entrainment and impingement. Because EPA's model is linear, a factor of 2 uncertainty in number of age-1 equivalents per lost fish translates into the same factor of 2 uncertainty in pounds lost and economic value.

EPA Response

Regarding compensation, please see EPA's response to Comment 316bEFR.025.015. Regarding the method for adjusting survival rates of entrained juveniles, please see EPA's response to Comment 316bEFR.074.101

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.02

Fish Population Modeling

EPA Has Not Justified its Assumption that There Is No Density Dependence

Chapter A6 of EPA's Case Study Report discusses the use of "population models" in assessing long-term consequences of mortality due to entrainment and impingement. Here, "population models" means the use of classical spawner-recruit models such as the Ricker and Beverton-Holt models (both of which have been used for fishery population management) to quantify the influence of density-dependent population regulation (compensation) on the abundance of fish populations and to calculate estimates of long-term effects that include the influence of density dependence. Specific topics covered in the chapter include:

-The general concept of population regulation and the principal models used by fisheries scientists to quantify density dependence,

-The way in which these models can be used to calculate quantities of interest to fisheries managers (e.g., maximum sustainable yield),

-Modifications of the models made to apply them to CWIS impacts,

-Various uncertainties that limit the ability of stock-recruitment models to predict responses of fish populations both to harvesting and to entrainment/impingement losses, and

-EPA's rationale for not quantifying impacts on populations and, instead, using models that assume no density dependence.

EPA asserts that stock-recruitment models do not account for impacts on multiple species, do not include impacts of multiple intake structures, do not account for other sources of human-related mortality (e.g., toxic chemicals), do not incorporate interspecies interactions, and do not consider interactions between density-dependent and density-independent processes. Case Study Analysis, p. A6-6. Because of the high degree of uncertainty associated with stock-recruitment models and because many of the fish species that are vulnerable to entrainment and impingement already may be depleted by overfishing, a "precautionary" approach to impact assessment is appropriate, according to EPA. The precautionary approach, EPA says, entails (1) use of entrainment and impingement losses as direct measures of potential impacts, analogous to the use of toxicity testing to predict the potential impact of pollutant discharges; and (2) use of density-independent models to project estimates of entrainment and impingement losses to estimates of reduced harvest and production foregone. Case Study Analysis, pp. A6-6 –A6-7.

In the first place, EPA's statement that many fish species may already be depleted as justification for a precautionary approach is not, and probably cannot be, supported. Before relying on this idea, EPA needs to show the public, if it can, which of the hundreds of sites and several hundred species affected by cooling water intakes are depleted by overfishing.

UWAG's primary concern with this assumption of overfishing, however, is that it inappropriately confuses the phenomenon of biological compensation with the mathematical models that have been used by fisheries biologists to quantify compensation. In addition, this assumption oversimplifies the use of compensation in fisheries management.

The operation of density-dependent processes in fish populations has been demonstrated in literally dozens of empirical studies, including statistical analyses of long-term databases and direct manipulative studies in small ponds and lakes. (See Appendix 5 to these comments.) Moreover, density dependence is explicitly recognized in fisheries management regulations implemented by the National Marine Fisheries Service (NMFS), which state that exploitation that reduces the size of populations by greater than 50% below the unexploited stock size are consistent with the long-term sustainability of populations (NMFS 1998b).

In focusing on a few types of simple models, EPA greatly oversimplifies the biological basis for life stage density dependence and ignores the fact that compensation is acknowledged explicitly by fisheries management regulations. The Ricker, Beverton-Holt, and other stock-recruitment models are used in fisheries management only when large quantities of high-quality data are available. In other cases, the approach most commonly used for establishing fishing rates that protect the reproductive capacities of fish populations is the "spawning stock biomass per recruit" (SSBPR) approach (Goodyear 1993). The SSBPR approach implicitly considers life stage density dependence by quantifying influence of fishing mortality on the reduction in number of eggs produced per female recruit over her lifetime. To maintain a stable population, the survival rate of each spawned egg must increase in order to offset the reduction in lifetime egg production caused by harvesting. As noted by Goodyear (1993), the SSBPR model was first described in 1977 (Goodyear 1977) as a method for indirectly quantifying life stage density dependence in power plant impact assessments.

Technical committees of the Atlantic States Marine Fisheries Service have, in fact, developed stock-recruitment models for two fish species that often are entrained and impinged at East Coast power plants: striped bass and weakfish (NMFS 1998a, NMFS 2000). These models are used as an input to the management process for these species, although they are not used to calculate numerical harvest limits. Although spawner-recruit models are not yet widely used in fisheries management, life stage density dependence is at least implicitly included.

Many of the uncertainties inherent in EPA's biological assessment method (e.g., estimation of stage-specific natural mortality rates) could lead to inaccurate estimates of the potential harvest lost due to entrainment and impingement. Ignoring compensation, on the other hand, can lead only to an overestimate of harvest reduction and, therefore, to an overestimate of the benefits to be gained by implementing technologies to reduce entrainment and impingement. The magnitude of the bias introduced by assuming a linear relationship between losses and harvest reduction is difficult to quantify, but it would be expected to be relatively small for fish stocks that are severely depleted and have a very low compensatory reserve, but relatively large for fish stocks that currently are being exploited at sustainable levels. EPA has made no attempt to quantify the degree of bias or the influence of such bias on the benefits assigned to alternative intake technologies.

It clearly is true that the precision of typical spawner-recruit models usually is too low for use in managing specific fish stocks. However, this degree of precision may not be necessary for a national-scale benefits analysis such as the one performed by EPA. For example, the methods developed by

Myers et al. (1999) for estimating the compensatory reserve of fish populations based on meta-analysis of hundreds of published stock-recruitment data sets could be used to develop such models for use in the benefits assessment. Rose et al. (2001) showed that this method produces estimates of compensatory reserve that are consistent with expectations derived from fish life history theory. Although the benefits predictions derived from a model that included compensation would be uncertain, they at least would not contain a consistent bias toward underestimation or overestimation of benefits.

As for EPA's resort to the "precautionary principle," UWAG has several observations. First, the precautionary principle is not mentioned in the Clean Water Act, and Congress did not direct that EPA use it. Second, the precautionary principle is one way of dealing with uncertainty in scientific studies but not the only one. Third, EPA's resort to the precautionary principle for applying § 316(b) seems to be based on an unsupported and unjustified assumption that cooling water intakes are causing widespread damage, which in fact is not true. Fourth, resorting to the precautionary principle whenever it is convenient to get past a point of uncertainty in the analysis tends to compound conservatisms until the end result is hyperconservative (overprotective) and therefore needlessly costly from a public policy standpoint. Fifth, EPA's goal should be to make its scientific estimates as realistic as possible and only then, if at all, to use the precautionary principle to set a margin of error in the final regulatory limit. Invoking the precautionary principle willy-nilly during the course of purely factual analyses risks producing a result that is unrealistic and, worse, unrealistic in a systematically biased way.

EPA Response

For its final analysis for the 316b Phase 2 rule, EPA did not include the material in Chapter A6 of the Case Study Document (DCN #6-0003) discussed by the commenter. However, EPA has addressed the issues raised by the commenter elsewhere in its responses to comments. Please see responses to Comment 316bEFR.005.009 on fish population modeling, Comment 316bEFR.025.015 on compensation, and Comment 316bEFR.005.026 on the term "precautionary approach."

Comment ID 316bEFR.041.041

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

EPA's Methodology for Extrapolating Baseline Losses at Case Study Facilities to National Baseline Losses Is Flawed

In Chapters C2 and C3 of EPA's Phase II EBA and Chapters B3, C3, and D3 of EPA's Case Study Analysis, EPA describes its method for estimating national losses of fish from impingement and entrainment. The method starts with actual measured losses at a few specific plants (the ones in its "case studies") and then extrapolates those numbers to produce a nationwide estimate. The assumption that impingement and entrainment are strictly proportional to flow (see, e.g., CSA C3-22) is critical to EPA's extrapolation method.

UWAG submits that EPA has never tested this assumption and, in fact, the available evidence and analyses show that it is not supported. Indeed, as discussed in Appendix 8, a review of the only EPA data set that is sufficiently extensive to permit quantitative analysis shows plainly that this core assumption is not true.

UWAG's review of this extrapolation methodology is primarily contained in Appendices 8 and 10. UWAG has five major concerns with EPA's extrapolation method.

1. The Tampa Bay and Ohio River Facilities Are Not Representative

First, the assumptions on which EPA's extrapolations for the Tampa Bay and Ohio River waterbodies are based are likely not valid. As EPA itself says, "[e]ven similar facilities on the same waterbody can have very different impacts, depending on the aquatic ecosystem in the vicinity of the facility." Phase II EBA, p. C1-1. EPA then proceeds to ignore its own advice. The fish community near the Big Bend facility has not been shown to be representative of the fish community in Old Tampa Bay and Hillsborough Bay (an assumption required by EPA's method). And, further, Tampa Bay cannot be considered representative of the entire Gulf Coast since the bay is not affected by sediments from the Mississippi River's silt plume. Estuaries from Mobile Bay, Alabama, to Corpus Christi Bay, Texas, experience higher levels of turbidity in comparison to those in Florida. Estuaries in Louisiana and along the upper Texas coast experience the highest ambient TSS levels. In addition, these Gulf Coast estuaries have extremely high levels of particulate organic matter (POM) that form the basis of a complex and extremely productive detrital food web.

For the Ohio River, the data presented for case study facilities in the Markland pool of the Ohio River (the only pool containing at least three case study facilities) indicate that impingement and entrainment losses are not proportional to intake flows (another assumption required by EPA's method). Appendix 8, p. 8-9, and Figure 1.

2. EPA Did Not Select the Case Study Facilities at Random

Second, for all waterbody types, EPA did not ensure representativeness of reference facilities by selecting the facilities on which it bases its extrapolations randomly. Indeed, the limited information in the case studies suggests that the reference facilities are not representative of all facilities within their waterbody types. EPA says it selected the case studies to represent a range of characteristics, but it does not say how the studies selected represent those characteristics. Instead, after naming important factors, EPA simply claims that the case study sites used for extrapolation are "considered representative of the majority of steam electric generators in the United States." Phase II EBA, p. C1-1 to C1-2. This is a truly astounding and wholly unsupported claim.

In fact, EPA appears to have selected for analysis only facilities with substantial existing data. Through use of that selection criteria, EPA biased the selection process. Those facilities with the most complete data sets tend to be the "high profile" sites that developed the data to allay perceptions about potential environmental impacts. The many sites that do not have extensive data sets may be more representative of typical CWIS impacts than facilities that have been heavily scrutinized and therefore have amassed extensive data and information.

3. EPA's Flow Index Extrapolation Method is Not Valid

Starting from the assumption that impingement and entrainment are strictly proportional to flow (which, as we have shown, is not the case), EPA developed biological loss estimates for a relatively small number of non-randomly selected plants. That is, for purposes of national extrapolation, EPA relied on impingement and entrainment data for 13 out of the 539 in-scope plants, or roughly 2% of the in-scope plants.

It then used a variety of methods to estimate the economic value of that impingement mortality and entrainment (which, in the case of entrainment, it assumed was entrainment mortality, despite the existence of data showing appreciable entrainment survival for at least one of the plants). Using this information, EPA applied a Flow Index Extrapolation method to derive estimates of the economic value of losses nationwide. Like EPA's biological loss estimates, the legitimacy of this rests on the truth of the assumption that the economic value of impingement and entrainment, and thus the economic loss to society, is strictly proportional to flow. EPA made no attempt to test this critical assumption. Given that the Agency's underlying assumption about the proportionality of biological losses and flows is unsupported, as Appendix 8 shows, it seems equally likely that this second assumption is also false.

4. Using the Angling Index Is Not a Valid Method

UWAG's fourth major concern is EPA's use of its Angling Index as a basis for extrapolation. Although it may have some superficial heuristic appeal, the Angling Index simply is not a valid method for estimating the value of national baseline losses. If used at all, it should be applied only to the portion of value lost that is attributable to reductions in recreational catch. Even for that portion, the Angling Index likely would produce biased results because the losses at the reference stations appear to be substantially higher than the average losses at other case study facilities.

There are at least three factors that inflate the Angling Index values: (1) the method uses double, treble, and maybe even quadruple or more counting; (2) EPA may not have accurately evaluated fishermen's choices of where they would go fishing (many anglers in Ohio would travel 20 miles to fish in the Ohio River but not 120 miles to fish in Lake Erie); and (3) a loss of fish does not automatically translate into a benefit if it is suddenly protected (fish that have compensatory reserves may be at the carrying capacity of the waterbody, and a reduction in mortality from one source would only serve to increase mortality from other sources). EPA's method fails to account for any of these.

EPA has applied the Angling Index method so as to overestimate angling days by failing to account for facilities that are within the 120-mile radius of another plant for which EPA developed an estimate. Basically, EPA assumed that each plant would serve a separate set of anglers, which is not the case.

5. EPA Uses High Estimates for the Great Lakes and Ocean Waterbody Types

UWAG's fifth major concern is with EPA's basis for choosing "best" estimates. EPA's rationale for using the high estimates (rather than a midpoint of high and low estimates) for the Great Lakes and Ocean waterbody types seems to contradict its rationale for using benefits transfer techniques for its initial estimates of the value of baseline losses. Moreover, EPA's sole reliance on HRC (habitat replacement cost) estimates ignores the range of estimates of value that it compiled.

Also, EPA's method for selecting "best" estimates is inconsistent and poorly justified. A detailed quantitative assessment of the effects of eliminating the Angling Index extrapolation method and of standardizing the choice of "best" estimates is not possible, given the limited data and information presented in the EPA reports.

A simple analysis can provide a sense of the magnitude of the effects of these errors. EPA reported its "best" estimate of the value of national baseline losses (for the 539 in-scope facilities) due to entrainment and impingement to be $1,521,000,000 (from Phase II EBA Table C3-6). Using midpoints as "best" estimates for all waterbody types (rather than using the upper bound estimates as "best" estimates for the Great Lakes and Ocean waterbody types) reduces the national baseline estimate from $1,521,000,000 to $1,350,000,000. Eliminating the use of EPA's Angling Index method of extrapolation (and use of only the Flow Index extrapolation method) further reduces the national baseline estimate to $1,081,000,000.

In short, EPA's use of the invalid Angling Index method (rather than only the Flow Index method, which itself relies on very simplistic and conservative assumptions), coupled with its inconsistent method for choosing "best" estimates (rather than using midpoints of high and low estimates for all waterbody types), has the effect of increasing EPA's national baseline estimates by over 40%.

The overall effect of these errors in EPA's methodology is to overstate significantly the estimate of nationwide losses. Although there is reason to question the validity of EPA's Tampa Bay and Ohio River loss estimates, the data and information presented in the Case Study Analysis and the Phase II EBA do not support a quantitative assessment of the effects of possible errors in those estimates. The same is true regarding the effects of apparent violations in assumptions of the Flow Index extrapolation method.

EPA Response

Regarding the commenter's comment that EPA's estimates of losses are flawed and biased, please see responses to (1) Comment 316bEFR.305.003 on EPA's production foregone method, (2) Comment

316bEFR.306.506 on EPA's conclusions regarding entrainment survival, (3) Comment 316bEFR.025.015 regarding compensation, (4)Comment 316bEFR.005.035 on the habitat-based replacement cost method and benefits analysis, (5) Comment 316bEFR.005.029 on EPA's commercial fishing benefits analysis, and (6) Comment 316bEFR.075.504 on EPA's recreational fishing benefits transfer methods.

In response to the commenter's request for a clarification of baseline, EPA notes that it has defined the I&E baseline as EPA's estimates of current average annual I&E rates (i.e., rates without the rule). The terms "case study facility" and "model facility" are used interchangeably to refer to the facilities with I&E data that were evaluated by EPA and used in its regional extrapolations.

The extrapolation approach described in the comment pertains to the approach applied by EPA at proposal, and is no longer used. The Tampa Bay and Ohio case study extrapolations presented at proposal are no longer included. As described in the NODA, for its final analysis EPA examined I&E losses, and the economic benefits of reducing these losses, at the regional level. The estimated benefits were then aggregated across all regions to yield a national benefit estimate.

The angling index is no longer used in extrapolation. Please see response to Comment 316bEFR.041.804 for information on the flow index. Regarding EPA's assumption that I&E is proportional to intake flow, please see EPA's response to Comment 316bEFR.041.037.

The primary objective of the regional extrapolation approach was to refine the scale of resolution of the benefits case studies conducted for proposal, so that extrapolations were within regions rather than nation-wide. Extrapolation was necessary because not all in scope facilities within a given region have conducted I&E studies. (For more detail on the regional approach, please see Chapter C1 of the EBA -- DCN #6-0002.)

Extrapolation was performed between facilities in the same region with similar technical characteristics. I&E data from multiple facilities in each region were used to develop each regional estimate. In some cases, all of the facilities in a region were evaluated (e.g., California). Data from a total of 46 facilities were used to develop I&E estimates for 7 regions. All extrapolations were based on losses per unit of average annual operational flow. Operational flows were obtained from EPA's survey of the industry.

EPA believes that this extrapolation approach was appropriate for the purposes of its analysis. EPA was concerned with developing regional estimates of I&E, not facility-specific estimates. For this purpose, it is important that estimates average out, but they don't have to be exact on a facility-specific level.

Comment ID 316bEFR.041.042

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01

Ecological Evaluation Methodology

EPA Has Disregarded Benefits of Open-Cycle Cooling

EPA also has overstated the benefits of cooling towers by disregarding some of the counterbalancing benefits of open-cycle cooling. At some sites, losses from open-cycle cooling are offset by benefits from open-cycle cooling, such as (in some cases but not others) increased dissolved oxygen from increased water circulation. There may be benefits, for example, where cropping of one species by impingement or entrainment benefits a more desirable species. And, at some sites, the warm discharge of an open-cycle cooling system may be beneficial for some animals, like manatees.

Moreover, entrained animals that are captured and returned unharmed to the environment cannot be considered an "adverse impact" or a "cost." For example, approximately 600 sea turtles entered the intake canal at the St. Lucie Plant in 2001, and over 99% were successfully captured and returned to the Atlantic Ocean. Before being released, the turtles are examined, weighed, and measured. The result is an enormous amount of scientific information (which NMFS considers to be very valuable) about sea turtles. Also, any turtles that are injured or ill (generally for reasons unrelated to the power plant) are taken to a nearby facility for rehabilitation and then released. The operator, Florida Power & Light Company (FPL), is constantly modifying and improving this program.

FPL also is permitted to capture at the St. Lucie Plant fish that are trapped in the intake canal. Many of these fish are captured and released, while others are removed and relocated to aquariums all over the world. This reduces the number of specimens the aquariums would otherwise have to acquire from some other source.

Also, the fact that wet cooling towers increase consumption of water imposes an important cost that EPA should take into account. Parts of the country suffer from droughts, and not just in the West, and water shortages are expected to be an increasingly important issue in the future.

EPA Response

Today's final rule does not require the use of wet cooling towers.

Comment ID 316bEFR.041.043

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA's Calculation of "Benefits" Is Too High

In Appendix 9 to these comments, Triangle Economic Research (TER) finds serious flaws and inconsistencies in EPA's economic benefits analysis. TER has extensive experience in valuing natural resources and in conducting high-quality benefit-cost analyses and cost-effectiveness studies. In many cases, TER finds, EPA used methods that are not consistent with EPA's Guidelines For Preparing Economic Analyses ("Guidelines"). Nor is EPA's application consistent with the OMB guidelines for conducting regulatory impact analyses.<FN 21>

EPA has estimated that national benefits for the proposed rule would amount to $734,728,000. TER estimates that, once various flawed methodologies are corrected, this number should be closer to $41,776,000. In short, EPA appears to have overstated the "benefits" of the proposed rule by over 17 times. To put it another way, EPA's estimate of benefits should be reduced by 94.3% if it is to reflect sound methodology.

The EPA benefits transfer application routinely violates both the "similarity" and "soundness" criteria used to evaluate the appropriateness of a transfer. The Agency's choice of the studies to represent the case study areas reflects many bad economic judgments. Moreover, EPA's failure to account for the appropriate timing of future benefits leads to significant overstatement. The commercial fishing benefits estimation methods use assumptions that are without economic foundation, leading to a substantial overstatement of benefits. The nonuse benefit estimates are calculated using a rule of thumb method that is based on studies conducted more than 20 years ago and are inappropriately transferred to the CWIS application. The Agency's rule of thumb fails to account for any of the recent studies that have raised serious concerns about the reliability of nonuse value estimates. EPA's method of extrapolating benefits to the national level systematically biases estimates upwards. Finally, the valuation methods referred to as Habitat Replacement Cost and Societal Revealed Preference confuse the fundamental concepts of benefits and costs, invalidating them for use in a benefit-cost analysis.

Below is a summary of the major problems with EPA's benefit estimate methods that TER identified.

Footnotes

21 Economic Analysis of Federal Regulations under Executive Order 12866 (OMB 1996).

EPA Response

This comment refers to EPA's proposed rule analysis. For the final rule analysis, EPA has made significant changes in its methods and applications. For recreational fishing valuation, EPA has estimated original regional RUM models for most regions. The exceptions are the North Atlantic region, where benefit function transfer is used, and the Inland region, where benefit transfer is used. For EPA's response to comments on the benefits transfer method used at proposal, please see comment # 316bEFR.075.504.

As stated in the NODA, EPA has discounted benefits to account for timing of benefit flows in the Section 316(b) Phase II rule analysis.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see the response to comment # 316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see the response to comment # 316bEFR.005.006.

For EPA's response to comments on the extrapolation method used at proposal, please see the response to comment #316bEFR.041.041

Comment ID 316bEFR.041.044

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's Habitat Replacement Cost Benefit and Societal Revealed Preference Estimates Are Without Economic Foundation

EPA's Habitat Replacement Cost (HRC) method and the Societal Revealed Preference method are inherently flawed. Both methods use costs of one type or another as a substitute for benefit estimates. This assumption that benefits equal costs is fundamentally flawed. Consumer surplus, not cost, is the basic measuring concept for estimating benefits. There is no justification for using costs as a proxy for benefits in the economics literature, nor is this approach consistent with EPA's Guidelines for Preparing Economic Analyses (Guidelines). EPA provides various rationales for using these non-economic methods to measure benefits. In its report, TER refutes each of the purported rationales for these approaches. In several instances, the rationales are inconsistent with EPA's own benefits analysis for the proposed Phase II rule.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

Comment ID 316bEFR.041.045

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Commercial Fishing Benefits Are Significantly Overstated Because of Suspect Empirical Analysis

The methods EPA uses to calculate the benefits of increased commercial dockside landings are suspect. Areas of particular concern include incorrect specification of benefit timing and inappropriate benefit transfer. EPA's benefit timing assumptions ignore the time from implementing the CWIS investments to the time that fish mature sufficiently to be caught for commercial purposes. Any potential benefits accruing to commercial anglers will begin some time in the future and should be discounted appropriately. EPA's Guidelines clearly state that, "present consumption is valued differently from future consumption" (p. 34). In addition, only some surviving age 1 equivalents are caught in their first year of adulthood. Others in this cohort are partially harvested each year of their remaining expected lifetime.

The magnitude of incorrectly specifying this time profile on benefit estimates depends on the appropriate discount rate, which is 7 percent for commercial fishing. The effect of time-lag to adulthood and partial benefit realization on net present value also is species dependent. However, EPA's analysis recognizes that more valuable fish such as striped bass and black drum take the longest to reach adulthood and live the longest. Thus, the appropriate discounting has a greater effect on the benefits from the most valuable species. Completely accounting for the effects of benefit timing and discounting is beyond the scope of TER's review. However, assuming a five-year lag to benefit accrual and harvesting of an entire cohort in its first year of adulthood produces an 11.9 percent reduction in EPA's benefit calculations. <FN 22> Table 1.1 in TER's report, reproduced below, details the effects of appropriate adjustments to commercial fishing benefits on overall benefits estimates:

[see hard copy for table]
Table 1.1 Adjustments to EPA National Benefits

Moreover, the assumptions and studies used by EPA to obtain societal benefits from commercial benefits are inappropriate. In particular, EPA's approach of scaling benefits estimates arising from short-run analyses to a long-run situation is improper. In a short-run analysis, commercial anglers can change only the amount of labor, fuel, or other variable inputs. In the long run, anglers can purchase new boats or make other capital improvements.

More important, the longer the time period, the more likely that new entrants will be attracted by economic profits or larger producer surpluses. Thus, economic theory dictates that long run producer surplus, and thus benefits to commercial angling, should be zero. EPA provides no alternative theoretical explanation for why the basic theory should not hold, nor does the Agency provide any empirical evidence required by its Guidelines to support this adjusted transfer. Thus, EPA's assumption that commercial fishermen will receive long-run profits ranging from 40–70 percent of increased dockside value is unwarranted. Removing the effect of these incorrect assumptions results in the 4.8 percent reduction in EPA's total benefits estimates depicted in Table 1.1.

EPA's multimarket producer surplus estimates hypothesize that long-run increases in producer surplus also accrue to related fish markets. Here again, EPA inappropriately transfers a 4.5 benefit multiplier from a short-run study. The existence of long-run producer surplus in any open market is an anomaly. According to a study cited by EPA, striped bass wholesalers receive markups of between "10 and 20 percent of the price paid to fishermen" (Norton et al. 1983). Prices are determined not by wholesalers, but by supply and demand situations at the Fulton Fish Market. Clearly, this is a description of a competitive industry with market participants receiving only normal market returns. Removing these inappropriate benefits from EPA's calculations results in a 36.6 percent reduction in EPA's total benefits estimates. Thus, the inappropriate inclusion of commercial fishing benefits leads to a combined overstatement of benefits of 41.4 percent.

Footnotes

22 This conservative assumption employs a 7 percent discount rate and does not spread benefit accrual over the life cycle of a fish cohort.

EPA Response

In the results presented in the Regional Study Document (DCN #6-0003), EPA discounts commercial and recreational fishing losses and benefits using discount rates of 0%, 3%, and 7%.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029. This comment response also addresses the need for discounting.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.01

Recreational Fishing Benefits

Recreational Fishing Benefit Estimates Are Overstated and Based on Inadequate Methodologies

EPA estimates recreational fishing benefits using benefits transfer and random utility model (RUM) analysis. Major areas of concern with EPA's recreational fishing benefit analysis include inaccurate characterization of the timing of benefits, <FN 23> incorrect specification of random utility models, and improper selection of studies for benefits transfer.

In the context of § 316(b) regulations, random utility models provide the best opportunity for correctly valuing increased catch hypothesized to result from entrainment and impingement reductions. These models are the most widely used method for valuing recreational fishing. They assume that a fishing site is a bundle of features such as accessibility, aesthetics, relative fishing success, and distances from anglers' homes. The RUM models also assume that anglers choose fishing sites that will maximize their satisfaction or utility. By observing the choices anglers make and the distances they are willing to travel, it is possible to measure the value of increasing a single feature of a recreation site, such as improved fish catch, which would be associated with the § 316(b) regulations.

However, EPA's analysis, as presented, is unsuitable for this purpose. In particular, with the random utility approach, the specification of opportunity cost of time and the estimation technique employed are key features of the model. EPA's random utility analysis contains several errors in these areas that invalidate their results. In particular, departures from standard random utility methods in terms of sampling methodology, calculation of implicit trip costs, and participation modeling lead to inflated benefit estimates many times those found in typical RUM studies.

Because EPA's RUM-based per-fish valuation numbers arise from nonstandard techniques and appear greatly inflated, TER concludes that they are inappropriate for the current application. Relying solely on benefits transfer numbers reduces overall benefits estimates by 8.4 percent as shown in Table 1.1. Furthermore, as Table 1.1 shows, the combined effect of adjusting for the timing of benefits and relying only on benefits transfer numbers reduces EPA's benefits estimates by 9.5 percent.

For benefits transfer, EPA focuses on comparing the physical characteristics of the study areas to each case study site. Studies chosen for the transfer are based on waterbody type, geographic location, and relevant species of fish. However, there are other aspects in which the studies used are not similar. These include the comparability of affected populations and the nature of the effects being valued in the study.

Furthermore, EPA selects recreational fishing studies to use that are not scientifically sound in terms of the response rate and estimation techniques, thereby violating the soundness criterion for benefits transfer. Moreover, because some of the studies are dated, they result in estimation methodologies that are no longer consistent with the best practices in the economics profession.

In violating the similarity and soundness principles of the benefits transfer method, EPA produces recreational fishing estimates that are upwardly biased. Correctly implementing original random utility studies or performing a detailed meta-analysis <FN 24> of existing recreation valuation studies would provide the best opportunity for measuring the recreational benefits hypothesized to arise from § 316(b) regulations.

Footnotes

23 Corrections to benefit timing and discounting in recreational benefits analysis are similar to commercial corrections but less influential (2.3%) due to a lower (3% versus 7%) discount rate.

24 Meta-analysis is the statistical synthesis of a large number of similar studies.

EPA Response

The commenter states that EPA's analysis of recreational fishing benefits presented at proposal is flawed because the Agency did not follow steps for developing a benefit transfer approach outlined in EPA's Guidelines for Preparing Economic Analyses. For EPA's response to comments on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

The commenter further states that "random utility models (RUM) provide the best opportunity for correctly valuing increased catch." The commenter, however, identifies several methodological flaws in EPA's RUM analysis.

EPA agrees that "random utility models (RUM) provide the best opportunity for correctly valuing increased catch" and has therefore expanded its use of the RUM method to include all study regions except the Inland region in the final 316(b) analysis. The Agency disagrees that its RUM approach is "unsuitable" for estimating recreational fishing benefits of the 316(b) regulation. For EPA's response to comments on the RUM method, please see responses to comment 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

Comment ID 316bEFR.041.047

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

The Conceptual and Empirical Bases of the Nonuse Benefit Estimates Are Flawed

There is considerable agreement that some people hold nonuse values, also referred to as existence or passive-use values, for some resources. Whether nonuse benefits should be included in a benefit-cost analysis is more controversial (Madariaga and McConnell 1987; Hausman 1993). Citing difficulties with contingent valuation (CV), EPA employs a benefits transfer approach for nonuse valuation. EPA cites Fisher and Raucher (1984) as well as Freeman and Sharma (1977) in stating that nonuse values should conform to a simple 50 percent (of use values) "rule of thumb." According to this approach, the theoretical existence of positive nonuse values justifies an approximation. The 50-percent rule of thumb approximation is based on an average of resources for which both use and nonuse values have been calculated.

However, EPA makes no effort to investigate the similarity of these situations to CWIS improvements. For example, because nonuse values do not depend on direct contact, concepts such as uniqueness, awareness, and the motives people may have for nonuse values are important factors in their determination. A cursory investigation indicates that the marginal improvements to fisheries being studied here are not likely to be unique or create substantial awareness. In addition, EPA's argument that nonuse values result from existence and bequest motivations is unconvincing. EPA provides few data or results to support effects that are not captured in use values. For this regulation, TER concludes that nonuse values are not zero but are likely to be negligible. Table 1.1 above includes nonuse values that are 10 percent of the combined use values, which reduces the EPA benefits estimates by 8.6 percent.

EPA Response

EPA agrees that many people hold non-use values for some resources, including fish lost to I&E.

The commenter suggests that the improvements expected from the rule are not likely to create substantial awareness. However, EPA notes that significant numbers of fish are expected to be spared from I&E and that only a small portion are valued in the commercial and recreational fishing analysis. (Please see EPA's response to comment #316bEFR.336.009 for a discussion of issues related to valuing the unlanded fraction of fish spared from I&E.)

The commenter also suggests that non-use values should be just 10% of combined use values and uses these values in calculating total benefits. But the commenter does not provide justification for this assumption.

EPA notes that the 50% rule-of-thumb is not used to estimated benefits for the final rule. For EPA's response to comments on the use of the 50% rule-of-thumb, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.041.048

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

EPA's Aggregation of Benefits to the National Level Uses Improper Statistical Methods Resulting in Biased Estimates

EPA developed an extrapolation method to estimate national benefits from the proposed Phase II rule and five regulatory alternatives. National baseline losses from I&E are estimated by extrapolating data from the facilities in the five case study areas to 539 in-scope facilities. Only a subset of these facilities is included in the actual aggregation, further limiting the size of the sample for estimating aggregate national benefits.

Moreover, several fundamental flaws in the EPA extrapolation methodology render the results unreliable. One of the biggest problems is the manner in which EPA chooses the case study facilities. EPA does not select a random sample of facilities for the case studies, which introduces a systematic bias to their results. EPA's grouping of the case study facilities into five waterbody types does not allow for variability of habitat, fish populations, and resulting I&E risk within a waterbody category. The habitat and respective I&E risk of the selected facility is applied to all in-scope facilities in that waterbody type, resulting in biased benefit estimates.

Additionally, EPA introduces a systematic bias into its results by computing estimated fish lost per million gallons per day (MGD) based on flow indices. Estimates are developed for each waterbody type based on an arbitrary selection of a facility within that type. The fish populations near that particular facility determine the magnitude of the estimates. These fish loss estimates are then applied to all facilities within that waterbody type regardless of the nearby fish populations.

Calculating a weighted average by waterbody type reveals the extent of the bias in these calculations. Although not all data are available, TER's preliminary calculations suggest that flaws in EPA's aggregation methods overstate benefits by more than 12 percent. See Appendix 8 for a more detailed explanation of EPA's procedure.

Finally, EPA's method of computing angling indices for each facility results in an overestimate of angling days due to EPA's lack of consideration of substitute fishing sites. Overestimating angling days leads to an overestimate of benefits. Again, EPA bases extrapolations on estimations of recreational catch from only one facility per waterbody type. A cursory examination indicates that the degree of bias is similar to that found in EPA's flow index extrapolation method. Heimbuch (2002) contains a more thorough critique.

EPA Response

For the cost-benefit analysis for the final 316(b) Phase II rule, EPA addressed many of the issues raised in this comment. More case study facilities were used. All facilities analyzed are included in the extrapolation. Extrapolations were made within regions rather than waterbody types, and were based on a variety of factors including flow. The angling indices was not used.

For details on EPA's response to comments on extrapolation methods, please see the response to comment #316bEFR.041.041.

Comment ID 316bEFR.041.049

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

EPA's Case Study Facilities are Unrepresentative from a Biological Standpoint

In Appendix 10 to these comments, Dr. Kyle J. Hartman of the Wildlife & Fisheries Department, Division of Forestry, College of Agriculture, Forestry, and Consumer Science of West Virginia University, assesses the biological validity of EPA's methods for baseline loss estimates at the case study facilities and the extrapolation to national estimates. Dr. Hartman did not include a critique of the validity of EPA's impingement mortality and entrainment loss estimates for individual facilities. Many of the companies whose facilities are the subject of those case studies will be submitting comments challenging those estimates.

Dr. Hartman identifies a number of problems with EPA's analysis. In each case study examined, Dr. Hartman finds potential violations of assumptions regarding suitability of extrapolation because of species, distribution, and abundance.

EPA Response

EPA wishes to point out that the purpose of its analysis was to develop a general estimate of the relative magnitude of I&E losses nationwide, and the costs of reducing those losses, not to develop precise estimates for individual facilities or particular fish species. Nonetheless, EPA took considerable care to identify the best life history information available for the species evaluated based on consultation with local biologists and review of both published and unpublished information. If there is a legitimate basis for other biologists to challenge the information obtained by EPA, it only points to the considerable uncertainty that exists concerning the "true" value of many fish life history parameters, including rates of growth and mortality of the early life stages most vulnerable to I&E. EPA used a regional rather than case study approach for the final rule.

Comment ID 316bEFR.041.050

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.03.01
Delaware

EPA Relies on Salem, which is Further Down-Estuary than the Other Facilities on the Delaware

First, EPA's extrapolation of data from the Salem facility to represent all in-scope facilities for the Delaware Estuary case study results in overestimates of entrainment and impingement impacts because of differences in organism distribution over the estuary, perhaps related to salinity. These differences in distribution for key species, such as bay anchovy, Atlantic croaker, and weakfish, show that abundances up-estuary from Salem are lower than at Salem. Since all other in-scope facilities are situated up-estuary from Salem, differences in distributional density between Salem (where the I&E estimates were generated) and the other in-scope facilities will result in lower availability of these species for possible entrainment and impingement. Thus, applying the higher I&E rates to the other in-scope facilities based on flow will overestimate the true impact of cooling water intake structures on the Delaware Estuary.

EPA Response

EPA's final analysis considers I&E for the entire mid-Atlantic region based on I&E data extrapolated from six facilities located throughout the region (Calvert Cliffs, Chalk Point, Morgantown, Salem Indian River and Indian Point). This study design was intended to capture the range of ecological conditions in this region. Please see response to Comment 316bEFR.041.041 for a discussion of EPA's regional extrapolation approach.

Comment ID 316bEFR.041.051

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.07.01

J.R. Whiting

J.R. Whiting Is Not Representative

Second, for the Great Lakes waterbody type, EPA used I&E data from the J.R. Whiting facility to represent all facilities on the Great Lakes. Available data indicate that J.R. Whiting is not representative of all, or perhaps even most, of the facilities in the Great Lakes waterbody type. J.R. Whiting is situated in the most productive section of the most productive of the Great Lakes, Lake Erie. Other things being equal, then, extrapolations from Whiting to other facilities will be biased toward higher impacts than a similar facility situated in areas with lower productivity. The size of this bias will vary from facility to facility, but there is no doubt that this is a serious error that overstates the I&E impacts for this waterbody type.

EPA Response

Please see response to comment 316bEFR.207.023, which addresses this issue.

Comment ID 316bEFR.041.052

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Organisms Are More Abundant Near Big Bend than Near Bartow

For the Tampa Bay case study, the key feature in EPA's extrapolation is the use of Big Bend I&E estimates to extrapolate to the Bartow facility. Available data suggest that water quality is lower (low dissolved oxygen and generally higher salinity) for the species affected by Big Bend. These differences in habitat quality (low dissolved oxygen) necessarily will result in lower abundances of organisms near the Bartow facility, which in turn will amount to lower potential I&E. Thus, extrapolation to Bartow will result in elevated estimates of I&E for the Tampa Case study and the waterbody type.

EPA Response

For its final analysis, EPA used a regional extrapolation approach, rather than a case study approach. I&E estimates for the Gulf Coast Region were based on other facilities in addition to Big Bend. Details of the Gulf Coast analysis are provided in Part F of the Regional Analysis Document (DCN # 6-0003). For additional information on EPA's regional extrapolation approach, please see Chapter A5 of the Regional Analysis Document and response to comment 316bEFR.041.041.

Comment ID 316bEFR.041.053

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.02

Ohio Watershed

The Ohio River Data EPA Used Are Out of Date

Similarly, the Ohio River Watershed extrapolations are plagued by a combination of antiquated data, spatial gaps in data, and an ill-conceived extrapolation methodology. The data used by EPA were collected in 1977-79, and many changes in fisheries abundance, composition, and associated vulnerabilities to cooling water intakes have occurred during the 25 years since then. Moreover, I&E data were available only downriver to river mile 560, yet EPA extrapolated the estimates from Clifty Creek downriver for 280 miles to the extent of the in-scope facilities. Thus, estimates from only one plant were expanded to approximately 25% of the length of the river. Any errors in the Clifty Creek estimates or violations of the assumption that Clifty Creek is unbiased are compounded by this reliance on Clifty Creek data and extrapolation over a large area. In fact, species abundance changes along the Ohio River. Hence, extrapolations of data from Clifty Creek to facilities downriver are invalid. Very high estimates of I&E at Clifty Creek for sucker spp. result in elevated estimates of loss of this species for the facilities in the 280 miles below Clifty Creek.

Estimates of smallmouth bass I&E in the case study also are biased high, due to a 193 river mile data gap between Kyger Creek and W. C. Beckjord. In this case, instead of using an average of I&E that was weighted by distance from the closest upstream and downstream plants, EPA used a weighted average from three plants situated downstream. Two of these three plants have the highest estimated impacts to smallmouth bass, much higher than for the other seven facilities. The use of these data to estimate impacts in the data gap zone results in biased high estimates of smallmouth bass impact for the case study. These high estimates then spill over into in-scope estimates for the Ohio River.

EPA Response

The extrapolation approach described by the commenter was not used for EPA's final analysis for the Phase 2 rule. For a discussion of EPA's extrapolation method for the final rule, please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and please see response to Comment 316bEFR.041.041.

Additionally, EPA notes that its analysis was constrained by the available facility-provided I&E data. EPA was not provided with I&E data for the downriver area referred to by the commenter. However, EPA notes that for the analysis of the Inland region for the final rule, which replaces the Ohio River case study presented at proposal, EPA based the regional extrapolation on a number of additional facilities (a total of 11 facilities, including Albany, WC Beckjord, Dickerson, Cardinal, Clifty Creek Kammer, Kyger, Miami Fort, WH Sammis, Philip Sporn, and Tanners).
The Inland analysis is described in Part H of the Regional Analysis Document (DCN # 6-0003).

As noted in EPA's Introduction and Chapter A5 of the Regional Analysis Document, the goal of EPA's analysis for the final rule was to develop I&E estimates for 7 regions throughout the country. Extrapolation was necessary because not all in scope facilities within a given region have conducted

I&E studies. (For more detail on the regional approach, please see Chapter C1 of the EBA -- DCN #6-0002) and EPA's response to Comment 316bEFR.041.041.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.05

Brayton Point

EPA Used Data Not Representative of Current Impingement and Entrainment at Brayton Point Station

In addition to the case studies evaluated by Dr. Hartman, it is clear EPA's loss estimates for Brayton Point are not representative. EPA used impingement and entrainment data collected prior to 1985 to calculate current losses attributable to Brayton Point. This approach is plainly incorrect and, because fish abundance has decreased significantly since 1984, results in a large overstatement of current losses.

As justification for refusing to base its analysis on current impacts, EPA offers two explanations: (1) it assumes that the Station should be responsible for possible future losses, and (2) it assumes that populations will recover to levels that existed several decades ago. <FN 25> These statements are without basis and are contradicted by statements in the preamble to EPA's proposed rule. For example, EPA states "[o]wners and operators may use existing data for the Study as long as it adequately reflects current conditions at the facility and in the waterbody from which the facility withdraws cooling water." 67 Fed. Reg. 17,143 col.1. Because fish abundance has declined since 1985 – for many reasons unrelated to Station operations – the numbers EPA used are not representative of current levels of impacts. EPA's failure to adjust the numbers to reflect the general decline in fish abundance in the area creates an upward bias in EPA's measurement of impingement and entrainment. Incredibly, on p. F3-1 of the case study, EPA claims that these inflated numbers may underestimate the true levels because the fishery was already in decline by 1984. This misleads the reader as to the impacts under consideration. There is simply no basis under § 316(b) for considering any impacts other than those that would be caused by the facility under present conditions.

Footnotes

25 EPA states in the Brayton Point Case Study (Page F1-2) that, in order to "evaluate the potential benefits of the proposed rule, EPA estimated expected I&E at Brayton Point under current (emphasis added) operations based on an analysis of I&E rates before the accelerated fish population declines that followed the 1984 conversion of Unit 4, as discussed in Chapter F3." Specifically, EPA compared current operations to a time series of I&E data for Brayton Point Station collected between 1974-1983. EPA points to its conclusions (page F3-1 of the case study) that fish populations in Mount Hope Bay currently are depressed well below historical levels as justification for the comparison (i.e., current operations to fish populations from several decades ago).

EPA Response

EPA disputes the commenter's claims about its evaluation of Brayton Point Station (BPS) I&E data. EPA only evaluated 1974-1983 data for this facility for several important reasons: (1) year-round entrainment sampling of all species began in 1972 and ended in 1984; BPS began entrainment monitoring again in 1993, but only for winter flounder, (2) 1984 and 1985 were not considered because of the use of "piggyback" cooling during some of this time, (3) Unit 4 did not go into service until 1974, so data from 1972 and 1973 were not included, and (4) this time period is prior to a dramatic decline in fish populations beginning in 1985. EPA believes all of these reasons justify its selection of data to evaluate for the purposes of estimating the total average annual I&E at BPS.

EPA believes that it is appropriate to assess I&E losses before the collapse of finfish stocks in Mt.

Hope Bay for several reasons. First, after extensive analysis, EPA Region 1 has concluded that operations at BPS have been a significant contributor to the collapse of Mt. Hope Bay fish populations. If the Agency had considered post-collapse data, which is also unavailable for most species, average annual I&E would have been underestimated. This, in turn, would result in biased estimates of the economic benefits of installing technologies to reduce I&E. Basing the evaluation solely on post-collapse data could lead to continuation of a serious downward spiral, where, as resources decline, the depleted resource is used as an economic justification for refusing to restore or protect those resources.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

EPA Has Consistently Chosen Higher-Impact Facilities

It appears, in fact, that in every case EPA chose to use the highest possible impact scenario for extrapolation. This appears to be true both in selecting for in-depth studies facilities that appear to be at the peak of biological activity and productivity for each waterbody type and in ignoring biological and distributional patterns that affect the validity of extrapolations. Although it appears that EPA attempted to place some bounds on impacts, this was not attempted until numbers of organisms affected already were computed. Thus, the “bounds” for the estimates are really based only on how much an additional unit of an organism may be valued. A better approach would be to use both liberal and conservative bounds for estimates made in generating numbers of organisms affected by cooling water intake structures.

EPA Response

EPA’s analysis does not include only high-impact facilities. See EPA's response to Comment 316bEFR.043.016.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

EPA Has Applied Multiple Conservatisms in its Case Study Analysis

EPA's Case Study Analysis demonstrate the potential for serious overestimations to result from multiple conservative assumptions. As discussed in an appendix to EPRI's comments prepared by Dr. Elgin Perry, a biostatistician, the application of multiple conservatisms in a multi-step analytical process can lead to an end result that is overly conservative, sometimes to the point of being clearly unrealistic. Dr. Perry examines the multi-step process EPA used to evaluate impingement and entrainment losses (and, thereby, the estimated benefits of the rule), and identifies the independent variables in each step. Dr. Perry also identifies a number of conservatisms applied by EPA that, in his opinion, "push [the] estimated benefits off the scale of realism." Those conservatisms include:

1. setting entrainment and impingement survival to zero;

2. not using models that employ compensatory mechanisms when estimating equivalent adults;

3. estimating production by life-stage categories using constant mortality and growth within life stages;

4. summing direct (e.g., loss of commercial/recreational fish) and indirect (e.g., loss of forage fish) losses;

5. estimating use-based benefits on the basis of replacement costs rather than on the basis of increasing the value of the resource; and

6. estimating non-use benefits as a multiplier of use-based benefits when quantification of these benefits is very uncertain.

UWAG supports Dr. Perry's conclusion that these multiple conservatisms result in an overly conservative estimate of impingement and entrainment losses for the case study facilities.

EPA Response

See response to Comment 316bEFR.074.201 on the question of "multiple conservatisms."

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

EPA Has Not Adequately Explained How it Used the Case Studies to Estimate the Benefits of Regulatory Alternatives

The preceding comments, and the comments EPA will receive from several companies whose facilities are the subject of the case studies (many of which are UWAG members), detail numerous flaws in EPA's assessment of biological losses from existing power plants and the economic value of those losses. In addition to these serious problems, it is far from clear how EPA used the case study information to develop estimates of the benefits of various regulatory alternatives for reducing impingement mortality and entrainment at existing facilities.

In Chapter C4 of the Phase II EBA, EPA presents its estimates of the potential benefits from each of seven regulatory options (including the proposed rule):

-Option 1: Track I of the waterbody/capacity-based option

-Option 2: Tracks I and II of the waterbody/capacity-based option

-Option 3: The proposed rule

-Option 3a: Impingement and entrainment controls everywhere, without exception

-Option 4: Use of closed-cycle cooling everywhere

-Option 5: Use of dry cooling for larger facilities in estuaries, tidal rivers, and oceans

-Option 6: Similar to Option 1, but requires closed-cycle cooling for all facilities, regardless of their capacity, on estuaries, tidal rivers, and oceans.

See also Phase II EBA A1-6. Based on its descriptions in Phase II EBA Chapters C4 and A1, EPA apparently used a multi-step approach for assessing the expected benefits from each regulatory option. As to each step, UWAG has questions about the validity of EPA's analysis and the legitimacy and consistency of the assumptions it made.

First, EPA assumed compliance responses for the 539 in-scope facilities. Specifically, EPA made assumptions regarding which facilities within each waterbody type would elect (or be required) to implement one of four types of technology:

1. Impingement mortality controls only (which EPA assumed (i) would involve retrofitting adding fish returns and (ii) would meet its performance standards in all cases);

2. Impingement controls and entrainment reductions controls (which EPA assumed (i) would involve retrofitting fine mesh traveling screens and fish returns and (ii) would meet EPA's performance

standards in all cases);

3. Reduction of intake flows commensurate with closed-cycle, recirculating cooling systems; or

4. Reduction of intake flows commensurate with dry cooling systems.

A summary of EPA's assumptions regarding compliance responses (i.e., the number of in-scope facilities, from among the total of 539, that would elect (or be required) to implement each technology type under each regulatory option) is presented in Phase II EBA Table A1-1, p. A1-9. At the end of that table, EPA cites as the basis for those totals the data provided in Appendix A of the Phase II TDD, which lists, among other things, each of the 539 "model" plants, its waterbody type and flow, whether or not retrofitting would be required, and, if so, what technology EPA assumed would be required if the proposed rule were adopted.

But the values in Appendix A of the Phase II TDD do not appear to support the numbers presented in Phase II EBA Table A1-1. For example, Table A1-1 says that, for Option 4 (the proposed rule), 241 facilities would need to install impingement controls only and 229 facilities would need to install impingement and entrainment controls. A manual count of the data in Appendix A indicates that, based on the technology EPA has assumed would be retrofitted, the number of facilities required to retrofit (and therefore the expected net reductions in impingement mortality and entrainment) would be far lower than EPA has assumed. According to Appendix A:

(1) 155 (not the 241 facilities EPA estimated) would be required to retrofit only impingement controls (i.e., fish handling and return systems); and

(2) Of the 189 facilities that Appendix A indicates would be required by the proposed rule to have both impingement and entrainment controls,

(a) 58 already have impingement controls and thus would be required to retrofit only entrainment controls, and

(b) Only 131 facilities would be required to retrofit both types of controls (both fine mesh screens and fish handling/return systems).

Second, for each facility and applicable technology type (i.e., the technologies EPA assumed a facility might implement, as discussed in step (1), EPA estimated the percent to which it expected those technologies to reduce the "baseline" impingement mortality and entrainment it had estimated, as described above, by extrapolation from limited case studies:

The percent reduction in baseline losses for each facility reflects EPA's assessment of (1) regulatory baseline conditions at the facility (i.e., current practices and technologies in place), and (2) the percent reductions in impingement and entrainment that EPA estimated would be achieved at each facility [by the technology] that the Agency believes would be adopted under each regulatory option.

(Phase II EBA Chapter C4, page C4-1 [likely correction to apparent typographical error].)

Although EPA does not provide any specific percentages, it says that for purposes of estimating benefits it assumed that all technologies “would be operated at the maximum efficiency assumed by EPA in its estimates of technology effectiveness.” Phase II EBA, p. C1-6. To the extent these percentage reductions are not achieved, EPA goes on to say, the benefits will be lower.

As EPA has made clear in its own proposal and supporting documents, all the technologies – even closed-cycle cooling <FN 26> – have a range of performance that varies from site to site and even within species and life stages at a given site. Indeed, for that very reason, EPA has proposed to express the performance standard as a range. It therefore seems at best disingenuous to claim that the benefits of this rule can be characterized based on the highest possible percentage reduction (which may have been 90%-95% – EPA never says) across all sites, all species and all life stages.

Third, EPA then took those facility values and, for each waterbody type, estimated the overall (i.e., overall in-scope facilities within the waterbody type) percent reduction in entrainment and impingement that it expected would result from implementing the regulatory option. EPA estimated the overall percent reductions as “flow weighted average reductions across all facilities in each water body category for each regulatory option” (Phase II EBA Chapter 4, page C4-1). EPA presented its estimates of overall percent reduction for impingement and entrainment in Phase II EBA Tables C4-1 and C4-3, respectively. (Note that Table C4-3 contains obvious typographical errors in the column under “Option 6,” which contains entries in dollars rather than percents, and refers to “impingement reductions.”)

Fourth, for each waterbody type, EPA appears to have estimated the potential national benefits of the regulatory option by multiplying EPA’s national baseline economic loss estimate times EPA’s estimate of the expected overall reduction in impingement and entrainment for the regulatory option:

Using the national baseline loss estimates reported in Chapter C3: National Extrapolation of Baseline Losses, EPA estimated the potential benefits of each regulatory option by applying a set of estimated percent reductions to baseline losses.

(Phase II EBA Chapter C4, page C4-1). EPA presented its estimates of potential benefits from impingement and entrainment for each regulatory option in Phase II EBA Tables C4-2 and C4-4.

With respect to steps 3 and 4 above, EPA simply has not provided enough information from which we can deduce how it arrived at its numbers. We request that EPA present in the NODA a breakdown of the data it used and the assumptions it made by facility and waterbody type.

Footnotes

26 Although EPA does not in this rulemaking discuss the reduction in flow that it expects cooling towers to achieve, in the proposed Phase I rule, it opined that cooling towers used at new facilities would reduce design flow by 96% to 98% in freshwaters and 70% to 96% in saline waters. 67 Fed. Reg. 49,060, 49,087 (Aug. 10, 2000). As UWAG points out elsewhere in these comments, the extent of reduction in actual flows (versus design flows, which EPA’s own data suggest many existing facilities are well below (see Phase II TDD, p. 2.39, Figure 2-1)) likely would fall considerably below these optimal percentages. Even more important, as we discuss elsewhere in these comments, a reduction in flow will not necessarily translate into a corresponding, linear reduction in the percentage of entrained organisms and are even less directly correlated with reductions in impingement. See also UWAG 2000 Phase I Comments, pp. 108-18.

EPA Response

For impingement and entrainment separately, EPA estimates the overall percentage reductions in a

region by calculating the following for each facility:
expected % reduction at facility * % of total regional flow at facility.

This value is summed across all facilities in a region to calculate the overall % reduction expected in the region.

To estimate the total benefits in each region, the estimated current losses are multiplied by the expected overall % reduction. This calculation is performed separately for impingement and entrainment.

To generate a national estimate of impingement and entrainment reductions associated with the various frameworks considered for today's final rule, EPA evaluated data collected from the Detailed Industry Survey and the Short Technical Survey and made general assumptions about the control technologies, if any, a facility had in place. EPA used benchmark values of 80 percent for a reduction in impingement mortality and 60 percent for a reduction in entrainment and assumed this base level of performance for all facilities operating an acceptable technology. EPA cautions that the estimates made for each individual facility in the national aggregate may not reflect the true nature of impingement and/or entrainment reductions, if any, occurring at a particular facility. EPA did not have the level of detail required to develop a more accurate profile for each individual facility. EPA believes, however, that the national benefit estimates are an accurate assessment of the overall scope of benefits that will be achieved by the selected option.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

EPA SHOULD SUBSTITUTE A SIMPLER REGULATORY APPROACH THAT ACCOUNTS FOR THE ACTUAL PERFORMANCE OF EPA'S RECOMMENDED TECHNOLOGIES

A. A Simpler, Alternative Approach Would Work Without Resort to Numerical Performance Standards

UWAG, as explained above, prefers a § 316(b) rule that is based on a reasonable, population-level definition of AEI and allows a permittee to undertake a detailed assessment of the site-specific factors that determine entrainment and impingement losses, like the UWAG or the PSEG proposals discussed in Section III above.

Instead, EPA's proposed approach reflects generic performance standards (80-95% reduction in impingement mortality, 60-90% reduction in entrainment) based on four impingement control technologies and three entrainment control technologies:

Impingement Mortality

1. Fine and wide mesh wedgewire screens

2. Aquatic filter barrier systems

3. Barrier nets

4. Modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems

Entrainment

1. Aquatic filter barrier systems

2. Fine mesh wedgewire screens

3. Fine mesh traveling screens

As noted above, UWAG agrees with EPA that these can be highly effective technologies and are capable of achieving appreciable reductions in impingement mortality and entrainment in those cases where they are practicable to deploy. But proving that one of them will achieve a certain numerical reduction that cuts across all aquatic species and life stages, as the performance standards appear to require, may prompt development of more biological data and more analysis than is warranted. Moreover, meeting the numerical reduction standards may not be possible at some sites either because hydrological conditions are not present for technological effectiveness or due to species sensitivity.

Assuming that EPA nevertheless chooses to follow a technology-based approach, the Agency should substitute for the current proposal a simpler approach that would require evaluation of the same technologies that underlie the numerical performance standards but would not impose those standards as the per se measure of performance or necessarily require proof of a numerical reduction in impingement mortality and entrainment. This alternative would require only that the permittee analyze (using site-specific data as necessary) the EPA recommended <FN 27> technologies on which the performance standards are based. From this analysis, the permittee would identify, from among those feasible for the site, the one that most cost-effectively reduces impingement mortality and, where applicable, entrainment <FN 28> at the site. The overall level of impingement mortality or (where required) entrainment reduction achievable by this most cost-effective technology would then become the basis for evaluating any alternative technologies or voluntary restoration proposed by the permittee, or for application of the cost-cost or benefit-cost tests.

As discussed below, the approach would need to include appropriate provisions for site-specific determinations based on cost and benefit considerations. It also would need to give permittees appropriate credit for the CWIS technologies (including siting) which they already have installed and encourage innovation by authorizing the use of alternative, equivalent technologies or voluntary restoration.

There is no legal reason why a technology-based regulation under § 316(b) has to have numerical standards. Section 316(b) itself requires that adverse environmental impact be minimized but does not require numerical standards for "impacts" or numerical reductions in impingement mortality or entrainment. Even if EPA does include a numerical standard in the regulation, nothing in the Clean Water Act prohibits the number from being used as a goal or benchmark rather than a binding limit. Moreover, even if a numerical goal is written into an NPDES permit, there is no legal reason why the number cannot be used only as a trigger for additional monitoring or analysis rather than for creating an enforceable noncompliance. Finally, there is nothing to prevent EPA from writing a regulation that, without setting numerical limits, requires a permittee to operate and maintain intake technology in an appropriate way.

Footnotes

27 UWAG uses the terms "EPA-recommended" or "EPA-approved" only as shorthand to refer to the technologies, named in the preamble to the proposed rule, on which EPA bases its performance standards. UWAG does not mean to imply that EPA has "approved" these technologies in any formal sense or to tie EPA to any particular technology.

28 For purposes of this discussion, UWAG will refer to "entrainment reduction," because that is what EPA's proposal currently requires. As we argue elsewhere in these comments, however, UWAG believes firmly that any final rule should focus on entrainment mortality, just as it does on impingement mortality.

EPA Response

EPA agrees that the CWA does not require § 316(b) requirements to be expressed as numeric standards. EPA further agrees that § 316(b) standards, when numeric, can function as goals. The TIOPs authorized in today's rule are non-numeric requirements that use the performance standards as prompts for adaptive management and optimization. EPA is not adopting the exact approach suggested by the commenter, but has provided ample flexibility in the final rule. Please refer to the response to comment 316bEFR.019.014.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

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Option 2--Implement performance requirements

This Alternative Approach Would Select the Most Cost-Effective Technology

Before deciding which of the EPA-approved technologies to install, the permittee would have to analyze site conditions and satisfy the permit writer that the selected technology was likely to be effective at the site. EPA could help by issuing guidelines on what site conditions make one technology preferable over another. Wedgewire screens, for example, are not as effective where there is inadequate flow.

Also, the permittee would have to look at both engineering data and biological data to determine which of the technologies would achieve the most cost-effective reduction in impingement and, if necessary, entrainment. This analysis should focus on the technology that is the most cost-effective at protecting the species and lifestages that are of most concern at the particular site (the Representative Indicator Species (RIS), in other words). Like the numerical performance standards, the most cost-effective recommended technology approach would require the permittee to assess how much protection to indicator species each technology would achieve. But this would require in most cases less biological data than currently required for the baseline calculation.

This alternative approach would permit the permittee simply to install the most cost-effective of the intake technologies (wedgewire screens, etc.) that EPA bases its performance standards on. The NPDES permit would not contain a numerical limit on the number or mass of fish entrained or impinged or on the percent reduction, but the commitment to install, operate, and maintain an approved technology would be enforceable. Once the permittee had installed the approved technology, his continuing obligation would be to verify periodically that he was properly maintaining and operating the technology. For example, the permittee might be required to inspect intake screens regularly to make sure they were not clogged or damaged. <FN 29>

With time, newer intake technologies could be approved and added to the “toolbox.” Meanwhile, research studies should be conducted to investigate new technologies under different site conditions. If such an approved technology was installed and properly operated, the presumption would be that the § 316(b) rule, and § 316(b) itself, were satisfied. It would be far better policy to spend resources on testing intake technologies under various conditions than on after-the-fact monitoring to show numerical reductions in the mass or the individual counts of fish or eggs impinged or entrained.

Of course, in some cases, none of the five recommended technologies will be feasible for the site or capable of achieving reductions at an appropriate cost. <FN 30> UWAG believes it remains essential to include in the rule provisions for selecting BTA on a site-specific basis, using appropriate cost-cost and benefit-cost tests that would work as described elsewhere in these comments. Due to the site-specific factors, for some facilities to achieve a significant reduction, the cost to construct and operate the most cost-effective recommended technology may be greater than the costs EPA considered (e.g., extensive dredging and dredge spoil disposal may be required) or the benefit in terms of impingement or entrainment may be far less than the construction, operation, and maintenance costs of the technology.

Footnotes

29 Of course, if a facility that installed an EPA-recommended technology undertook a significant design or operational change that affected the CWIS, it would be appropriate to revisit the BTA determination at that point.

30 According to EPA, the appropriate cost is one not significantly greater than the technology costs EPA considered or than the benefits of the technologies' application at a particular site. With respect to comparison of costs and benefits, UWAG elsewhere in these comments urges a more sensible, defensible test, rooted in economics – that is, costs that maximize net benefits.

EPA Response

EPA is not adopting the exact approach suggested by the commenter, but has provided ample flexibility in the final rule. Please refer to the response to comment 316bEFR.019.014.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

The Simpler, Alternative Approach Would Be Crafted to Account for Existing Controls and Foster Innovation

Provision also would need to be made for existing facilities which already have impingement mortality or entrainment control, as EPA's proposal recognizes. This need not be cumbersome. Only where a permittee wished to account for reductions in impingement or entrainment achieved by existing CWIS technologies would it need to evaluate which of the technologies was most effective for its facility if one assumes it had a basic CWIS configuration (that is, a shoreline intake structure without any without impingement or entrainment controls). At such a site, the adequacy of technologies or other alternatives offered by the permittee would be evaluated against the estimated overall performance of the most cost-effective EPA-recommended technology, as applied to a basic configuration. This would be the overall target reduction level. Such an approach is very similar to the type of analysis EPA's proposal would require.

In this way, the cost-effective approach should allow a permittee to show that some new or different technology – or the location of its intake in a place where entrainable and impingeable organisms are not much found (such as an oxygen-deficient part of the waterbody) – provided protection comparable to the level achieved by the most cost-effective of the EPA-approved technologies. This would encourage innovation and recognize that a suitable "location" can satisfy § 316(b) without elaborate technology.

Thus, if the permittee was able to show that the existing location and technology of the intake was likely to be as effective as the most cost-effective of wedgewire screens, fine mesh screens, and aquatic fiber filters at a site, then no additional protection would be required. Again, there would be no numerical limit in the permit for a percentage reduction, and, again, the permittee would have to verify periodically that it was operating the alternative technology properly. Also, because the permittee would not be using one of the EPA-recommended technologies, the permit writer could choose to require some appropriate amount of biological monitoring to evaluate the technology's actual effectiveness. However, if the permittee demonstrated that intake location alone was achieving equivalent protection, no further verification would be necessary; at most, the permittee should be required to verify every 10 years that nothing about the waterbody had changed that would render the chosen location significantly less protective than it had been in the past.

EPA Response

EPA is not adopting the exact approach suggested by the commenter, but has provided ample flexibility in the final rule. Please refer to the response to comment 316bEFR.019.014.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

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Option 2--Implement performance requirements

UWAG's Simpler, Alternative Approach Has Numerous Benefits

The simpler approach UWAG advocates would have a number of benefits. First, it would encourage development and application of EPA's recommended technologies, as the Agency desires, while at the same time more accurately reflecting the site-specific factors that determine performance. Second, it would be flexible enough to foster innovation. Third, it would provide the technology template which EPA believes is needed to simplify and expedite the BTA selection process for State and federal permit writers, thereby conserving resources. Fourth, by not arbitrarily constraining the range of performance that can be considered, ignoring the inevitable trade-offs among different species and life stages, or gauging performance by reference to an inflexible numeric standard, it would avoid contentious debates over the "right" performance standard. Fifth, it would better ensure environmental protection and allow for informed public participation, because it would focus on real technology capability, not a generic number. Sixth, it would avoid unnecessary compliance monitoring and conserve future permitting resources by focusing on tools for gauging proper operation and maintenance, rather than inflexible numeric standards that could only be fairly interpreted and applied after collection and careful interpretation of significant data that accounts for natural variability.

EPA Response

EPA is not adopting the exact approach suggested by the commenter, but has provided ample flexibility in the final rule. Please refer to the response to comment 316bEFR.019.014.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

EPA's 5% Mean Annual Flow Is Not Supported by the Record

To support its proposal to require Phase II facilities on freshwater rivers and streams to meet standards for entrainment control, EPA claims that (1) such a CWIS otherwise would entrain more than 5% of the organisms in its vicinity and (2) EPA believes that is unacceptable. 67 Fed. Reg. 17, 151 col. 2. EPA's reasoning is baseless for several reasons.

First, EPA's claims necessarily assume that all organisms in the vicinity of the CWIS are evenly distributed (otherwise, the relative flow withdrawal would not be a good predictor of the relative magnitude of entrainment). As UWAG showed in its comments on the proposed Phase I rule, uniform organism distribution within the water column does not always occur and tends to be a conservative assumption. UWAG 2000 Phase I Comments, pp. 111-12.

Second, EPA seems to assume that all organisms in the vicinity of the CWIS will be subject to entrainment. This too is false. Only organisms of an entrainable size – usually very early life stages – will be at risk of entrainment. These are precisely the organisms that tend to have very high natural mortality and, thus, would not survive anyway even if the intake were not present.

This relates to EPA's third assumption, namely that entraining 5% of the entrainable-sized organisms would be "unacceptable." EPA offers no analysis either of the value of the entrained organisms per se or the effect, if any, such losses have on the larger population. Absent any attempt to assess these key questions, UWAG believes EPA has no basis for selecting a 5% threshold or any other across-the-board threshold that would trigger additional requirements. EPA has made an arbitrary and unsupported choice which is likely to impose enormous costs for very little real gain. EPA cannot explain in any meaningful qualitative or quantitative terms why 5% is more unacceptable than, say, 4.8%, and why a larger percentage – say 10% – would not be just as acceptable. In fact, as UWAG's Phase I comments showed, many rivers support excellent fisheries despite much higher percentage flow withdrawals.

To support this threshold, EPA also points to its discussion in the Phase I Notice of Data Availability (NODA), concerning the proposed 5% relative flow design criterion that the Agency has now adopted as a "technology" criterion for new facilities. 67 Fed. Reg. 17,151 col. 2. Of course, unlike the Phase II proposal, in the new facility rule the 5% criterion was used as a separate design requirement, not a trigger for application of entrainment controls. In its comments on the NODA, UWAG showed that the 5% criterion was extremely conservative and could be justified only as a screening criterion. UWAG Phase I NODA Comments.

EPA nevertheless chose to adopt it principally (it appears from EPA's Response to Comments) because it would further reduce effects and because the Agency thought most new facilities could meet it. It concluded this, according to the Phase I proposal, because it did a study of existing facility and found that 89% of existing non-nuclear facilities would fall at or below the threshold if they installed wet recirculating cooling towers. 65 Fed. Reg. 49,086 col. 1. If anything, this demonstrates the widespread effect EPA's proposed 5% threshold will have on Phase II facilities.

EPA Response

Please see response to comments 316bEFR.099.018 and 316bEFR.063.005.

Comment ID 316bEFR.041.063

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Permittees Should Be Able to Choose Between Applying EPA's 5% Mean Annual Flow Threshold and a 5% Flow Test When Organisms Are Vulnerable to Entrainment or Impingement

A facility must meet the 60-90% entrainment reduction standard if, among other things, its design intake flow is greater than 5% of the mean annual flow of a freshwater river or stream. Proposed § 125.94(b)(3), 67 Fed. Reg. 17,221 col. 2. The mean annual flow standard is highly conservative as a regulatory standard, and in some cases a permittee may be able to justify a different measure that is still conservative but more biologically appropriate. For instance, the permittee may have collected data to show the period of time when the most vulnerable RIS is present. If the permittee can show that the facility's design intake flow is less than 5 percent of the river or stream flow during the biologically appropriate time, the facility should not have to meet the entrainment performance standard. The permittee, based on available data and information, should choose between the 5% mean annual flow test and a similar test applied when entrainable organisms are present. Both tests achieve the objective of exempting facilities from entrainment reduction only when their likely impact is minimal.

EPA Response

EPA has retained in the final rule the 5% threshold based on design intake flow, rather than actual flow, for several reasons. Design intake flow is a fixed value set based on the design of the facility's operating system and the capacity of the circulating and other water intake pumps employed at the facility. This allows a clear and timely classification of facilities. The design intake flow does not change, except in those limited circumstances when a facility undergoes major modifications or expansion, whereas actual flows can vary significantly over sometimes short periods of time. EPA believes that an uncertain regulatory status is undesirable because it impedes both compliance by the permittee and regulatory oversight, as well as achievement of the overall environmental objectives. Further, using actual flow may result in the NPDES permit being more intrusive to facility operation than necessary since facility flow would be a permit condition and adjustments to flow would have to permissible under such conditions and applicable NPDES procedures. It also would require additional monitoring to confirm a facility's status, which imposes additional costs and information collection burdens, and it would require additional compliance monitoring and inspection methods and evaluation criteria, focusing on operational aspects of a facility.

The 15% Capacity Utilization Rate Threshold Needs to be Clarified

A facility must meet the entrainment reduction standard if, among other things, it has a "capacity utilization rate" of 15% or greater and withdraws its cooling water from a tidal river or estuary, an ocean, or one of the Great Lakes. See proposed § 125.94(b)(3), 67 Fed. Reg. 17,221 col. 2, 17,153-54. Typically, the capacity utilization rate is judged on a unit-by-unit basis, not for a facility as a whole. This is because different units at a facility may have different capacity utilization rates. For example, it is not uncommon for a facility to include one or more baseload units, along with one or more peaking units. EPA does not explain how it intends each permittee to arrive at a capacity utilization rate for the whole facility. Neither does it explain how it decided what the net capacity utilization rate was for the in-scope facilities, for purposes of determining which would need entrainment controls. Presumably, EPA used some sort of average or mean, but exactly what it did it does not reveal. Obviously, EPA needs to explain what it did and propose what it intends Phase II facilities will do to make this calculation.

Equally important, EPA should consider whether to treat all units at a site as part of the facility for purposes of this calculation, even if one or more units operating at or below 15% capacity utilization are served by separate intakes. UWAG submits that EPA has not likely considered the costs of requiring such separate retrofits and, therefore, should clarify that in such circumstances the peaking unit is not subject to entrainment controls.

1. Low-Capacity Facilities Should Be Allowed to Show that They Operate Only When Representative Organisms Are Not Vulnerable

Plants that do not fall below the 15% threshold nevertheless should be allowed to show, on a site-specific basis, that their periods of operation each year do not overlap with the times that entrainable species of concern are vulnerable to entrainment.

2. A Facility Should Get Credit for Legal or Practical Limits on Capacity Utilization

If a facility's capacity utilization rate is limited as a practical matter, then the facility should be deemed to have a capacity utilization rate no greater than the practical limit dictates. Also, if the permittee agrees to limit its capacity utilization to below the threshold (15% in EPA's proposal), either by agreement with the permitting authority or by permit condition, then the facility should be deemed to be below the threshold.

3. EPA Should Use DOE's Definition of Capacity Utilization Rate

For calculating the "capacity utilization rate," EPA should make sure it is consistent with DOE's calculation method. Because electricity is not easily stored, power plants follow the load across demand cycles. Maloney 2000. Capacity utilization can be captured empirically in two ways. One is generation relative to capacity when a unit is connected to the system. The other is the percent of time the unit is disconnected. EPA needs to consult with DOE to ensure consistency between the two agencies.

EPA Response

The Agency has allowed for facilities to calculate capacity utilization rates on intake-specific bases when the generating unit and intakes can be isolated. Hence, the commenter's recommendation on this matter has been met.

The Agency has not allowed for intakes/facilities that do not fall below the 15 % threshold to "qualify" for the reduced requirements of the threshold. The Agency has, however, allowed for facilities in the demonstration of compliance to account for strategic flow reduction (i.e., strategic operation to minimize the potential to entrain species of concern in high densities and vulnerable life stages) in the calculation of their entrainment reduction.

The Agency has allowed for facilities to make agreements as part of their permit to not operate an intake/facility above the capacity utilization threshold for the projected period of the permit. Hence, this recommendation from the commenter has been met.

If a facility's capacity utilization rate is limited as a practical matter, then the facility will be able to show that it has a historically low capacity factor or agree to not operate above a future projecting agreement in their permit. Hence, the commenter's concerns have been met.

The Agency has ensured that the final rule's definition of capacity utilization is consistent with the Department of Energy, Energy Information Administration's definition of capacity utilization to the extent possible. Both definitions agree that the basis for the definition is generation relative to capacity when a unit is connected to the system. As such, the commenter's recommendation has been met.

Comment ID 316bEFR.041.065

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Rarely Used Emergency Service Water Should Not Count Toward the 50 MGD Flow Threshold

The "existing facilities" to which the proposed rule would apply are facilities with a design intake flow of 50 million gallons per day (MGD) or more. Proposed § 125.91(c)(4), 67 Fed. Reg. 17,220 col. 2. In applying this 50 MGD threshold, EPA should distinguish between ordinary cooling water intakes and emergency service water intakes. An emergency service water intake may operate only a few hours each month, enough to ensure that it stays in working order. It may have a capacity greater than 50 MGD, but the design flow of an intake that is used only rarely should not be counted in determining whether a facility is subject to the § 316(b) rule.

EPA Response

Please see response to comment 316bEFR.041.202.

Comment ID 316bEFR.041.066

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

EPA NEEDS TO CLARIFY HOW THE PERFORMANCE STANDARDS (PERCENT REDUCTIONS) WOULD BE MEASURED

Although EPA's proposed rule is less suitable than the UWAG and PSEG proposals discussed above in Section III, or the simpler alternative described in Section VI, it may serve as a suitable framework for § 316(b) decisions if certain changes are made. This Section VIII recommends specific ways in which EPA's proposed performance standards should be changed and clarified, if they are kept in the rule.

A. EPA Should Provide Guidance on Determining the "Calculation Baseline"

EPA's proposed rule defines an intake structure, which at many sites will be a hypothetical one, to serve as the "baseline" from which impingement/entrainment reductions are measured. This "calculation baseline" is defined as a "shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls." Proposed § 125.93, 67 Fed. Reg. 17,220 col. 3. Some existing facilities do not have shoreline intakes – for example, river plants with main channel submerged intakes, estuarine or oceanic plants with submerged intakes, plants with intakes angled out from the shoreline, and plants with intake canals. These facilities, and others that do have shoreline intakes but have already installed impingement/entrainment reduction technology, will have to evaluate what the plant's impact would be if it had been designed or situated differently.

The concept of the calculation baseline starts from a good premise: existing plants that already have reduced their potential impact, either by location of the intake or by design features, should get credit for the reductions. It would be unfair to penalize facilities that reduced impacts early by requiring them to meet the rule's performance standards using the already-improved intake as the baseline from which more reductions must be made.

However, EPA needs to provide better guidance on how to measure the baseline level of impingement mortality and entrainment. For entrainment, egg and larval densities in the nearfield of the hypothetical intake should provide a basis for estimating baseline impacts, since entrainable organisms tend to behave like passive particles, particularly at early life stages. (This approach has been used by the mid-Hudson plants and is known to work.) Of course, life history information would need to be used to ensure that monitoring programs capture predictable spatial variations in density (such as behavioral factors that might cause densities of some species to vary over time or within the water column). But determining the baseline will be harder for impingement.

Also, fluctuations of fish populations over time will complicate the baseline calculation. Populations vary from year to year based on natural conditions. A baseline population value should be based on more than one year of data, or else adjusted to account for natural population fluctuations.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.041.067

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

For Entrainment, EPA Should Develop an "As Built" Alternative to the Calculation Baseline

In order to avoid the problem of fluctuation over time and the uncertainty of estimating the effect of a hypothetical intake, for entrainment alone UWAG recommends that the calculation baseline be supplemented with an optional alternative approach. A facility that chooses this option should be allowed to install a technology (wedgewire screens, for example) and then measure the amount of entrainment with the new technology by recording the number or mass of eggs and larvae found at the discharge point after passing through the plant. To determine whether this entrainment was 60-90% less than before, it could be compared to one of two measures: (1) the number or mass of entrained organisms at the outfall before the technology was installed (for facilities that have records of such "before" entrainment) or (2) simultaneous entrainment sampling in the nearfield of the intake. In other words, the "baseline" would be either actual historical measurements of entrained organisms before the new intake technology was installed, or else measurements of entrainable organisms at the intake at the same time that entrained organisms are sampled at the outfall.

-This can be called the "as built" approach. Its potential benefits include the following:

-The facility assumes the risk of proving that the technology will perform as anticipated;

-Facilities install new technologies sooner than they would under the "calculation baseline" approach because pre-deployment studies are not necessary; and

-The "baseline" numbers are actual samples of entrained or entrainable organisms.

For entrainment, facilities should be free to choose either EPA's calculation baseline approach (with its accompanying sampling and analysis regime) or the "as built" approach outlined above.

The "as built" approach, however, is not appropriate for impingement. Impingement is highly species-specific and life stage-specific, and in most cases there will be no reliable way to measure "impingeable" organisms by sampling near the intake. To apply the performance standards to impingement, it is necessary to have data from before the new intake technology was deployed. The "baseline" (pre-deployment) impingement numbers then can be compared to the post-deployment numbers to calculate the percent reduction in impingement mortality.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.041.068

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

The Calculation "Baseline" Needs to Be Better Defined

In addition to supplementing the calculation baseline approach with the "as built" approach outlined above, EPA needs to refine the definition of, and methods for measuring, the calculation baseline. First, EPA should amend the definition of "calculation baseline" by clarifying that the baseline plant should be assumed to be equipped with standard 3/8-inch mesh screens. <FN 31>

Second, the preamble to the proposed rule says that the calculation baseline could be estimated by evaluating existing data from a nearby facility. This should be written into the rule itself, and the facility need not be "nearby" or necessarily on the same waterbody. What matters is how closely comparable the environmental conditions that drive entrainment or impingement are likely to be. A permittee should be able to use data on fish or larvae abundance from power plants in similar locations and impacting species similar to its own to determine how much impingement mortality and entrainment there would be with no reduction controls. On a free-flowing river, a permittee should be allowed to do upstream studies near the intake to predict baseline impingement mortality and entrainment. UWAG acknowledges, however, that where impingement is concerned, site-specific differences are important. Impingement data from one site should be used for another site only with caution, and only where there is good reason to judge that the one site is representative of conditions at the other.

Third, EPA should be flexible in allowing use of data that are some years old. For a facility that has made improvements to its intake over the years, data most representative of a "baseline" condition with no impingement or entrainment reduction controls may be data collected years ago. EPA should not disallow such data just because they are not recent. So long as data are scientifically sound and reasonably representative of the condition one is trying to characterize (a "baseline," in the present example), they should be usable.

Fourth, in cases where the actual facility has an intake at the end of a cooling water intake canal instead of at the shoreline, the permittee should be allowed to use as the baseline either a hypothetical shoreline intake or the actual intake. It is possible that, in some cases, an intake canal might attract fish or provide a protective habitat and thus be more suitable baseline against which to determine reduction than a hypothetical shoreline intake. EPA should provide that permittees may, if they choose, calculate the reduction in impact from new technology measured against the as-built intake rather than a hypothetical shoreline intake.

As for the location of the hypothetical "baseline" intake at the shoreline, in cases in which it does not actually exist, the permittee should be allowed to choose the location of the hypothetical shoreline intake, so long as the location is one where an intake might have been placed in the exercise of sound engineering judgment, without regard for fish protection.

Fifth, in setting the baseline for impingement, the permittee should either (1) select the RIS, as suggested in UWAG's Decision Principles, or (2) use the entire number (or mass) of animals lost by impingement under baseline conditions. A choice of methods is necessary because demonstrating a 80-95% reduction in impingement mortality for compliance purposes will present different problems for different species and sites.

Sixth, EPA should leave flexibility in what kind of data can be used to calculate "baseline" at sites where a shoreline intake with no impingement or entrainment reduction controls does not presently exist and may never have existed. Since the permittee in such cases must deduce the level of entrainment and impingement mortality at a hypothetical intake, some considerable uncertainty is inevitable. Since it may not be possible to collect empirical data that show the level of impingement mortality and entrainment that would have occurred at the baseline, the permit writer and permittee will need flexibility in determining what data are reasonably available or can reasonably be collected and how such data are to be interpreted. Intensive biological studies to support the calculation baseline should not be required.

Likewise, in predicting the reductions in impingement mortality and entrainment to be achieved by technologies that have not yet been installed, the estimates of performance, being predictive, will have considerable uncertainty, especially in light of the wide fluctuations in fish populations even under natural conditions. Again, reasonable predictions, based on reasonably available scientifically sound information, should be accepted, based in part on experience with the variability in performance of technologies like wedgewire screens and aquatic filter barriers.

Footnotes

31 The hypothetical baseline intake would, of course, have the same cooling water requirements as the actual facility. Also, the awkward "and/or" in the definition could better be rendered simply "or" or, more clearly, "no impingement reduction controls and no entrainment reduction controls."

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.041.069

Subject Matter Code 7.02
Performance standards

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Flow Reductions Should be Counted Toward Meeting the Performance Standard for Entrainment

If a new facility is constructed to replace an old facility but continues to use the same intake with reduced flow, the flow reduction should be credited toward meeting the performance standard for entrainment. Specific standards could be written for determining the appropriate credit. For example, the permittee could choose one of the following:

1. Credit based on actual flow under operation where, for example, a Habitat Evaluation Procedure (HEP) is funded over time;

2. Credit based on a baseline of the existing facility's (versus the new one's) permitted maximum design flow; or

3. Credit based on the existing facility's flow (calculated so as to exclude years when there were major maintenance outages).

EPA Response

The definition of an existing facility is "any facility that commenced construction as described in 40 CFR 122.29(b)(4) on or before January 17, 2002; and any modification of, or any addition of a unit at such a facility that does not meet the definition of a new facility at § 125.83." For a more detailed discussion on what constitutes an existing facility and how it applies to today's rule, please see section II.2 of the preamble.

In general, EPA agrees with the commenter. If a facility does not significantly modify a cooling water intake structure but reconfigures its power generation system (e.g. installation of a combined cycle turbine) such that the requirements for cooling water are less, credit should be considered towards compliance with today's requirements.

EPA does not believe this situation would warrant specific standards as discussed by the commenter.

Comment ID 316bEFR.041.070

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

The Entrainment Standard Should Consider Entrainment Mortality

EPA's proposed performance standards apply to impingement mortality, but they apply not to entrainment mortality but to total entrainment, whether or not entrained organisms survive. A facility gets no credit for an egg or larva that passes through the cooling system unharmed, as many do.

This is unrealistic. If an entrained egg or larva survives and thrives, it should not be counted as part of an "adverse impact." Moreover, many studies show that entrained organisms do survive. Survival varies widely depending on species, intake structure attributes, and waterbody characteristics. And there are tradeoffs: increasing cooling water flow may entrain more organisms, but it also reduces the temperature increase they experience and the time they are exposed to it.

UWAG acknowledges EPA's concern that some past survival studies may not have been robust enough to qualify survival for some species or life stages. However, permittees willing to conduct technically sound studies to demonstrate the rate of survival should be allowed to use these when calculating compliance with the performance standards. Survival rates, like so many other things, are species- and site-specific. But the fact that entrainment survival does not occur everywhere at the same rate is no reason to refuse to consider it at all, especially at a site where the permittee has data establishing survival rates.

EPRI has reviewed EPA's concerns with past survival rate data, and UWAG understands that EPRI's comments will address this issue. But whether or not EPA's concerns about past studies are well-founded, they should not disqualify other studies, especially those that may be done in the future, from being used to select intake technologies. In the Phase II Case Study Analysis, § A7-4, A7-4.1, EPA has tried to identify the characteristics of a sound entrainment survival study. Without necessarily agreeing in every respect with EPA's view of what constitutes an adequate study, UWAG believes that, at the least, a survivability study that meets EPA's standards should be usable for selecting BTA and measuring compliance with the performance standards.

In short, the entrainment performance standard should allow survival to be taken into account where usable data on survival exist. Facilities might choose to conduct survival studies, which would allow the baseline to start at a lower numerical value. Alternatively, the percentage reduction could be reduced on a site-specific basis from the 60-90% that otherwise applies to entrainment.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.041.071

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

For Compliance Purposes, the Performance Standard for Impingement Mortality Should Be Applied Either to “Representative Indicator Species” (RIS) or to Total Fish of All Species

1. One Alternative Is to Use RIS

In determining for compliance purposes whether a technology will reduce impingement mortality by 80-95%, the analysis in many cases should not be applied to all impingeable species in the waterbody. Consistent with long practice, it should be acceptable to apply the 80-95% reduction standard only to certain species that are impingeable and representative of species in the waterbody that need to be protected. UWAG has called these “Representative Indicator Species” (RIS).

At many sites it may not be feasible to design an intake technology that will ensure protection of every impingeable species to the same extent, because there are too many potential species, and their occurrence and distribution are too variable. Also, survival rates change over time. A technology that has a certain survival rate for one species in one season may have a different effect on another species in a different season.

Moreover, fisheries experts agree that not all species are of equal biological value. The loss of large numbers of some species will not harm the aquatic community. Impingement of forage species, for example, may be far less biologically significant than impingement of commercial or recreational species. And exotic species, especially nuisance species, may not be valuable to a waterbody at all.

2. As Another Alternative, Compliance Can Be Measured by Total Number (or Mass) of Fish Lost by Impingement

The rule should allow as an alternative, however, that the permittee may choose to measure compliance with the performance standard for impingement mortality by simply measuring (counting or weighing) the combined impingement losses of all species together. This should be allowed if the permit applicant can satisfy the permitting agency that it is justified at a particular site. Even where it is justified, however, threatened or endangered species would have to be considered separately.

EPA Response

See the preamble to today's rule for a discussion of monitoring requirements as well as methods of demonstrating compliance.

Comment ID 316bEFR.041.072

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

The Performance Standards Should Not Apply to Nuisance Species

For both impingement and entrainment, exotic species that are regarded as a "nuisance" should not be subject to the percent reduction standards. Indeed, many State agencies have rules against placing nuisance species back in a waterbody once they are removed. Some exotic species, like zebra mussels, are highly invasive and offer no commercial or recreational benefit. Entrainment or impingement of these species should not be considered an "adverse impact" at all. Some species, such as the common carp or Asiatic clam, are viewed as nuisance species by natural resource managers for some State waters but not all. At least where they are considered a nuisance, the entrainment and impingement performance standards should not apply.

Zebra mussels and Corbicula (Asiatic clam) can be entrained in great numbers. At least one utility has problems entraining and impinging an exotic snail (the Chinese or Japanese Mystery Snail), which was introduced to the United States as a food source in California and more recently for use in aquariums. These snails are taken by water intakes in significant numbers and can even clog condenser cooling water tubes. Given State fishery resource managers' often extensive efforts to get rid of these species and EPA's own express concerns about their effects, cropping by CWISs should not be considered "AEI" <FN 32> or in setting the "baseline" (though they might be considered in assessing net benefits when benefit-cost analysis is used).

One way to handle nuisance species in a § 316(b) analysis would be by a benefit-cost analysis that assigns an appropriate valuation, on a site-specific basis, to losses of such species. If a nuisance species is unwanted because it harms other, more desirable fish, its value should be considered small or even negative. If on the other hand an exotic species has some value, even a small one, then a technology that protects it should have that value added to its "benefits" for purposes of § 316(b) benefit-cost analysis.

Also, EPA should write the § 316(b) performance standards to accommodate fish that are moribund or dead before they arrive at the cooling water intake. For example, weather-related phenomena like winter fish kills or kills associated with sudden temperature drops and other site- and waterbody-specific episodic biological and physical phenomena can kill or injure fish, which may then be carried to the intake. If a facility has reliable data on the rate of arrival of such dead or moribund fish, the measurement of the reduction of impingement mortality should be adjusted accordingly.

Footnotes

32 EPA has warned about the problem of exotic species. See "Invasive Non-Native Species," <http://www.epa.gov/OWOW/watershed/wacademy/acad2000/invasive.html>; U.S. Biennial Report on Exotic Species in the Great Lakes, <http://www.epa.gov/grtlakes/glwqa/ usreport/part5.html>.

EPA Response

Please see response to comment 316bEFR.034.022.

Comment ID 316bEFR.041.073

Subject Matter Code 7.02
Performance standards

Author Name Hunton & Williams
Organization obo Utility Water Act Group

For Entrainment, the 60-90% Reduction Standard Can Be Applied to Either Total Biomass or Total Numbers of Organisms (Either Identified by Species or Not) Entrained

The 60-90% reduction standard for entrainment, where it applies, can be applied either in terms of total biomass or in total numbers of organisms entrained. For the existing plant as presently configured, the entrained biomass could be measured by collecting entrained organisms from the outfall or other appropriate monitoring location where a representative sample can be taken. This mass would be compared to the mass of eggs and larvae that would have been entrained at a shoreline intake with no entrainment reduction controls (or other baseline) to determine if there is a 60 percent reduction or better.

For the "baseline" plant configuration and the future plant with new intake technology installed, sampling could be done near the intake (the hypothetical shoreline intake for the baseline plant and the existing or relocated intake for the future complying plant). The density of entrainable organisms then might be used to calculate the mass of organisms that would be entrained, both by the shoreline intake without any protective technology and by whatever new proposed intake technologies are being assessed. As always, the element of time must be taken into account, for entrainable organisms will be present at some times and not at others, and this differs from species to species.

On the other hand, in freshwater rivers and streams in the past, entrainment traditionally has been measured by counting the number of organisms entrained. This produces either a total number of undifferentiated eggs and larvae entrained, or, to the extent possible, an identification of the entrained eggs and larvae by species or family. UWAG supports use of either total biomass or total numbers of organisms (whether identified to the species level or not) as a basis for calculating entrainment losses. If eggs and larvae can be identified, the analysis should focus on RIS.

It is important, however, not to require a permittee to prove that he has reduced entrainment of every entrained species by 60%. EPA has no data to support species-by-species permit reduction or monitoring. In some cases, the difficulty and cost of taxonomic classifications makes species-specific monitoring unreasonable, and classification is not even possible for early life stages of some species. Therefore, measurement of entrainment through total biomass or total of all species combined must remain an option.

EPA Response

For a discussion of the calculation baseline, please see response to comment 316bEFR.063.022. For a discussion of determining compliance with the final rule, please see response to comment 316bEFR.063.005 and the preamble to the final rule.

Comment ID 316bEFR.041.074

Subject Matter Code 7.02

Performance standards

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Averaging Times Should Be Long Enough to Accommodate Natural Fluctuations

EPA also needs to clarify the averaging period for the percent reduction. A short-term averaging period cannot be justified because of the significant natural temporal and spatial variability in fish abundance and distribution. In months when there are no entrainable organisms near the intake, entrainment may be near zero, and percent reduction will probably also be low (or at least meaningless, given the low "baseline"). Thus, an average of entrainment reduction over a single month would be unrepresentative. Moreover, the density of aquatic populations can vary naturally over the longer term, from year to year. Accordingly, the percent reductions should be applied as an average within certain confidence intervals over several years.

Elsewhere in these comments, UWAG has proposed that once a new intake technology is installed, the permittee may have to monitor for two years (or less) at some sites and perhaps up to five years at estuarine sites to verify that the technology is achieving reductions within the ranges specified by EPA's performance standards. It would be sensible to measure the percent reductions over the entire monitoring period, which could be less than <FN 33> two years or up to five years in length.

This does not mean, if the permittee discovers at the end of the five-year period that his average did not meet the performance standard, that he suddenly and unexpectedly is subject to penalties for five years' worth of violations. This would be unfair in light of the variability of fish communities and the permittee's limited control over what animals approach his intake. The rule should state that a permittee that has done everything it agreed to do but nevertheless does not meet the standard is not deemed to be in noncompliance for two years' or five years' worth of daily violations.

Footnotes

33 EPA should clarify that less than two years of verification monitoring may be acceptable in some cases. Proposed § 125.95(b)(7) (67 Fed. Reg. 17,224 col. 2) requires a permit applicant to include in the Comprehensive Demonstration Study a plan to conduct, at a minimum, two years of monitoring. But that is a requirement only for planning and for review by the permitting authority, not for actual monitoring.

Proposed § 125.96, which addresses what monitoring must actually be performed, says that actual monitoring must be as specified by the Director to demonstrate compliance with § 125.94 (67 Fed. Reg. 17,224 col. 3). How much monitoring is enough to demonstrate compliance is site-specific, and UWAG does not believe it is EPA's intent to require two full years of monitoring whether it is needed or not. UWAG asks EPA to clarify that the monitoring necessary may be less than two years' worth in some cases.

EPA Response

Please see response to comment 316bEFR.063.005 for a discussion on the methods of determining compliance with today's final rule.

Comment ID 316bEFR.041.075

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

EPA Should Clarify What Is "Entrainable"

EPA needs to clarify the difference between impingeable and entrainable organisms, which depends on screen mesh size. A larger mesh means, other things being equal, that there are more "entrainable" organisms and fewer impingeable ones. Reducing the mesh size means that some organisms that would have been entrained now may be impinged. Thus, a fine mesh screen might be installed to reduce entrainment, with the result that formerly entrainable fish or larvae are now impinged against the screen. As screen mesh size becomes smaller, survival rates of impinged smaller organisms may drop.

EPA should resolve this issue by defining an "entrainable" organism as one that will fit through a standard 3/8-inch intake screen. This will lend certainty and consistency to the rule.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.041.076

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.03

Monitoring requirements

EPA Should Clarify that Annual Monitoring Is Not Required for Facilities with Cooling Towers

Although having cooling towers (reducing intake capacity to a level commensurate with a closed-cycle, recirculating cooling system, in the words of proposed § 125.94(b)(1)) is one way to satisfy the proposed rule, EPA points out that cooling towers were not used as a basis for the numerical performance standards. 67 Fed. Reg. 17,142 col. 2. Since EPA has determined that cooling towers are not "BTA," UWAG concludes that a permittee cannot be required to install them. The main value of § 125.94(b)(1), in UWAG's view, is that a facility that has already installed cooling towers will unquestionably be in compliance with the rule. As a practical matter, in most or all instances, retrofitting a cooling tower to an existing facility built without one would fail the benefit-cost test, because the high cost of building a tower at an existing facility would be so much larger than the benefit it would offer in terms of reducing entrainment and impingement.

The proposed monitoring requirements reflect how conservative cooling towers are compared to the numerical performance standards. Section 125.95(b) says that all facilities except those that satisfy § 125.94(b)(1) (that is, those that have flow commensurate with closed-cycle cooling) must submit a comprehensive demonstration study, including information on the "calculation baseline." Since facilities with cooling towers do not have to calculate a "baseline," clearly the proposed rule does not contemplate that a cooling tower will have to be monitored to determine how much reduction in impingement mortality and entrainment it is accomplishing. Section 125.94 provides that the facility must monitor only as specified by the Director to demonstrate compliance with § 125.94.

It is curious, and possibly misleading, then, that EPA's Technical Development Document appears to assume that facilities with cooling towers will spend $75,000 a year for annual monitoring. See Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule, App. A (EPA 821-R-02-003 April 9, 2002). EPA should state clearly that this is not required. At most, a facility with a cooling tower would have only to show that its intake capacity was commensurate with a closed-cycle, recirculating system; no annual monitoring would be required for that purpose.

EPA Response

In today's final rule, EPA has determined that facilities that choose compliance alternative 1, flow commensurate with closed cycle cooling, will not need to submit any components of a Comprehensive Demonstration Study and will not be required to monitor further to verify compliance with the performance standards (see § 125.94(a)(1)(i)).

Comment ID 316bEFR.041.077

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

OPERATIONAL MEASURES MUST BE VOLUNTARY

Although EPA lists seven specific technologies on which it bases its cost and benefit estimates, EPA also says in the preamble that its conclusion is based on use of "one or more of these technologies with operational controls in some cases." Whatever this means, it should not mean that EPA can require operational controls (meaning, typically, cutting back on cooling water flow, and thus on electricity production).

EPA Response

EPA has not determined any specific technology to be BTA and does not require any facility to use any particular technology, or suite of technologies, to comply with today's rule. Rather, it leaves the determination of the appropriate controls to be implemented up to the facility itself subject to the approval of the permitting authority.

Comment ID 316bEFR.041.078

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

Some Facilities Cannot Adjust Flow

From a purely mechanical standpoint, many existing power plants are severely limited in their ability to “adjust” (control) cooling water flow. Most circulating water pumps that supply once-through cooling water are not variable speed pumps; they operate either full on or full off.

In addition, some facilities have legal restrictions on their ability to adjust flow. Several Florida facilities are required, as part of their Florida Industrial Wastewater (SPDES) Permits, to develop “manatee protection plans.” A required component of these plans is to ensure an adequate supply of warm water if the ambient water temperature drops below 61oF in order to ensure manatee survival. This means that utilities sometimes have to operate a facility even when it is not economically beneficial. While this “running out-of-economics” scenario is infrequent (because when water temperature drops below 61oF usually the facilities are operating anyway because the air is cold), it would be a problem if reducing flow were required by a permit condition. In such a case, a permit requirement to restrict flow for § 316(b) purposes would conflict with the requirement to provide heated discharge water to protect manatees.

EPA Response

In today's final rule, EPA has not designated any particular design and construction technology or operational measure as Best Technology Available (BTA), with the exception of facilities eligible for compliance alternative 4. This includes flow reduction technologies such as variable speed pumps, which would allow a facility to moderate its intake flow based on generating needs. EPA believes that the numerous physical and biological variables that exist at each facility, coupled with economic concerns, justify a site-specific determination of the most appropriate design and construction technology, operational measures, and/or restoration measures. Reducing intake flow remains an option, however, for those facilities that wish to implement it.

Comment ID 316bEFR.041.079

Subject Matter Code 2.04

EPA's legal authority to:

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Congress Did Not Authorize EPA to Regulate Levels of Operation

Congress did not authorize EPA to regulate, by § 316(b) or other provision of the Clean Water Act, the level of operation of power generating facilities. This is evident from the language of § 316(b): operational controls are not, by any stretch of the language, aspects of the "location," "design," "construction," or "capacity" of the intake structure, and so they cannot be required under authority of § 316(b).

Leaving aside § 316(b), nowhere else in the Clean Water Act did Congress so much as suggest that EPA should regulate how dischargers operate or how much product they are allowed to produce. Thus, EPA is not authorized to regulate pollutant levels in a facility's internal waste stream, <FN 34> and all the more can it not direct a facility to cut production. <FN 35>

Footnotes

34 American Iron and Steel Inst. v. Environmental Protection Agency, 115 F.3d 979, 996 (D.C. Cir. 1997).

35 Operating restrictions are costly. Whenever a facility is prohibited from operating for any reason, it is incapable of generating revenue. In a "regulated" market, such as Florida, a utility is required by the Public Service Commission to supply enough electricity to meet all the customers' needs as well as to maintain an agreed-upon reserve. If units are not available to operate and the demand for power exceeds the utility's ability to supply it, the power must be purchased from other suppliers (assuming there is power available to be purchased). Under these circumstances, the cost of the power purchased is often greater than the price would have been if the utility had generated it, and the revenues go to the seller of the electricity.

In an unregulated market where purchased-power agreements are in place, the same principles apply. Utility A commits to have a certain number of megawatts of electricity for sale to Utility B at all times. If for any reason Utility A cannot meet its commitment (e.g., if a unit has mandatory operating restrictions because of § 316(b) compliance issues), it must pay Utility B for "replacement power" to meet the contract demand. Again, this replacement power is often more expensive than the cost of the Utility A's generating it.

In a true "merchant" scenario, the economic facts are simple, because there are no replacement power issues: the generator earns money only when it makes electricity.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII. The final rule does not directly regulate the level of operation of Phase II existing facilities. The rule allows, but does not require, the use of operational measures as one of several means of meeting applicable performance standards. See Riverkeeper v. EPA, slip op. at 33 (2nd Cir. Feb. 3, 2004) ("We also think the statute allows the EPA to regulate the operation of cooling water intake structures, as the word "design" can reasonably be read to embrace the methods used in running a structure as well as its layout and technical specifications.")

Comment ID 316bEFR.041.080

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.03

Definition: Waters of the U.S.

THE RULE'S TREATMENT OF COOLING PONDS AND LAKES NEEDS TO BE CLARIFIED

A. Ponds Created Specifically for Cooling Are Treatment Systems Are Excluded from the Definition of "Waters of the U.S."

EPA's regulation, 40 C.F.R. § 122.2, exempts "waste treatment systems" from the definition of "waters of the United States." The definition reads as follows:
Waters of the United States means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; . . . Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Thus, thermal treatment systems, including ponds and lagoons designed to meet CWA requirements (which cooling ponds clearly are), are specifically exempted from the NPDES permit requirement. <FN 36> Because a cooling pond is a part of a plant's treatment system, the make-up water intake point should be considered the jurisdictional intake for the purposes of § 316(b).

Disturbingly, EPA's proposed definition of "once-through cooling water system" says that such systems sometimes use "ponds." Proposed § 125.93, 68 Fed. Reg. 17,221 col. 1. This definition may give the wrong impression, since cooling "ponds" are clearly "treatment systems" instead of "waters of the United States."

In the preamble to the proposed rule, EPA says that it "interprets 40 C.F.R. § 122.2 to give permit writers discretion to regulate cooling ponds as 'waters of the United States' where cooling ponds meet the definition of 'waters of the United States.' To the best of UWAG's knowledge, EPA has never issued any such interpretation on a national basis, and the only EPA memorandum on point of which UWAG is aware says that reference to cooling ponds in § 122.2 may be interpreted as having no legal force or effect, thereby taking cooling ponds wholly outside the definition. Letter from Robert Perciasepe, Assistant Administrator of EPA's Office of Water, to W. Ray Cunningham, Director, Water Management Division (EPA Region IV) (December 13, 1993). In any case, for purposes of implementing § 316(b), UWAG believes strongly that EPA should find that cooling ponds (and, as discussed below, other man-made impoundments created solely or primarily for supplying cooling water) are closed-cycle cooling systems and not "waters of the United States" subject to § 316(b).

Footnotes

36 Such systems, if created in waters of the United States, were at one time brought back within the application of the other criteria in the definition by the restrictive provision at the end of the treatment system exemption; however, that restriction was suspended in 1980 and no longer has any legal effect. Cooling ponds "as defined in 40 C.F.R. 423.11(m)" also fall outside the treatment system exemption. But the rule containing the definition of "cooling ponds" cited in that parenthetical, which served as the basis for that restriction, was set aside by the Court of Appeals in Appalachian Power Co. v. Train, 566

F.2d 451 (4th Cir. 1977). Thus, as a matter of law, the cooling pond exclusion from the treatment system exemption no longer has any force or effect.

EPA Response

See responses to 316bEFR.006.001 and 015.002.

Comment ID 316bEFR.041.081

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

EPA Should Consider Cooling Lakes and Reservoirs to Be Closed-Cycle Cooling Systems

Cooling "ponds," then, are expressly excluded from waters of the U.S. Cooling "lakes," formed by damming rivers or streams that are waters of the U.S., should be treated the same for § 316(b) purposes. EPA has long asserted broad authority to define waters of the U.S. and to include and exclude waters from the definition of "waters of the U.S." where necessary to achieve the purposes of the Clean Water Act, although this authority has been narrowed by the SWANCC case, Solid Waste Agency of Northern Cook Co. v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001).

As a matter of policy, EPA should treat both cooling ponds and cooling lakes, built in whole or in part to supply cooling water, as closed-cycle cooling systems that achieve the requirements of § 316(b). <FN 37> Cooling lakes do not need additional intake technology, both because minimizing "adverse environmental impact" was considered when the impoundment was constructed and because experience shows that adverse environmental impacts generally do not occur in cooling lakes, which usually have thriving populations. <FN 38> It makes no sense to expose existing facilities to the possibility that they will have to construct additional fish protection technologies on impoundments that, in the first place, were designed and constructed primarily to provide cooling water.

Footnotes

37 The same can be said of some reservoirs, which typically are manmade, highly engineered systems that in some cases were constructed primarily to supply cooling water and heat treatment. For example, many reservoirs in Texas and other parts of the Southwest were built primarily or solely for this purpose. See Appendix 11 to these comments. Thus, UWAG believes that States should have the authority to deal with reservoirs just as they do cooling lakes or ponds and treat them as part of a closed-cycle system where the reservoir is constructed primarily for cooling water supply and thermal treatment.

38 See generally Parkhurst and McLain 1978.

EPA Response

Please refer to the response to comment 316bEFR.006.001.

Comment ID 316bEFR.041.082

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

EPA does not appear to have made any attempt to identify either (1) the number of facilities with cooling lakes or thermal treatment reservoirs that would be required to retrofit additional technologies, or (2) the costs and benefits of such additional controls. In fact, a review of the information EPA provides on in-scope facilities suggests that EPA assumed that all or most of these facilities would not be required to retrofit any additional technologies or do any additional studies.

EPA Response

EPA agrees in part and disagrees in part. As noted in the definition for a closed-cycle recirculating cooling system at § 125.93, a facility with a cooling pond may be considered as employing closed-cycle recirculating cooling. EPA agrees that any facility that is designated as using closed-cycle recirculating cooling would be exempt from further requirements, as stated in § 125.94(a)(1)(i).

However, as stated in Section II.C of the preamble and in the response to comment 316bEFR.006.001, EPA does not intend to change the regulatory status of cooling ponds and acknowledges that a determination of whether a cooling pond is to be considered a "water of the United States" and whether a cooling pond can be considered as a closed-cycle recirculating cooling system will be made on a case by case basis by the Director.

Given the site-specific nature of this decision and the inherent difficulty in predicting the outcome of such a decision, EPA did not attempt to identify the number of facilities with cooling ponds that would have additional requirements under the final rule. Similarly, EPA did not attempt to identify the costs and benefits of any additional requirements.

Comment ID 316bEFR.041.083

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.07

Special definitions

The "Annual Average Retention Time" in the Definition of "Lake or Reservoir" Is Not the Most Appropriate Metric and Might Be Misinterpreted

EPA's proposed definition of "lake or reservoir" requires an annual average hydraulic retention time of more than seven days. See 67 Fed. Reg. 17,130 col. 3. In order to more accurately reflect the biological principle and purpose sought by this criterion, the metric should be based on the average hydraulic retention time during the period when entrainable life stages of important species are present.

Also, EPA is not clear about how the retention time is to be calculated, and the definition does not discuss how inflows from make-up water sources, return flows from recirculating cooling water systems, evaporation, and infiltration should be accounted for in calculating the retention time. Therefore, particularly in the arid Southwest where overland outflows are very small and evaporation/infiltration rates are high, hydraulic retention times might be inappropriately described as shorter than the seven days required to be defined as a lake or reservoir. EPA should clarify that wet circulating cooling system flows are not to be included in the calculation, only the natural hydraulic residence time.

It is possible that the proposed rule might be misinterpreted to require inflows and outflows generated by a recirculating cooling water system to be considered in calculating hydraulic retention time. If so, many hydraulically isolated waterbodies designed and constructed as closed-cycle cooling water ponds and reservoirs would incorrectly be defined as "rivers" under the proposed rule. EPA should clarify that only inflows from and outflows to a "water of the United States" should be used in the calculation of hydraulic retention time.

EPA Response

Please refer to EPA's response to comment 316bEFR.015.006.

EPA's Proposed Prohibition Against Altering the Natural Thermal Stratification of Lakes and Reservoirs Is Legally and Technically Flawed

If a facility proposes to increase its design intake flow on a lake or reservoir, EPA's proposed rule would not allow the increased flow to disrupt the natural thermal stratification or turnover pattern, except where the disruption is determined to be "beneficial to the management of fisheries." See proposed § 125.94(b)(4)(ii), 67 Fed. Reg. 17,221 col. 3. This provision is unwise, but, if it is to be included in the rule at all, a better formulation would be "must not disrupt . . . if such disruption is determined to be an adverse environmental impact to fish or other aquatic life." Apart from that, the "disruption" standard has several problems.

1. EPA Has Not Evaluated Technologies for Avoiding Destratification

Nowhere does EPA provide any indication of what CWIS technology might meet the "disruption" standard. EPA may feel that intake location, and not a specific technology, is adequate to meet it. If so, EPA may in effect be requiring the relocation of CWISs in some lakes and reservoirs without even considering possible technological solutions.

2. Altered Stratification Ordinarily Is Not a Problem

In any case, there is good reason to conclude that altered thermal stratification is not a problem. The issue of altered thermal stratification in lakes and reservoirs due to power plants has been addressed by the Nuclear Regulatory Commission (NRC) as part of the development of its Generic Environmental Impact Statement for License Renewal of Nuclear Stations (GEIS 1996). Section 4.2.1.2.3 of the GEIS, which is concerned with thermal effects, indicates that thermal stratification occurs in two ways: by the discharge of heated water (not a consideration under § 316(b), which applies only to intake structures) or by the altered circulation patterns caused by pumping cooling water in and out of the power plant. Surface discharge of heated water can intensify stratification, whereas enhanced circulation (as may be caused by facilities with once-through cooling systems) may break down stratification.

a. Destratification May Be a Benefit

In many cases, destratification of a lake or reservoir is desirable. The Tennessee Valley Authority has installed fans on the surface of one of its reservoirs to destratify it, thereby allowing the otherwise anoxic hypolimnetic waters to receive oxygen. In other cases, as appropriate, TVA releases greater-than-planned or greater-than-normal flow through reservoirs to create mixing and prevent or disrupt stratification, which can lead to hypoxia. The only cases where disrupting stratification would cause an adverse environmental impact would be where the disruption led to a release of toxicants in toxic amounts or of excessive nutrients in a form available to algae, or where a cool or cold lower-waters fishery was adversely impacted.

The NRC GEIS cites a study in Illinois where an unheated flood control reservoir (Lake Shelbyville) was compared with a cooling lake (Lake Sangchris). GEIS 1996, p. 4-54 (citing EPRI, "Evaluation of a Cooling Lake Fishery," Introduction, Water Quality and Summary, Vol. 7 (1980)). In contrast with the unheated lake, Lake Sangchris did not stratify in the summer. As a result, largemouth bass had a longer growing season and greater annual growth in Lake Sangchris, the cooling lake.

b. Altered Thermal Stratification Has Never Been a Problem at Most Plants

The GEIS also notes that the common practice of using cool hypolimnetic water from deep intakes for power station cooling, with surface discharge, may increase the size of the warm epilimnion and decrease the amount of habitat available to coolwater fish. The NRC GEIS uses the example of thermal discharges from the Oconee Nuclear Station, which increased the annual heat load of Keowee Reservoir by one-third and lowered the thermocline from between 5 and 15 meters to as low as 27 meters. As another example, the McGuire Nuclear Station withdraws cool hypolimnetic water from Lake Norman and discharges the heated water at the surface. As at Oconee, this has the effect of increasing the size of the upper layer of warm water and decreasing the habitat available for coolwater fishes (e.g., striped bass) in the hypolimnion of Lake Norman.

Temperature modeling of Lake Norman indicated that increasing the maximum upper discharge temperature from 95 to 99ºF during July, August, and September would conserve coolwater fish habitat in the Lake by allowing smaller withdrawal rates of hypolimnetic waters. This would lower the average heat content of the lake by allowing more heat to dissipate to the atmosphere from the warmer localized area. After consultation with the North Carolina Department of Health and Natural Resources, the NPDES permit was modified to allow the higher temperatures. Modeling reservoir heat budgets allows effects of thermal discharges on stratification to be predicted and used by utilities and regulatory agencies to develop the best heat dissipation scheme.

The GEIS also says that altered thermal stratification has never been a problem at most plants. At a few plants (e.g., McGuire and Oconee), the issue has been periodically re-examined and mitigated as needed by adjusting thermal discharges through the NPDES permit renewal process. Based on a review of the published literature and operational monitoring reports, the GEIS concludes that operation of the cooling system has not altered thermal stratification at most power plants with once-through cooling systems. At the small number of plants where changes in thermal stratification have occurred, monitoring and modeling studies have been used to adjust the thermal discharges, thereby mitigating adverse impacts. As appropriate, these models can take into account other thermal inputs to the receiving waterbody and therefore consider cumulative as well as individual plant effects. Consultation with the utilities and regulatory agencies during preparation of the draft GEIS, as well as their comments on the draft GEIS, revealed no concerns about the individual or cumulative impacts of cooling systems on thermal stratification. GEIS 1996, p. 4-8.

c. The Nuclear Regulatory Commission Concludes That the Effects of Cooling Systems on Thermal Stratification Are Not Significant

The NRC concluded that the effects of cooling system operation on thermal stratification are a Category 1 issue with a "small" level of significance. In order for the NRC to list an issue as Category 1, the analysis in the GEIS had to find that (1) the environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics; (2) a single significance level (i.e., small, moderate, or large) has been assigned to the impacts; and (3) mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are likely not to be sufficiently beneficial to warrant implementation. GEIS 1980, p. 4-8. The issue is classified as a small level of significance if the environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

The NRC findings in the GEIS, then, demonstrate that thermal de-stratification due to cooling water intake is a non-issue.

3. EPA Has Not Defined "Disrupt"

Also, EPA nowhere defines what "disrupt" means. In a lake or reservoir, stratification results from natural physical processes that result in a layer of warmer surface water separated from a cooler (and therefore more dense) layer by a thin boundary called the thermocline. In nature, many factors influence the formation and dissolution of the stratified waterbody (e.g., seasonal temperature changes and wind). When a power plant is situated on the waterbody, additional factors are introduced that affect the relative heat balance of the system. The degree to which a cooling water withdrawal and corresponding thermal effluent discharge contribute to "disrupting" the stratification is largely a function of the volume of water withdrawn, the zone from which it is withdrawn, the delta T across the condenser, and the location and depth of the discharge.

EPA Response

EPA disagrees that the standard is flawed. EPA believes the natural thermal stratification of a lake, if present, influences the physical and chemical cycles of lakes, which, in turn, strongly govern their production, utilization, and decomposition. A facility with a disproportionally large water intake can adversely impact both primary and secondary production. EPA believes the intake capacity standard for lakes and reservoirs is economically practicable and technologically achievable for existing facilities, and will result in an acceptable level of source water protection.

A facility located on a lake or reservoir that wishes to increase its design intake flow is required to establish a maximum intake capacity that will not disrupt the natural thermal stratification or turnover pattern of the source waterbody where such stratification or turnover pattern is determined to be beneficial. EPA believes an "across-the-board" limit is unworkable for lakes and reservoirs since the concept of flow is inapplicable to a lake. In addition, EPA believes preserving some degree of the natural thermal stratification, if present, is desirable because of the increased cooling efficiency that can result. The thermal stratification standard, while different from the flow-based standards for estuaries and freshwater rivers, does limit a facility to an intake capacity that will achieve an acceptable level of protection for the source water.

EPA acknowledges that it has not identified any technologies to avoid the disruption of the thermal stratification of lakes. As stated earlier in this response, EPA believes that the disruption of thermal stratification is best prevented by limiting changes in intake capacity and not by installing intake technologies.

EPA has chosen not to further define the term "disruption." EPA expects facilities located on a lake or reservoir to work in conjunction with the Director to correctly determine what constitutes an unacceptable disruption of any natural thermal stratification or turnover pattern.

Comment ID 316bEFR.041.085

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 2.04

EPA's legal authority to:

EPA Lacks Authority under § 316(b) to Regulate Stratification

Any power plant intake and discharge located on a lake or reservoir will change or affect the stratification in some way. The real issue is the degree of the alteration, which will vary based on site-specific differences in the factors mentioned above. As discussed elsewhere in these comments, minimizing unacceptable alterations requires a careful balancing of factors relating to the waterbody, the intake structure, and the discharge. Section 316(b) gives EPA authority over only the CWIS, not over discharges or other factors. Thus, a limit on stratification, which not only may be impossible to meet but also implicates an aspect of the facility regulated under other sections of the CWA, is inappropriate and, for the reasons discussed above, wholly unnecessary.

Providing an exception in cases where the permittee can show the change in stratification is beneficial (see 67 Fed. Reg. 17,221 col. 3) does not solve the problems inherent in the proposed rule. Between "harmful" and "beneficial" lies a range of neutral effects. EPA has no real evidence that changes in stratification are likely to be harmful, and yet the proposed rule would require studies to prove the negative. This is the opposite of administrative efficiency and cannot be justified.

EPA Response

Disrupting the natural thermal stratification or turnover pattern of a lake (other than the Great Lakes) or reservoir indicates a cooling water structure intake's substantial effect on a waterbody. Under the rule, EPA has determined that a commensurate level of entrainment, an adverse impact, must be reduced. For a discussion of EPA authority to implement section 316(b), see the preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.041.086

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 8.03

Proposed standards for Great Lakes

GREAT LAKES FISH ARE NOT UNIQUELY SENSITIVE TO ENTRAINMENT, AS EPA'S PROPOSAL IMPLIES

EPA proposes to require Phase II facilities situated on the Great Lakes to meet the same entrainment reductions it has proposed for facilities on estuaries and oceans (which it claims are sensitive to entrainment by virtue of the greater density of entrainable organisms that EPA alleges occurs throughout estuarine and ocean waters <FN 39>). Even if UWAG agreed with EPA's views on the sensitivity of estuaries and oceans (which we do not), EPA has not, and cannot, offer any similar justification for requiring entrainment controls on Great Lakes facilities.

EPA has not offered any evidence that entrainable organisms are particularly at risk in the Great Lakes, and the evidence suggests just the opposite, as we will show in the discussion below. Instead, EPA claims that entrainment controls are necessary because the Great Lakes represent a "unique system that should be protected to a greater extent than other lakes and reservoirs." 67 Fed. Reg. 17,141.

EPA says that it provided additional details in the Phase I proposal and NODA that support special treatment for the Great Lakes. 67 Fed. Reg. 17,141 col. 2, citing 65 Fed. Reg. 49,060 and 66 Fed. Reg. 28,853. As UWAG's comments on both of those Phase I documents showed, EPA's support amounts to little more than conclusory statements without any factual backing. UWAG, by contrast, submitted ample facts during the Phase I rulemaking to show that the Great Lakes are not particularly sensitive to entrainment and do not warrant special protection. Because EPA ultimately decided to apply across-the-board technology requirements for new facilities, it deleted its special protection for the Great Lakes and never otherwise defended it. Thus, EPA's previous proposal provides no real support for its current one.

UWAG recognizes that the Great Lakes represent a unique and important resource. However, with regard to impingement and entrainment, EPA confuses uniqueness with sensitivity. The Great Lakes are unique, and they do have a unique fish assemblage, but that does not mean the fish are uniquely sensitive. To the contrary, the aquatic communities in the Great Lakes are probably less sensitive than in many other lakes and reservoirs. Generally speaking, the naturally occurring freshwater species in the Great Lakes are the same species found in smaller lakes in the north central United States. Moreover, the five Great Lakes themselves are not all alike, and lumping them together into a single "sensitive" category is a gross oversimplification.

A. Salmonids in the Great Lakes Normally Are Not Vulnerable to Entrainment

From a fisheries perspective, what sets the Great Lakes apart from most smaller lakes and reservoirs is the presence and active management of large numbers of both native and introduced salmonids (i.e., Pacific salmon, trout, and coregonids, primarily bloater and white fish) (Becker 1983, Tanner 2000). At first glance it might appear that this unusual resource would need more protective regulations. But because of the life history of these species, the opposite is true.

As coldwater species, most of these species are fall/winter spawners that spawn in relatively deep, often offshore areas (particularly reefs and shoals) (Becker 1983, Tanner 2000). Thus, the larvae of most salmonids are not at particular risk of entrainment. Also, many of the trout and salmon populations in the Great Lakes are primarily the result of stocking. Thus, there are few or no trout or salmon eggs or larvae to be entrained. Also, the size of the populations is actively managed by resource agencies.

This assessment is supported by data EPA provided in the § 316(b) Phase I rule. Only one salmonid (lake trout) appears in EPA's entrainment table (Phase I EA Table 11-6), it was at a single plant (out of 25 plants on Lake Michigan alone (Kelso and Milburn 1979)), and it was entrained in low numbers. Therefore, given the life history characteristics of the group of fishes of most concern in the Great Lakes (i.e., salmonids), no special level of concern is warranted. EPA has no basis for imposing entrainment control requirements on facilities in the Great Lakes when no such requirements are warranted for other lakes or reservoirs.

B. Because of their Spawning Behavior, Non-Salmonids in the Great Lakes Are Not Ordinarily at Risk

Among non-salmonids, most of the highly valued recreational Great Lakes fishes also are relatively insensitive, again because of their life histories. Besides salmonids, four species provide most of the Great Lakes sport catch: yellow perch, smallmouth bass, northern pike, and walleye.
Yellow perch is of particular concern in Lake Michigan now because their population is very low. Yellow perch lay their eggs in long gelatinous strips, which greatly reduces the likelihood that their eggs will be entrained. Some yellow perch populations spawn well offshore, further reducing the likelihood of entrainment losses.

Smallmouth bass are nearshore nest builders. After the eggs hatch, the male guards the fry for several days. Because of this nest guarding, non-drifting behavior, smallmouth bass larvae are not frequently entrained, even where adult populations may be abundant (EA 1987).

Northern pike are restricted primarily to shallow embayments along the Great Lakes (which is not where the power plants are). They spawn in very shallow areas over dense aquatic vegetation. No intakes are located in any such areas. Walleye are uncommon in the open areas of the Great Lakes, except Lake Erie; thus, entrainment of walleye is low compared to non-recreationally important species. Walleye, as well as yellow perch, are actively managed by resource agencies through quotas on recreational and commercial harvests.

In summary, the fishes that make the Great Lakes unique (the salmonids) or constitute the non-salmonid recreational fishery (yellow perch, smallmouth bass, northern pike, and walleye) are not, by reason of their life history characteristics and agency management, particularly at risk. Therefore increased levels of entrainment control are not warranted for Great Lakes intakes. Instead, the Great Lakes should be subject to the same requirements as other lakes and multi-purpose reservoirs.

Footnotes

39 As UWAG showed in its comments on the Phase I rule, EPA's assumption that estuaries and oceans are inherently more sensitive to entrainment than are other waterbody types is not warranted. UWAG 2000 Phase I Comments, pp. 129-34, 148-52.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies.

Comment ID 316bEFR.041.087

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Hunton & Williams

Organization obo Utility Water Act Group

THE ONLY DEFENSIBLE STANDARD FOR "BEST" TECHNOLOGY IS THAT WHICH HAS THE MAXIMUM NET BENEFIT

EPA's performance standards, which would require an 80-95% reduction in impingement mortality and a 60-90% reduction in entrainment, raise many questions. Several technical questions about how to apply the standards are addressed in Section VIII above. In addition, the standards raise important issues about the role of cost in selecting BTA. In the preamble to EPA's proposal, the Agency says permittees should choose the most cost-effective technology for achieving a level of reduction within the 80-95% or 60-90% performance range. 67 Fed. Reg. 17,142 col. 1. UWAG agrees that this is appropriate. EPA also says that cost plays a role in deciding when the standards should not apply at all and a site-specific analysis be done instead.

EPA's proposed test for departing from the performance standards and using a site-specific analysis instead is that the cost of meeting the standards be "significantly greater than" either the benefits or the costs that EPA itself considered in making the rule. See proposed § 125.94(c)(1)-(2), 67 Fed. Reg. 17,221 col. 3. What EPA should use instead is the only cost test that has a rational basis in economic theory: the "best" technology is that which maximizes net benefits.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020. See also preamble to the final rule.

Comment ID 316bEFR.041.088

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The Way to Choose the "Best" Technology Is to Abandon Performance Standards and Instead Select the Technology that Maximizes Net Benefit

NERA's analysis of the Phase I rule (Appendix 12 to these comments) shows that the correct way to choose the best technology is to select the one that maximizes net benefits. Comments by other experts support this fundamental principle. See, e.g., comments prepared for PG&E National Energy Group by Professor Robert Stavins of Harvard University.

The maximum net benefit criterion is the only criterion that is consistent with the basic economic principle of efficiency. In its most basic form, benefit-cost analysis seeks to find the technological alternative or other social investment that provides the most benefit for the smallest possible cost, thereby maximizing the net benefit (benefit – cost) of the improvement. <FN 40> Thus benefit-cost analysis is a framework for determining which alternative will enhance economic efficiency the most. Efficiency addresses two broad considerations:

-In a world of limited natural, human, and financial resources, it is desirable to achieve any given goal at the least possible cost.

-When faced with multiple goals, we should allocate our scarce resources among these goals so as to achieve the greatest total benefit for any given expenditure of scarce resources.

Maximum net benefit is the preferred economic criterion for evaluating the efficiency of decisions. It is the only criterion that identifies the alternative that will yield the highest potential gain in efficiency, that is, the alternative that will yield the largest gain in benefits to society.

Maximum net benefit is preferred to maximizing the benefit-cost ratio because it reflects the scale of alternative projects. For example, a project could have a high benefit-cost ratio but not produce the maximum net benefits simply because it is a low-cost alternative that produces relatively large benefits. Another project could involve higher costs, but produce larger total benefits and subsequently have a higher net benefit.

The maximum net benefit criterion has several important strengths and is especially well-suited to address the regulatory matters related to the § 316(b) regulations. In particular, the criterion, when it is implemented as part of a benefit-cost analysis, organizes important information about the large number of potential CWIS investments in a logical form that allows for trade-offs and relates directly to a rule for identifying BTA. It also systematically incorporates considerations of uncertainty about both costs and benefits. Comparisons about uncertain benefits and costs are based on expected outcomes.

Clearly, because of a lack of information or the limits of available methodologies, it may not be possible to accurately monetize all possible benefit or cost categories. In such cases, the benefit-cost analysis will qualitatively describe the benefits and costs in question. In cases where monetized benefits fall short of costs, decisionmakers may decide whether or not the likely value of identified, nonmonetized net benefits is large enough to justify the investment. <FN 41> Thus, benefit cost analysis is sufficiently flexible to address both monetized and non-monetized benefits.

Benefit-cost analysis critics assert that such emphasis on human-use values neglects the value of ecological services. However, accurately measured human-use values incorporate values for ecological services. These ecological services provide benefits to humans even if they are not consumed directly by humans. For example, food-chain services provided by benthic organisms are analogous to factor inputs in production processes. These organisms derive their values from the value of the outputs they produce, which are quantified using nonmarket valuation techniques. Such benefits can be quantified and included in the analysis, even if they cannot be reliably monetized.

The criticism sometimes heard that benefit-cost analysis is overused or that subjective, nonmonetary factors are neglected in public policy decisions are unfounded. Both OMB and EPA have issued guidance that requires careful accounting of uncertain and unquantified values and outlines established methods for doing so.

However, evaluating nonmonetized net benefits should not be confused with a “wholly disproportionate” cost test, which would mandate CWIS investments the measured costs of which exceeded measured benefits by a substantial margin. Such a test is arbitrary and tends to overcompensate for uncertainty. The net effect would be to waste scarce public and private resources. The “wholly disproportionate” approach seems motivated by the unjustified assumption that measured benefits are consistently and significantly understated relative to costs. For cooling water intake structures, both costs and benefits include components that are difficult to measure and thus involve some degree of uncertainty. Benefit-cost analysis of CWIS alternatives should incorporate OMB and EPA guidance on accounting for uncertainty and risk in both expected cost and expected benefit calculations.

Finally, some might argue that benefit-cost analysis is expensive and unnecessarily complicated. Economists have developed the benefits transfer approach as a cost-effective way to implement the benefit-cost analysis framework. This approach uses the available data and models developed in the professional literature as a way to control the costs of the analysis. Nevertheless, the transfer is performed using sound economic principles and is based on the maximum net benefit criterion.

Additionally, the transfer can be tailored to meet the needs of a particular situation. In simple cases, the transfer is likely to be straightforward. More complicated cases may involve a mixture of targeted data collection and analysis, but this is still less expensive than a full-scale original study. Even those studies may be warranted in cases where the potential investment costs are sizeable and there is substantial uncertainty. Appendix A of the TER report appended to these comments summarizes how the benefits transfer approach can be implemented cost-effectively.

But EPA may insist on retaining its performance standards. For that reason, the rest of this section discusses how EPA might use cost to signal when a site-specific analysis should be used instead of the performance standards.

Footnotes

40 An early definition states that benefit-cost analysis is a “technique that measures impacts in dollars or other quantified values and that also provides systematic recognition of unquantifiable values and significant qualitative impacts” Liroff

1982. More recently, Arrow et al. 1996 provide eight principles on the appropriate use of benefit-cost analysis.

41 Where substantial risks are involved, decision makers may be able to quantify the monetary value of the risks and include it as a cost associated with that alternative. This approach is the way financial markets absorb information about investments with varying risks.

EPA Response

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

If No Technology Will Meet the Performance Standards at a Reasonable Cost, Then a Different Analysis Is Needed

Suppose, then, that EPA retains the performance standards but that for a certain site there is no technology that can achieve them at a reasonable cost. Because the costs will vary from site to site, UWAG agrees with EPA that there should be an alternative approach where deploying the technologies is not practical or the costs are excessive (though UWAG cannot agree with EPA's "significantly greater" cost test, because it is not based on sound economic principles).

EPA Response

In response to comments regarding situation where there may be no technology that can achieve the performance standards at a reasonable cost, please see the preamble for discussion on site-specific determination of best technology available for minimizing adverse environmental impact. The final rule allows for a comparison between the facility's projected costs of compliance to the costs considered by the Agency. If the facility's costs are significantly greater than the costs considered by the Agency then the Director may make a site-specific determination of the best technology available for minimizing adverse environmental impact.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater than" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

EPA's Designation of a Limited Set of BTA Technologies and the Percentage Reduction Standards Based on Those Technologies Are Defensible Only Because of the Flexibility Provided by the Cost-Cost and Benefit-Cost Tests

EPA's performance standards (80-95% reduction in impingement mortality and 60-90% reduction in entrainment) are based on very general site-specific estimates of what a limited set of technologies (wedgewire screens etc.) can achieve in a few individual cases. But many site-specific factors influence whether a technology can be deployed as a practical matter and what level of performance it can achieve. <FN 42>

Footnotes

42 This is true even for cooling system technologies such as wet recirculating cooling towers, which EPRI studies have shown will not produce predictable reductions in entrainment and impingement corresponding with flow. As an ongoing Oak Ridge National Laboratory study for EPRI demonstrates, there does not seem to be a consistent dose-response pattern between volume of water withdrawn and effects on fish populations. EPRI 2002a.

EPA Response

EPA notes that today's rule, with the exception of compliance alternative 4, does not designate any specific determination to be considered Best Technology Available (BTA).

Please see response to comments 316bEFR.307.064, 316bEFR.311.002 and 316bEFR.063.005.

Comment ID 316bEFR.041.091

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.05

Intake structure technology costs (e.g., screens, etc)

EPA's Cost Estimates Are Not Clearly Explained or Supported

The variability of cost and performance of technologies at different sites is shown in a report by Edward P. Taft and Thomas C. Cook of Alden Research Laboratory, Inc., who also authored EPRI's 1999 Fish Protection Report. The report (Appendix 13 to these comments) reviews EPA's estimates of the costs of intake technologies.

As that review shows, EPA's cost estimates are very general, focusing on a few selected technologies (for impingement, retrofitting fish buckets and return systems to reduce mortality or reducing through-screen velocity to 0.5 feet per second; for entrainment, retrofitting fine mesh screens and fish buckets/return systems, reducing through-screen velocity to 1.0 feet per second, or "fanning" (i.e., expanding) the intake to accommodate the resulting increase in screen area).

EPA's cost estimates, while not necessarily incorrect, are in some cases not clearly explained or supported. For example:

-EPA does not clearly specify whether the design velocity it considered in costing fine mesh screening/fanning (1.0 ft/sec) was the through-screen velocity or the screen approach velocity, nor does it appear to have provided the data from which UWAG could assess whether the 1.5 ft/sec median velocity EPA assumed for existing facilities reflects through-screen or approach velocity. EPA also does not say whether the 1.0 ft/sec design value is a maximum or an average value.

-It is not clear whether EPA included costs for constructing fish handling compliance technology.

-In Box 2-1 of the TDD, costs for underwater installation of t-24 passive intake screens are presented. While these costs may be accurate, it is not clear how they were applied to estimate underwater traveling water screen installation costs.

-EPA does not explain why construction factors for fine mesh screens with fish handling systems are lower than for fine mesh screens alone.

EPA Response

EPA clarified and expanded the set of compliance costs based on intake technologies for the NODA. See comment 316b.EFR.041.651. The Agency provided many more technologies for costing in the NODA, clarified the basis for the cost derivations, and addressed the subject of site-specific factors through the application of the varied technologies.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.05

Intake structure technology costs (e.g., screens, etc)

Site-Specific Factors Will Affect Costs

Many site-specific factors will affect the costs of intake technologies in practice, including the following:

-The possible need to rearrange or relocate pumps and associated piping or to build a new screen array and construct cut-off walls to channel flow so as to achieve the design velocity;

-The possibility that sheet piling may not be possible in some cases, necessitating construction of cofferdams instead;

-The possibility that retrofitting a backwash system requires raising the head shaft/ sprocket in some cases;

-Possible costs to excavate in order to install piping to convey water from screens to an onshore screenwell;

-Possible factors that could increase O&M costs, which EPA calculated as a percentage of capital costs, using a factor taken from the new facility rule.

EPA itself recognizes the importance of site-specific factors and the variability they create. See Phase II TDD at 3-1. But EPA concedes that it did not undertake a systematic data collection effort with consistent data collection procedures, which might have allowed it to develop a performance standard that would account for the site-specific factors. (Similarly, EPA has not collected data to document the reductions in impingement mortality and entrainment achievable by one of the other alternatives it considered, wet recirculating cooling towers.) Nor does EPA claim that requirements that vary slightly based on waterbody type will account for these factors. Instead, EPA has conducted a general analysis that relies mostly on the 1999 EPRI Fish Protection Report, as well as other fairly limited (and largely qualitative) information developed by EPA's contractors.

EPA's proposed performance standards cannot be met at every facility, <FN 43> or cannot be met at a reasonable cost at every facility, because fish populations are not under the exclusive control of plant operators and are subject to wide and unpredictable natural variations in behavior and abundance. The percent reduction in impingement mortality and entrainment that a particular technology will achieve in practice depends on natural environmental conditions, ranging from drought (low river flows) to floods (abnormally high river flows), which routinely occur during prime spawning periods (such as those for game fish like smallmouth and largemouth bass and walleye). The impact and significance of these factors can be determined only by a site-specific analysis.

Site-specific factors influence both (1) where the technology can be located and (2) whether it can be operated so as to maximize biological benefits or even meet the performance standards. As such, these factors determine how effective a technology will be in protecting organisms. Consider, for example, the use of wedgewire screens to achieve optimum hydraulic conditions for fish protection at an existing shoreline CWIS on a river. Such screens need to be placed in an area where ambient currents will carry organisms and debris away from the screens. At one site this might be accomplished easily, at another, a suitable location may not be available due to navigation or other site-specific constraints. See Appendix 14, which is a report by Edward P. Taft of Alden Research Laboratory, Inc., describing the performance of intake technologies in light of EPA's proposed performance standards.

EPA should consider when establishing performance standards that the database of experience with wedgewire screens, fine mesh screens, and aquatic fabric filter systems is biased toward success. The reason is that the database is a research database and not a "compliance" database. That is, the intake technologies were generally tested under near-perfect (and short-term) conditions (including painstaking O&M), thereby optimizing performance. Had long-term testing been conducted, subjecting the technologies to all the challenges of nature, performance would likely have been lower. Because of this bias, it is inappropriate to conclude that the high performances recorded in the past can be standardized for the industry.

This is not to say that fine mesh screens, wedgewire screens, and aquatic filter barriers will not work. It means only that they will not meet the performance standards for all existing facilities and may be very expensive at some sites. <FN 44> EPA recognizes this, to some extent, by setting ranges rather than single-number criteria.

Footnotes

43 Other than fine mesh screens, the proposed technologies have not been proven, or even tested, in Gulf Coast estuaries. Very high aquatic productivity, heavy sediment loading in the water column, intense biofouling communities, and shallow waters can limit the application of fabric filter systems and wedgewire screens in Gulf estuaries. Fine mesh screens (typically 5-10 mm openings) are successful only where limited biological productivity, limited biofouling, and minimal sediment loading permit.

Very high aquatic productivity levels in Gulf Coast estuaries result from long growing seasons, an abundant food supply, freshwater inflows, and prolific intertidal marsh and reef habitats. This intense productivity, although seasonally and diurnally variable, is seen virtually year-round with a myriad of phytoplankton and zooplankton assemblages, abundant nekton species, and invertebrate and mollusk species. These estuaries, where recruitment levels of eggs, larvae, and juveniles are extremely high, are not conducive to the application of fine mesh filtration associated with a cooling water intake structure.

Equally significant are the abundant biofouling communities of American oyster, barnacle species, assorted mussel species, and colonial hydroids present in these habitats, which quickly colonize mechanical equipment that is submerged even for a brief period of time.

In addition, the heavy loading of organic materials, very common in the water columns of these flood-prone estuaries, adds significantly to the problem of restricting water flow through fixed or revolving mechanical devices. Add in the numerous species of comb jellies, other assorted jellyfish species, and the periodic influx of sargassum weed, and two things become clear: (1) aquatic fabric barriers and wedgewire screens may not be functional technologies in Gulf Coast estuaries, and (2) site-specific alternatives are essential for compliance.

44 The desirability even of cooling towers is site-specific, since cooling towers differ greatly in both their cost and their environmental impact from site to site.

EPA Response

EPA recognizes the site-specific factors that are important for consideration of costs. See the Technical Development Document for a further discussion of how the Agency utilized a variety of site-specific construction and operation and maintenance costs in estimating the compliance costs of the rule.

For discussion of the performance standards in the final rule, see the preamble to the final rule.

For a discussion of how the Agency accounts for the implications in cost uncertainty in performance of a range of technologies in varied conditions, see Section X of the preamble to the final rule and the Technical Development Document.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

Because of the Site-Specific Nature of Costs, Feasibility, and Performance, an Alternative to the Performance Standards Is Necessary

More important, EPA recognizes the variability of technology performance at different sites by providing an alternative approach where costs are excessive. It is extremely important to have such an alternative. UWAG itself has said that intake technologies like wedgewire screens, fine mesh screens, and aquatic filter barriers can achieve 90% or better reduction in entrainment and impingement. <FN 45> But UWAG's statement was qualified by the caveat that this level of protection cannot be accomplished at all sites, and that there is not yet a large body of experience using some of these technologies.

Thus, under the proposed rule, if none of the intake technologies EPA used for its performance standards (or other intake technologies or, at the permittee's option restoration projects) would in fact meet those standards, or such measures would achieve the standards only at a cost that is "significantly greater" than the benefits, the permit writer would be entitled to seek site-specific alternative requirements. To make this showing, the permittee would do a site-specific analysis demonstrating the costs and benefits of the alternative technologies, and identifying those that are feasible and the costs of which would not be significantly greater than benefits. The permit writer would set alternative requirements based on this demonstration.

Indeed, UWAG believes that, without an alternative for excessive cost situations, the proposed rule would be insufficient as a matter of law. The evidence in the record to support the use of wedgewire screens, fine mesh screens, and aquatic fabric filter barriers and the type of technology assessment that EPA has performed would not be good enough to establish a pure technology-based effluent limitation guideline under § 301 of the Clean Water Act or a new source performance standard under § 306, which EPA has required be applied uniformly by industry category and subcategory.

Nevertheless, the analysis that underlies EPA's performance standards is not necessarily inadequate as a matter of law, because § 316(b) is not a pure technology-based requirement <FN 46> like §§ 301 and 306, because the interaction between a cooling water intake structure and a waterbody is different from the "discharge of a pollutant" regulated by §§ 301 and 306, and because EPA has provided an alternative for excessive cost situations. Without such an alternative, EPA's analysis would not be adequate under the Clean Water Act or the Administrative Procedure Act. (A requirement for closed-cycle cooling at most or all facilities also would not be justifiable, for the same reason.)

EPA has, in fact, allowed for a site-specific analysis where the costs of meeting the performance standards are too high – in EPA's words, where the costs are "significantly greater" than either the costs EPA considered or the benefits of the technology. But UWAG does not agree that the "significantly greater" test makes sense in terms of economic theory.

Footnotes

45 For example, on page 37 of UWAG's 2000 Phase I Comments, UWAG pointed out that, for the Brunswick Station,

seasonal flow minimization and fine-mesh traveling screens had reduced entrainment by almost 90% for some species and life stages. The fish diversion structure had reduced the density of larger organisms impinged at the plant by 43% and weight by 67%. On page 39, UWAG said that the screens at the Surry Station resulted in a survival rate of over 90%.

46 A technology-based approach looks first at the available treatment technology and how effective it is across an entire industry category, considers its cost, and picks a technology that is "best" for the entire industry category. A water quality-based approach, by contrast, looks first at the desired goal in the water (a water quality standard or, in the case of § 316(b), the goal of minimizing environmental impact) and requires the permittee to find a technology to accomplish the goal. In this sense, § 316(b) is neither purely technology-based nor purely water quality-based. Like water quality-based requirements, § 316(b) begins with a standard of quality in the receiving waters, namely that adverse impact be minimized. This is why UWAG has always insisted that EPA must first define what "adverse environmental impact" is, just as EPA must set instream water quality criteria before water quality-based permit limits can be set plant-by-plant.

EPA Response

For a discussion of the site-specific compliance alternative, please see the preamble to today's final rule.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.03

Available I&E technologies

Technologies that Are Not Feasible at a Particular Site Should Not Have to Be Analyzed in Detail

One case where a cost test should not be necessary, however, is where a technology simply will not work at a site. EPA should clarify that an intake technology that is not feasible at a particular site need not be analyzed in detail. A brief explanation of why the technology will not work at the site should be sufficient.

By not "feasible" we mean that technology, for engineering reasons, simply will not work at a particular site or that there is not enough room at the site to construct it. <FN 47> "Infeasible" would apply, for example, where a particular type of screen would interfere with navigability. Such technologies are not in any meaningful sense "available" for a site and therefore cannot be "best technology available."

For example, in 2002, PG&E NEG was informed by Gunderboom, Inc., that its fabric filter barrier technology could not be installed in either Salem Harbor, where the Salem Harbor Station is situated, or in Mount Hope Bay, where the Brayton Point Station plant is situated, because of interference with navigation and other reasons. Plainly, no purpose would be served by requiring PG&E NEG to do more than simply report this fact to the agency.

The same result might be reached by recognizing that a technology that will not work at a particular site will also fail any benefit-cost test. Certainly it will not maximize net benefits. It will also fail EPA's cost-cost and benefit-cost tests; one might say that the "cost" of meeting the performance standards with a technology that does not work is very large or that the "benefit" is very small, even zero.

But the cost-cost and benefit-cost analyses should not be necessary to eliminate an infeasible technology. When a facility's engineers can show that a technology simply will not work at a site, the facility should not have to do a cost analysis. It should be enough to state concisely to the permitting authority the reason why the technology will not work.

Footnotes

47 The California Environmental Quality Act defines "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technical factors." Cal. Env. Qual. Act § 21061.1.

EPA Response

Today's rule maintains the flexibility for a facility to determine the most appropriate design and construction technologies, operational measures, and/or restoration measures suitable to its location that can best achieve requirements of today's rule. EPA does not require the evaluation of any particular technology for use at a particular facility. Rather, the Agency relies on the best professional judgment of the facility personnel to determine which technologies might be successfully deployed to meet the requirements of today's rule and therefore warrant further investigation.

Comment ID 316bEFR.041.095

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Author Name Hunton & Williams

Organization obo Utility Water Act Group

A Site-Specific Benefit-Cost Test Is Essential

Leaving aside clear-cut cases where a technology will not work, EPA's decision to include a benefit-cost test exception is the key to making the rule viable. However, EPA's test that costs must be "significantly greater" than benefits cannot be supported.

There is no question that costs must be considered when determining BTA. <FN 48> This suggests that principles of economics should be consulted in making the rule. To the economist, the "best" intake structure technology for a given site is the one that maximizes net benefit. The "maximize net benefit" formula is supported by the work of UWAG's consultant NERA, as documented in UWAG's comments on the new facilities rule, and by economics literature generally. See Appendix 12 to these comments; Arrow 1996.

One could write the § 316(b) rule, then, to provide for a site-specific alternative whenever the technology that would maximize net benefits was not one that would meet the performance standards. But this would, in effect, nullify the performance standards and replace them with the "maximize net benefits" test. <FN 49> While that would be a good idea, we are assuming here that the performance standards remain in the final rule and have some teeth as a technical restraint on the economic analysis.

EPA could use the test of costs that exceed benefits by any amount for exempting a facility from the performance standards: no additional technology would be required unless the benefits of using it (mostly in terms of saving fish) would exceed the costs (mostly in terms of dollars spent, but also of adverse environmental impacts of the technology). A technology would not be required if its costs were greater than its benefits by even a small amount, because installing such a technology would decrease the net benefit to society; the public is worse off when a company incurs, say, \$100.01 to provide \$100 worth of benefits. <FN 50>

Footnotes

48 Section 316(b) uses "best available" to describe the technologies Congress wanted EPA to consider for minimizing AEI. Wherever Congress used these words in other parts of the CWA, such as §§ 301 and 306, it meant for costs to be considered. Indeed, §§ 301 and 306 are referenced in § 316 itself as the basis for identifying the dischargers subject to § 316(b) (i.e., those point source dischargers otherwise subject to effluent limitations guidelines and new source performance standards). Moreover, one of the few things the legislative history says about BTA is that it means best technology available "at an economically practicable cost." 118 Cong. Rec. H9130 (daily ed. 33,762, 1972), Leg. Hist. at 264 (remarks of Congressman Clausen for House Conferees).

49 The only difference might be in whether the permittee has the burden of invoking the benefit-cost test. EPA could leave the performance standards in place to apply wherever the permittee did not ask to be relieved from complying with them, leaving the burden on permittees to invoke the benefit-cost test.

50 Although "the public" receives the benefit of more fish, it is also the public that pays the \$100.01 cost in the form of higher prices for electricity or lower return on investments in utility companies.

EPA Response

See responses to 316bEFR.045.012 and 018.009.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

The "Wholly Disproportionate" Standard Is Irrational

One test that clearly can not be supported is the "wholly disproportionate" test. This test says that a facility need not meet the performance standards, and may do a site-specific analysis instead, if the cost of meeting the standards is "wholly disproportionate" to the benefits. This is irrational, because it would require technologies the costs of which were much greater than their benefits, leaving society much worse off than before.

The "wholly disproportionate" test is not consistent with the economic objective of maximizing the net benefits from BTA determinations. It appears to be motivated by an unsupported assumption that measured benefits are consistently and significantly understated compared to costs, perhaps because of perceived limitations in the methods of assessing benefits. Whatever the motivation, improvements in benefit assessment methodologies and empirical studies in the last two decades provide ample bases for using an appropriate benefit-cost test (see Appendix 12 at 66).

How big would costs have to be to be "wholly disproportionate" to benefits? This can be inferred from a handful of court decisions, not all of them in the area of environmental law. A few cases interpret "wholly disproportionate" or similar terms. In State of Ohio v. U.S. Department of the Interior, 880 F.2d 432, 444 (D.C. Cir. 1989), reh. denied en banc, 897 F.2d 1151 (1989), the D.C. Circuit suggested in dictum that "grossly disproportionate" might mean, for example, that damages were three times the amount of use value, that is, a ratio of 3:1. In General Railway Signal Co. v. Washington Metropolitan Area Transit Authority, 875 F.2d 320, 326 (D.C. Cir. 1989), cert. denied, 494 U.S. 1056 (1990), the court concluded that line item figures of $1.3 million were "grossly disproportionate" to estimates of actual costs ranging from $566,000 to $650,000, a ratio of 2.3:1 or less. The court also said that a 161.5% markup to cover profits and indirect costs was "wholly disproportionate" to the relatively modest in direct costs and the 9.73% profit figure contained in an estimate of the costs of the work that included these elements.

UWAG is aware that individuals, perhaps even some at EPA, have speculated that costs might have to go as high as 10 times benefits to be "wholly disproportionate." But so far as we know these statements were oral, unofficial, and unsupported by anything in statute, regulation, or written guidance. From the above-cited precedents it appears that a better guide is that a cost is "wholly disproportionate" if it is 2 or 3 times benefits. That is certainly consistent with plain English; most people asked to pay twice what a house or car was worth would agree that the price was wholly disproportionate.

EPA Response

See response to 316bEFR.005.018.

Comment ID 316bEFR.041.097

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The "Significantly Greater" Standard May Not Be as Bad as the "Wholly Disproportionate" Standard, But It is Still Irrational

EPA proposes to use costs "significantly greater than" benefits as the test for when the performance standards may be abandoned in favor of a site-specific analysis. Clearly EPA intends this to require technologies with costs greater than benefits, but not so much greater as the "wholly disproportionate" test. 67 Fed. Reg. 17,145 col. 3 - 17,146 col. 1.

"Significantly greater than" is an improvement over "wholly disproportionate." But to the extent "significantly greater than" allows choices with negative net benefits, it too is irrational, because it leaves society worse off than before.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.041.098

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

A “Benefits Greater than Costs” Test Would Be Better than “Significantly Greater,” Though Still Not Optimal

A better test for deciding when to abandon the performance standards and resort to a site-specific analysis would be to do so if all the technologies that can achieve the performance standards have negative net benefits (that is, costs greater than benefits). <FN 51> This would not be as good as maximizing net benefits, but it would at least be rational, in the sense that it would not require a facility to choose technologies that make society worse off overall. It would be equivalent to allowing a site-specific analysis if the benefit-to-cost ratio of meeting the performance standards was less than 1:1, though we have tried to avoid using ratios for decisionmaking.

As a legal matter, “positive net benefit” as a decisionmaking standard can be said to grow directly out of § 316(b). Section 316(b) calls for minimizing environmental impacts that are “adverse.” A loss of fish cannot be said to be “adverse” if the alternatives for reducing it would have no net benefit to society.

At least one State implicitly endorses, in effect, a cost-benefit ratio of 1:1. In the Maryland regulations, COMAR 08.03.05.D, Maryland calculates the value of the impingement species lost by estimating the number of each species destroyed and multiplying by values listed in COMAR 08.02.09.01. These factors are weighted by an adjustment factor (1.0 for recreational species, 0.75 for forage species). Dischargers then must install and operate functional modifications to mitigate impingement loss if the additional cost of installation of modifications to intake structures and of operation modifications over a five-year period does not exceed five times the estimated annual value of impingement loss. These approved modifications are defined as BTA. COMAR 08.03.05.D(1)-(2). (Maryland deals with entrainment in a different provision, Regulation .04.)

Footnotes

51 In other words, this formula would merely eliminate the word “significantly” from the test, which introduces a bias based on the unsupported assumption that benefits are typically measured too low or costs too high.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.041.099

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

How a "Benefit-Cost" Test Should Work in Practice

In short, UWAG believes that a sound benefit-cost test would work as follows. Regardless of the numeric performance standards, the § 316(b) rule should require the intake technology (including if appropriate the status quo) that maximizes net benefits.

If EPA retains its numeric performance standards, however, a benefit-cost test should be provided, as it is in EPA's proposed rule, to provide relief from excessive costs. The permittee should have to consider all "available" intake technologies for the site. These would not include technologies that were not feasible for engineering reasons, because these would not be "available" in any real sense. Absent such engineering reasons, though, the permittee would have to assess each of the technologies that EPA has based its rule on – that is, fine- and wide-mesh wedgewire screens, aquatic filter barrier systems, barrier nets, modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems.

If all the technologies that could meet the performance standards were too costly, then the permittee should be allowed to use an alternative, site-specific analysis. For deciding what is "too costly," the "wholly disproportionate" test would be irrational and counterproductive, because it allows decisions that make society not just worse off but considerably worse off. The "significantly greater" test is better, but still irrational and unjustified by the principles of economics. Only a test that would allow a site-specific analysis whenever the cost of meeting the performance standards exceeded the benefits would pass the minimum threshold of rationality.

By whatever test, once a site-specific analysis is allowed, EPA's proposal is that the Director select a less costly technology "to the extent justified by the significantly greater cost." Proposed § 125.94(c)(2), 67 Fed. Reg. 17,221 col. 3. In UWAG's view this should be taken to mean that the technology selected should be the one that maximizes net benefits. That might be the status quo. As EPA has acknowledged, in some cases "no action" may be the appropriate decision.

In any case, it should not be necessary to analyze (1) cooling towers, (2) restoration measures, or (3) operational measures, because they cannot be required under the new rule, only offered voluntarily.

EPA Response

See the preamble for a discussion of the site-specific compliance option.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater than" and "wholly disproportionate" test to assessing the value of alternative CWIS technologies, please see comment

#316bEFR.006.003.

For EPA's response to comments on technologies permittee should evaluate for the cost to cost test, please see comment # 316bEFR.029.039.

Comment ID 316bEFR.041.100

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The Rule Should Allow Consideration of "Equity"

The "maximize net benefits" formula is the only one that satisfies economic theory for serving the public interest. But it is based on maximizing utility to society, and legal standards are about fairness as well as efficiency. In two respects the test may need to be modified in cases where fairness demands. One is in considering money already spent to protect fish before the rule was promulgated. The other is where a net benefit could be obtained for the public but only by a very large expense to the operator of the facility.

1. Past Expenditures May Have to Be Considered in Some Cases

EPA has appropriately recognized that many facilities in states with established § 316(b) programs have already installed protective technologies or taken restoration measures. Just as EPA has allowed credit for such efforts by establishing a "baseline," so EPA should allow the counting of past expenditures in the cost-cost and benefit-cost tests where necessary for fairness.

Benefit-cost analysis considers costs going forward, not costs already incurred. To an economist, the analysis of the efficient protection of fishery resources requires a forward-looking analysis rather than a historical one. It is irrelevant to the economist what costs or benefits have been incurred in the past, and the focus is exclusively on potential actions and the marginal benefits and marginal costs of such actions.

But regulators should have authority to consider, in appropriate cases where fairness requires it, fish protection costs incurred in the past. If the costs of screens already installed before the § 316(b) rule becomes final were "significantly greater" than the costs EPA considered, for example, then the threshold for applying a site-specific analysis may already have been crossed. As noted above, these costs should include the monitoring and studies needed to comply with § 316(b).

Consider, for example, the following hypothetical:

	Cost	Benefit
Baseline	0	0
Existing screens (already installed before the § 316(b) rule)	100	30
Proposed additional new screen or filter to satisfy new rule	10	15
EPA's estimated cost	50	–

Suppose the rule provided for a site-specific analysis if the incremental cost of technology to meet the performance standards was two times (or less) the benefits. By that test, the original screens in the above scenario, having cost $100 to save $30 worth of fish, would not be justified, but in this example they have already been installed. The proposed new modifications, in contrast, are cost-justified (at least by the irrational 2:1 test), because they would cost only $10 to buy $15 worth of benefits. But because the total costs and benefits ($110 versus $45) fail the 2:1 test, the proposed new screens should not be required, out of fairness.

For the same reason of fairness, permitting agencies should be allowed to give credit for the benefits of restoration projects undertaken in the past that reduce the impacts of cooling water intake structures. Under appropriate circumstances, the beneficial effects of restoration projects, both during the permit term and beyond, should be counted toward satisfying the numerical performance standards of § 125.94(b)(2) and (3). Where the performance standards cannot be met by intake technologies without costs "significantly greater" than either EPA's costs or the benefits of the technologies, past restoration projects should, as fairness requires, be counted in the site-specific analysis toward deciding what measures, past and future, are "justified by the significantly greater costs."

2. Regulators Should Be Allowed to Reject a Proposed Technology that Will Impose Inordinate Costs on the Facility

Another exception to the pure "net benefits" test might need to be made where the benefit is small in proportion to the burden on the permittee. The strict "maximize net benefits" test would call for the alternative that produces the most net benefit to society, even if the cost to an individual facility or company is very high, and even if the second-best alternative has a much lower cost and almost as great a net benefit. Consider the following hypothetical:

	Benefit	Cost	Net	Ratio
Baseline	0	0	0	–
Technology A	500	400	100	1.25
Technology B	100,000	99,800	200	1.002

Assume that in both A and B cases the cost is incurred entirely by the facility paying for protective technology, while the benefits are entirely in terms of saving fish, with the benefits accruing to the public generally. In this case Technology B has a greater net benefit to society than Technology A (twice as great, in fact), but it also costs the utility an enormous amount more. In this case some departure from the "maximize net benefits" test is desirable and should be allowed by the proposed rule. (Using a benefit-cost ratio would provide relief in this case, but we have said already that using ratios for decisionmaking is not favored.) EPA's rule should allow regulators to deal with "distributional" issues like this one.

EPA Response

See Comment ID 316EFR.005.020 for EPA's response on "maximize net benefits".

In regard to the comments that past expenditures should be considered in the cost tests, EPA disagrees because the purpose of the rule is to reduce impingement mortality and entrainment from what is the status quo today. Therefore, the baseline for assessing costs associated with the requirements of the rule starts with this final rule. However, in the final rule there are several compliance alternatives where existing design and construction technologies, operational measures, and/or restoration measures are considered for meeting the performance standards. See the preamble to the final rule for additional information on cost tests and compliance alternatives.

Comment ID 316bEFR.041.101

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Costs and Benefits Should Be Counted in Their Entirety

Whatever benefit-cost test is used, it will be valid only if the costs and benefits it considers are accurate and complete. EPA would do well to provide guidance on techniques for valuing costs and benefits.

1. Costs Should Be Counted Completely

In calculating the costs of an intake technology, the permit writer should take into account the unique aspects of the site, its size, its proximity to population, and local ordinances that affect cost. Most of the costs could be covered by a specific set of non-water quality impact cost factors. Additional capital costs and O&M costs must first be considered. Schedule-related issues on brownfield or site-limited sites should be considered, because if construction limitations call for a longer construction schedule, the cost of construction funds can increase project cost by up to $80 million for a 1200 MW gas-fired combined-cycle plant. Costs should also include noise abatement costs, visual protection/landscaping, loss of land value, and purchase of emission credits. Finally, the costs of sampling and studying the waterbody should be included.

In the preamble to the proposed rule EPA discusses how rigorous and “empirical” any cost estimate should be. 67 Fed. Reg. 17,152. It is not clear what EPA means by “empirical.” If it means that permittees should use reasonably reliable sources of cost data, such as the experience of the permittee or other companies, vendor estimates (which EPA itself relies on heavily), and supportable engineering studies, then EPA’s point is well-taken. But if EPA is attempting to suggest some sort of standard for the quality of cost data, it should say exactly what it means.

EPA Response

In response to the comment on the meaning of the word "empirical", used by the Agency in the preamble to the proposed rule, please see Merriam-Webster's Collegiate Dictionary.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.041.102

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.07.03
RFC: Test: benefits should justify the costs

EPA Should Clarify How "Benefits" Should Be Determined

To apply a benefit-cost test, the "benefits" of a technology must be quantified. In essence, this means determining the value of the fish or larvae that are saved from entrainment or impingement mortality.

Unfortunately, some of the methods used in EPA's own analysis of the "benefits" of the proposed rule are unsound. EPA should correct the impression that these methods are appropriate for benefit-cost analyses in individual cases. The most egregious example is the use of the habitat replacement cost (HRC) method to use costs as a proxy for benefits. This error is discussed above. <FN 52>

In addition, EPA should provide guidance on the use of contingent valuation (CV) methods, since badly designed CV studies can be seriously misleading. Contingent valuation is a controversial methodology, especially for § 316(b) purposes. The contingent valuation method for estimating the value of natural resource services involves a direct survey of individuals to elicit their willingness to pay (WTP) for different levels of services. For example, the survey might ask respondents the maximum amount they would be willing to be pay for a 25% increase in fish catch at a particular site. The CV method requires that people be able to express their value for marginal changes in fishery services and, furthermore, that their responses to hypothetical questions indicate their actual valuations of the changes described in the questions.

For determining non-use values (the satisfaction people derive from the mere existence of a fish, even if they never intend to use it), <FN 53> CV may be the only available method. However, CV presents great methodological challenges, and a CV study must be carefully designed if it is to be useful. In the context of § 316(b), it is very hard to believe that there are high non-use values for marginal improvements in fish populations such as are at issue in most § 316(b) cases. It is one thing to believe that people value the very existence of an endangered species, and quite another to conclude that they value a one percent increase in a population of gizzard shad or menhaden.

The main shortcoming of the CV method is that it relies on responses to hypothetical questions instead of observations of actual behavior. When people are asked the amount they would hypothetically be willing to pay for some commodity, they have little incentive to answer carefully. Economists have long felt that observations of actual behavior more accurately reflect preferences than responses to hypothetical questions. For non-use values, though, there are no behavioral trails to be followed (Arrow 1993 at 3).

Moreover, CV fish evaluation studies typically include both use and non-use values, focus on highly valued game fish, and use a policy that results in a large increase in the fish population. CWIS applications, in contrast, typically involve only use values, common sport fish species, and relatively small changes in fish populations. Therefore, using estimates from CV fishing studies for a CWIS-related cost-benefit analysis may require careful interpretation.

Elsewhere in these comments UWAG has recommended ways in which benefits of fish protection should be determined. EPA might do well to clarify the following points:

-The valuation of benefits must take into account that some species have lower values than others. Appropriate models are available to value noncommercial and nonrecreational species (i.e., forage species).

-The "benefits" of a technology should not include organisms that are spared entrainment if they would have survived entrainment unharmed. Rather, benefits should be adjusted to reflect survival rates where data on survival rates are available.

-Benefits should be reduced to reflect density dependence in fish populations. If the lower density resulting from the loss of a thousand larvae would cause the population to produce, say, 750 additional larvae, then the benefit of preventing a loss should be adjusted accordingly.

-"Benefits" of a technology should include providing protected habitat or warm water for manatees, shore birds, etc.

Footnotes

52 In describing UWAG's proposal for the existing facilities rule, EPA erroneously states that "UWAG believes use of existing EPA cost-benefit calculation methodologies, such as those used for natural resource damage valuation under CERCLA and NEPA would be sufficient." 67 Fed. Reg. at 17,165. UWAG cited to EPA's natural resource damage valuation process, and EPA's BEN model, only as examples of tiered approaches to developing site-specific cost-benefit information. See UWAG Phase I NODA Comments, pp. 103-08. UWAG explicitly stated that it did not endorse use of EPA's natural resource damage valuation process or the BEN model in § 316(b) determinations.

53 See K. Arrow et al., Report of the NOAA Panel on Contingent Valuation (Jan. 11, 1993).

EPA Response

The comment states that EPA has used unsound methods in its benefits analysis. This comment refers to EPA's proposed rule analysis. For the final rule analysis, EPA has made significant changes in its methods and applications.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see the response to comment # 316bEFR.005.035.

The comment states that EPA should provide guidance on the use of CV methods. For EPA's discussion of the appropriateness of using stated preference methods in the context of the 316(b) regulation see the Notice of Data Availability (67 FR 38752). The Agency notes, however, that its benefits analysis does not rely on original CV studies, so there is no need to explain the shortcomings of CV studies.

The comment says that it is hard to believe that there are high non-use values for marginal improvements in fish populations. However, no empirical evidence is presented to support this belief. For EPA's response to comments regarding evidence for non-use values for temporary losses to common species, please see the response to comment #316bEFR.306.302.

The comment states that the analysis must take into account differences in values for different fish species. EPA does account for differences in value for different species of fish. The RUM models estimate values for different species or species groups, and the benefit transfer for the Inland Region uses different values for different species groups. See Chapter 4 in Parts B through H in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003).

The comment mentions that appropriate models are available to value forage species, but does not give a specific example of such models. EPA does use a trophic transfer model to translate foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. This method, however, allows to estimate indirect use value of forages species. There may well be nonuse values that still pertain to all forage fish, and especially to the forage fish that are not adding to biomass in landed fish (as the latter are overlooked in the current valuation context). Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

For additional information on EPA's conclusions about entrainment survival, please see response to Comment #316bEFR.306.506 and Chapter A7 of Part A of the Regional Study Document for the Phase II rule.

For a discussion of density dependence in the context of the 316b rulemaking, please see EPA's response to Comment #316bEFR.025.015.

The final regulation does not require technologies that will change water temperatures. For a discussion of the effect of hot water discharges and manatees, please see EPA's response to comment #316bEFR.051.016.

Comment ID 316bEFR.041.103

Subject Matter Code 10.1

General: cost tests

Author Name Hunton & Williams

Organization obo Utility Water Act Group

A Cost-Cost Test is Appropriate

In addition to the benefit-cost test for departing from the performance standards, EPA proposes a cost-cost test: A site-specific analysis could be used if the cost of meeting the performance standards was "significantly greater" than the costs EPA considered in making the rule.

The "significantly greater" test here is not necessarily irrational, as it is when applied to costs and benefits. Here it is analogous to the "fundamentally different factors" exception to national technology-based effluent limitations. As such, UWAG cannot say it is unreasonable, so long as the difference between projected cost at the site and EPA's estimated cost that is required to meet the test is not too great.

However, EPA needs to clarify how permit writers should identify the costs EPA considered in setting the rule. According to the preamble, the permittee interested in using the cost-cost test would "consider the model plants presented in EPA's Technical Development Document, determine which model plant most closely matches its fuel source, mode of electricity generation, existing intake technologies, waterbody type, geographic location, and intake flow and compare its engineering estimates to EPA's estimated cost for this model plant." 67 Fed. Reg. at 17,144 col. 1-2. According to the Phase II TDD, the costs developed for 539 plants and presented in Appendix A to the TDD would form the basis of comparison. Phase II TDD, p. 2.1. It is not clear how the permit writer is to distinguish among 539 plants to find the one that most closely matches the permittee's facility. UWAG applauds EPA's attempts to provide a wide range of model plants, and this method may provide appropriate flexibility for comparing complex engineering costs, since such costs are affected by a variety of site-specific factors. But further clarification of the model plant selection process is warranted. <FN 54>

Footnotes

54 UWAG notes that Appendix A to the Phase II TDD does not provide the geographic locations of the 539 listed plants. EPA says that geographic location is "an important factor for the consideration of installation capital costs" but explains that the Agency "could not reconcile a means to protect a limited amount of confidential business information claimed by respondents to the questionnaire and the need to provide this data to the public for the purposes of evaluating this proposed cost test option." Phase II TDD, p. A-1. Apparently EPA intends to release the geographic location information at a later date. Id. UWAG reserves the right to comment more fully on this cost test when this information becomes available.

EPA Response

The Agency agrees with the commenter's assessment of the reasoning behind the cost-cost test, the cost benefits test and the term "significantly greater."

The Agency addresses the issue of implementing the cost-cost test in section IX.H of the preamble to the final rule and in response to comment 316b.EFR.410.001.

Comment ID 316bEFR.041.104

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

EPA'S PROPOSAL TO PERMIT RESTORATION ON A VOLUNTARY BASIS IS GOOD POLICY

UWAG agrees that restoration should be one way of satisfying § 316(b). Restoration activities might include, among other things, fish hatcheries and stocking, wetlands restoration or creation and other types of habitat improvement, removing barriers to fish migration, and creating artificial reefs. Restoration projects created in the past, as well as those undertaken after the rule becomes final, should all count toward compliance with the new rule. On a site-specific basis, such measures may have more potential to achieve net environmental benefits for the waterbody than intake technologies and operating restrictions.

A. Experience with Restoration Projects Has Been Good

Clearly restoration projects are good for the environment. For example, fish stocking as a restoration effort is practiced by Quad Cities Station as a means to offset fish impingement. Biological monitoring and trending of standing crop estimates in the Mississippi River pools that are stocked by Exelon have demonstrated a 30% recruitment in certain game species resulting from these stocking efforts. The Illinois and Iowa departments of natural resources have acknowledged this remarkable accomplishment and continue to be strong supporters of the fish-stocking program on the Mississippi River. Restorations achieve measurable results and are also well received by the public and by government agencies.

It is sometimes argued that the language of § 316(b) forbids consideration of environmental enhancements in place of CWIS technological modifications. UWAG agrees that environmental enhancements are not "intake structure technologies" and thus that § 316(b) does not authorize regulators to require them. However, § 316(b) does require the regulator to determine, in the first instance, whether AEI is occurring. Because past restoration measures directly affect the AEI determination, they enter the § 316(b) determination process well before the regulator reaches the question of what CWIS technologies are the "best available" for minimizing AEI. Thus, that existing environmental enhancements are not CWIS technologies does not make them irrelevant to the AEI inquiry.

As for proposed environmental enhancements offered during the BTA assessment phase of § 316(b), EPA has considered and accepted voluntary environmental enhancements in several § 316(b) permitting decisions. See, e.g., In the Matter of Florida Power Corp., Crystal River Power Plant, Units 1, 2, and 3 Findings and Determinations, NPDES Permit No. FL0000159 (Sept. 1, 1988) (authorizing a fish hatchery program "in an attempt to replace fish and shellfish eggs, larvae, and juveniles entrained" by the facility); Fact Sheet for John Sevier Decision (Application No. TN0005436) Region IV (1986) (finding fish stocking and monitoring program were "appropriate measures for compliance with Section 316(b)"). Other examples are provided by the Salem and San Onofre stations.

There is no principled reason to change this approach in the § 316(b) rule, and there are good policy reasons to allow regulators the flexibility to evaluate environmental enhancements that will offset impingement and entrainment losses. Where a permittee's operation of a CWIS causes effects that otherwise would constitute AEI and those losses either can be addressed or significantly offset by restoration measures that benefit not only the species of interest but also the ecosystem as a whole (such as wetlands restoration, fish ladders, and aquaculture activities), it makes little or no sense from a public policy perspective to automatically require installation of an intake technology instead. This is especially true where the cost of upgrading CWIS technology (together with other relevant factors such as the remaining useful life of the facility) weigh against requiring an investment in technology.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. All restoration measures must meet the requirements described in the final rule, including those under sections 125.94 and 125.95. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the use of existing restoration projects and of the role of ancillary benefits from restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.041.105

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.05

RFC: Info. to include in a restoration plan

A Permittee Should Be Able to Propose a Restoration Project After the Permit Application Is Submitted

UWAG is concerned that EPA's proposed rule may, albeit unintentionally, preclude permittees from developing and submitting restoration projects after their permit applications have been submitted. Proposed § 125.95(b)(5), 67 Fed. Reg. 17,223 col. 3, implies this when it says that "if you propose to use restoration measures to meet the performance standards in § 125.94, you must submit the following information with your application for review and approval . . . ." This could be read to suggest that a permittee has only one chance – when it puts together its study plan and submits its permit application – to propose restoration. This is neither practical in all cases nor necessary. Such a limitation would serve only to constrain unnecessarily the development of useful projects and, ultimately, of trading that might use such projects.

UWAG does not believe that EPA intended to propose such a limitation. Rather, we think it is an artifact of inconsistencies and problems inherent in EPA's proposed framework for permit application and compliance. UWAG has identified many such issues, described elsewhere in these comments. UWAG recommends that EPA address this issue when it revises, as we hope it will, the overall framework and deadlines for permit application and compliance.

EPA Response

EPA believes this comment pertaining to the timing of submission of information has been addressed in the final rule.

Comment ID 316bEFR.041.106

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Evaluating the Performance of a Restoration Project Is Different from Monitoring Intake Structure Performance or Discharges of Pollutants

If restoration is offered as a means of complying with § 316(b), requirements for monitoring compliance should be flexible. It is not possible in many cases to verify by monitoring that a particular project (a wetland, for example) has a specified impact on the aquatic community. The permit writer should be satisfied so long as the permittee verifies that it has created or restored the number of wetland acres that were agreed to.

As an important first step, the scope and nature of the agreed-to environmental restoration project should be documented in the permit or another binding document. Schedules of implementation and any appropriate monitoring plans also could be documented. Because of the many possible types of restoration measures and the varied ways they may interact with the environment, EPA should avoid attempting to limit in advance the type of monitoring measures or other types of demonstrations that might be used to evaluate restoration projects for § 316(b) purposes. Instead, EPA should make restoration projects subject to some form of evaluation, leaving it to the regulator to decide, based on his best professional judgment, what constitutes an acceptable demonstration of the project's efficacy.

The scope of the evaluation of restoration measures may depend in part on the degree of uncertainty surrounding the project. A restoration projection that involves an experimental technique or is unproven in a certain environmental setting may be subject to more rigorous evaluation than a restoration that is routine, like fish stocking. In any case, however, the scope of the evaluation should be scientifically reasonable and should not impose an unreasonable burden of proof. One possible approach is to agree on the size of the enhancement project in advance, based on an expert evaluation of how much of the CWIS losses the enhancement would replace, and then rely on structural criteria to measure compliance.

Monitoring to demonstrate effectiveness of a habitat enhancement program must not be required to count fish or larvae as replacements. An alternative approach might be that physical environment measurements (such as changes in elevation that enable certain habitats to proliferate or aerial photo imaging over time that demonstrates habitat expansion in conjunction with a specific program) are more acceptable monitoring parameters. Even in these cases, we must caution EPA that if other uncontrolled factors may be impacting the habitat evolution, they should be taken into consideration in the monitoring program.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others. Evaluation and monitoring difficulties are two reasons why restoration measures may not be suitable for a particular site.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule contain a significant amount of flexibility.

Comment ID 316bEFR.041.107

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Proving Fish-for-Fish Replacement Should Not Be Expected

While habitat restoration is a valid and important alternative, and UWAG commends EPA for including a restoration alternative in the proposed rule, we have a number of cautions regarding the application of the HRC approach to validating that a restoration project offsets resource and ecosystem losses. In most cases, proving this offset biologically (that is, demonstrating that an equal or commensurate number of larvae or adult fish of some or similar species are replaced by restored or enhanced habitat) is an unreasonable if not impossible task. In most waterbody situations, particularly estuarine environments, the number and variety of impacts on the waterbody are far too complex to reasonably correlate habitat improvements with long-term and complex species population variations.

For these reasons, we strongly recommend that any true-up mechanisms for demonstrating the success of habitat restoration and its correlation to CWIS effects be confined to physical demonstration achieved by use, for example, of aerial imaging to verify changes in water quality (clarity), habitat quality and quantity, and sedimentation as determined by bathymetric measurements. These type of verifications avoid the much more difficult and variable biological demonstrations of species replacement, which are subject to too many other impacts in most cases to accurately correlate to CWIS-related changes.

In short, UWAG does not believe that reliance on the HRC approach for demonstrating replacement of biological losses is a valid, defensible, or reliable method. However, the Habitat Equivalency Analysis model itself, given adequate availability of species data, may be able to serve some purpose in acting as a "reality check" on general mitigation acreage requirements of the habitat restoration/program.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others. Evaluation, scaling, and monitoring difficulties are some reasons why restoration measures may not be suitable for a particular site.

EPA is not requiring in the final rule any one method for scaling. For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule are written with a significant amount of flexibility.

Comment ID 316bEFR.041.108

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

"Restoration" Should Be Broadly Defined to Allow a Range of Beneficial Activities

Habitat restoration should be clearly and broadly defined to include habitat protection measures. That is, if a habitat will facilitate the propagation of species lost at the CWIS, then protection of such habitat from sedimentation, erosion, and water pollution should be encouraged where there is evidence that expansion of such habitat will accommodate species population increases.

The Habitat Equivalency Analysis (HEA) process is a useful tool for evaluating restoration projects. Application of the HEA in many cases will vividly illustrate the value to an ecosystem of a habitat restoration or enhancement. The overall productivity resulting from the acre that replaces adult equivalent loss may be tens of times that of the simple species adult equivalent loss. Evaluation of the HEA model (such as at Morro Bay, California) can illustrate how the energy transfer, for example from vegetative biomass such as eel grass to fish, consumes less than one percent of the total energy provided by the habitat food base. Thus the vast majority of the system's energy flows into the system, a situation that does not occur when entrainment is simply prevented or when aquaculture simply replaces the eggs or larvae.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.041.109

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Restoration Has Long-Term Benefits

The long-term and broad-ranging benefits of restoration (or habitat conservation) can be significant. Unlike intake technologies, restoration produces benefits beyond the life of the plant.

Allowing restoration of wetlands to satisfy the § 316(b) rule would be consistent with the national policy of preserving, protecting, and enhancing wetlands. The Corps of Engineers recently opened for comment a "Draft Estuary Habitat Restoration Strategy," which has a strategy of restoring one million acres of wetlands nationwide. Allowing voluntary restoration under the § 316(b) rules would be consistent with this national program.

The long-term nature of benefits from restoration projects has implications for how restoration, when it is voluntarily offered, should be counted toward compliance with the proposed rule. If restoration is offered as a means of meeting the numerical performance standards, the analysis of how much reduction is accomplished in impingement mortality and entrainment should take into account that the increase in fish from the restoration project will continue far into the future. Similarly, if restoration is offered as part of a site-specific analysis because intake technologies have failed either the cost-cost or benefit-cost test, deciding what level of effort is "justified by the significantly greater costs" should take into account the fact that the restoration will benefit the aquatic community for years into the future. Indeed, whenever a restoration project is compared to an intake technology to determine whether the restoration project is comparable to the technology, the longer life of the restoration project should be counted.

EPA Response

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.041.110

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration Options Should be Flexible

In order to maximize the ability of facilities, States, and other stakeholders to achieve the benefits of restoration, flexibility is necessary. To restore or improve fisheries and other aquatic resources that are potentially affected by impingement and entrainment losses often requires taking action on several fronts. Limiting factors for fisheries and other aquatic resources might include low dissolved oxygen due to excessive nutrients, lack of suitable spawning habitat due to high sediment loads, migratory obstructions, etc. Resource managers and other stakeholders on most waterbodies where generating stations are situated are taking actions on multiple fronts to address such issues to increase beneficial use of aquatic resources.

Voluntary restoration projects should be encouraged as much as possible, and that means allowing permittees to undertake a broad range of such activities, so long as they can satisfy the permit writer that they will benefit the aquatic community. For example, projects that are distant from the facility site should be allowed, and also projects that would help species different from the ones impacted by entrainment or impingement. When restoration measures are evaluated to address impingement and/or entrainment losses, the benefit increases when such actions support or complement the overall waterbody restoration or enhancement goals.

For example, gizzard shad and threadfin have been stocked in many southern and midwestern water bodies to provide forage for game fish. These species are commonly impinged and entrained yet are not considered depleted or at risk in most waterbodies, and few resource managers would consider it meaningful to have facilities engage in aquaculture or other actions to increase populations of these species. However, they may consider it of high value for a facility to engage in similar actions to increase populations of recreational species that may not be subject to impingement or entrainment or, if so, only in very small numbers. For example, at PEPCO's Chalk Point Station in 1988, the facility was determined to have the potential for adverse impact to bay anchovies in the Chesapeake Bay due to entrainment. The anchovy is an important forage fish in the Bay and along the Atlantic Coast generally. To address this issue, the Maryland authorities agreed to the use of restoration measures using aquaculture.

However, rather than have the facility raise anchovies, the State asked the facility to raise and stock striped bass, which at the time were on the State's threatened species list. After recovery of the striped bass, the State had the facility raise and stock American shad, another protected species in the Bay. Striped bass were not entrained, and only a small number of juveniles were impinged; American shad were neither impinged nor entrained. But Maryland in this case realized a much greater benefit in advancing its fishery management goals by having the flexibility to select species for restoration other than those affected by impingement or entrainment.

Additionally, instead of direct restoration of habitat by permittees, non-profit foundations or trusts could be established that would provide financial support to environmental restoration projects within a watershed or region. Examples include the Hudson River Foundation (http://www.hudsonriver.org) and the Great Lakes Fishery Trust (http://www.glft.org).

UWAG believes that the key elements for successful use of restoration measures are as follows:

-Actual physical improvements to waterbody and aquatic resources should occur. These physical improvements should be favored over programs that result in indirect benefits to the waterbody (e.g., purely educational programs).

-EPA should not require that facilities, when using restoration measures, “replace” impingement and/or entrainment losses on a quantitative species-by-species basis. Instead, natural resource management agencies, in consultation with the permittee, should have the flexibility to restore depleted commercial or recreational species, or threatened and endangered species, consistent with the overall fisheries or restoration management goals for the waterbody.

-For many waterbodies the loss of wetlands, submerged aquatic vegetation or other suitable spawning areas is a well-documented limiting factor for resident fish species. Restoration of these habitats is clearly of benefit to the waterbody. But it is very difficult and time-consuming, and often technically infeasible, to quantify the principle effects of habitat restoration. UWAG is not opposed to reasonable monitoring and verification for restoration measures, but there should not be a requirement to conduct detailed quantitative studies to relate productivity from habitat restoration on the one hand to impingement or entrainment losses on the other.

EPA Response

EPA believes there is flexibility in the final rule in the use of restoration measures. The final rule allows permitting authorities to make decisions on the feasibility of restoration projects on a site-specific, case-by-case basis.

For a discussion of the role of the permitting authority in determining specific needs for a restoration measures, see EPA’s response to comment 316bEFR.060.026.

For a discussion of the extent to which restoration measures may address state program priorities, see EPA’s response to comment 316bEFR.099.029.

For a discussion of the extent to which restoration measures are voluntary, see EPA’s response to comment 316bEFR.060.022.

Restoration measures must result in production of fish and shellfish, including maintenance of community structure and function, within a facility’s waterbody or watershed. For additional discussion of the appropriate spatial scale for restoration measures, see the preamble to the final rule.

EPA agrees that actual physical improvements to the waterbody or watershed or aquatic resources should occur from a restoration measure.

All restoration measures must meet the requirements of the final rule, including those described in sections 125.94 and 125.95.

Section 316(b) Does Not Authorize Mandatory Restoration

UWAG agrees with EPA that restoration measures should be voluntary. The Clean Water Act gives no statutory authority for requiring restoration.

EPA may believe that restoration measures can be required as part of intake structure "design," according to EPA's own interpretation of that statutory term. EPA also may believe that the courts would defer to this interpretation under the doctrine of Chevron v. NRDC, 467 U.S. 837 (1984). But UWAG believes that is not the case.

1. The Chevron Decision Would Not Justify Mandatory Restoration

The Chevron decision prescribes how courts should review an Agency's interpretation of a statute it is charged with administering. In Chevron, the rule in question defined the term "source," for purposes of new source review under the Clean Air Act, to include an entire facility, rather than each stack or activity within a facility. The U.S. Court of Appeals for the D.C. Circuit found that the statutory language and legislative history did not indicate conclusively what Congress meant by "source" but struck down EPA's rule on the ground that EPA was changing prior policy without documenting the impact of such a change on air quality. The Supreme Court reversed, finding that Congress had not spoken directly to the issue in question and that EPA's rules reflected a permissible construction of the statute.

The Chevron case does not justify mandatory restoration under § 316(b) for the following reasons. First, an interpretation authorizing mandatory restoration would be inconsistent with the plain language of the statute. Section 316(b) gives EPA specific and limited authority to require that the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." Restoration projects are clearly not the design of cooling water intake structures, as the statute requires, nor is any "technology" associated with such requirements reflected in the design of the structure. Rather, the restoration projects that we understand EPA has in mind would involve projects done on and for the benefit of a waterbody or some other environmental medium. They would not involve technologies applied on or to the CWIS.

2. An Intake Structure Is a Structure

Nor can EPA credibly claim that it is free to define "cooling water intake structure" to include attributes of the waterbody that are wholly unrelated to any structure by which cooling water enters a facility. EPA's General Counsel has put forth some guidance on the meaning of "cooling water intake structure."

For example, in General Counsel Opinion No. 41, EPA distinguished CWISs from cooling systems, showing that it recognized that intake structures have limits. It would not be credible to interpret the term “intake structure” to give EPA authority to impose requirements that permittees design restoration projects for the general benefit of a waterbody or other environmental medium. See, e.g., Walton v. Hammons, 192 F.3d 590 (6th Cir. 1999) (agency may not ignore traditional tools of statutory language or resolve any apparent statutory ambiguity).

3. An Agency May Not Create Authority that Congress Has Not Given It

The fact that the CWA does not specifically prohibit EPA from imposing restoration also does not justify EPA’s action. Nothing in the Chevron decision suggests that an agency may create any requirement that it thinks is a good idea and that Congress has not had the foresight to prohibit. Rather, a rule must reflect a permissible construction of the statute under which Congress has granted the agency authority to act. The specific authority Congress has given EPA is to set technological requirements for the location, design, construction, and capacity of cooling water intake structures, as necessary to minimize adverse environmental impact. Even if the specific terms are open to some interpretation, nothing authorizes EPA to go beyond the basic jurisdictional grant – i.e., establishment of technological controls for cooling water intake structures. And, as noted above, there simply is no credible way to stretch the term “cooling water intake structure” to cover a whole waterbody (much less other environmental media, which EPA also has talked about as candidates for “environmental restoration”). See, e.g., Lopez-Flores v. Resolution Trust Corp., 93 F. Supp. 834 (E.D. Mich. 2000) (gap-filling activities may increase depth of the penetration of a statute into the affairs that were intended to be regulated, but they may not expand scope of agency’s authority into the external universe of topics that Congress neglected or purposefully omitted).

EPA Response

For a discussion of the extent to which restoration is voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of the authority EPA has to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.041.112

Subject Matter Code 11.11

RFC: Mandatory restoration approach

Author Name Hunton & Williams

Organization obo Utility Water Act Group

UNDER THE PROPOSED RULE, PERMIT WRITERS WOULD NOT BE AUTHORIZED TO REQUIRE RESTORATION MEASURES TO BE ANALYZED UNLESS THEY WERE VOLUNTEERED BY THE PERMIT APPLICANT

By the terms of the proposed rule itself, restoration measures are to be voluntary. It follows that, when a permit applicant analyzes its alternatives for meeting the numerical performance standards, it need not include restoration as one of the alternatives. If a suitable restoration project is available, however, the permit applicant can at its option include it as a possible means, alone or in combination with intake technologies, of achieving a reduction in impingement mortality and entrainment that is in the required range.

If none of the available intake technologies can achieve the performance standards at the site, the permit applicant will have to show that the cost of achieving them is “significantly greater” either than EPA’s estimated costs or the benefits. A site-specific analysis of alternatives will then be required. Again the permit applicant will be able to offer a restoration project as a way of complying with the rule, but the applicant can not be required to seek out a restoration project.

This is, UWAG believes, what EPA intends. The current proposed rule could be interpreted, however, to suggest that a permittee wishing to seek a site-specific limit could be required to accept a limit based not just on alternative technologies, but also on a restoration requirement (or operating restrictions). See proposed § 125.94(c)(2), (3), 67 Fed. Reg. 17,221 col. 3. To prevent this misinterpretation (which would, in any case, exceed EPA’s authority under the CWA), EPA should refine the language of the proposed rule accordingly. EPA should clarify that voluntary means voluntary and prevents the permit writer from requiring consideration of restoration projects in both the above-described situations.

EPA Response

For a discussion of the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of the consideration of design and construction technologies before choosing restoration measures, see EPA's response to comment 316bEFR.033.005.

Under the final rule, a permit applicant seeking a site-specific limit could be required to accept a limit based on design and construction technologies, operational measures, and/or restoration measures.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

SECTION 316(b) DOES NOT AUTHORIZE EPA TO REQUIRE STATES TO SET ADDITIONAL CWIS LIMITS

In proposed § 125.94(e), EPA says that the Director may establish more stringent requirements if necessary to meet the requirements of other applicable Federal, State, or Tribal law. 67 Fed. Reg. 17,222 col. 1 (April 9, 2002). See also proposed § 125.90(e), 67 Fed. Reg. 17,220 col. 1 (April 9, 2002). This proposal is not required by § 316(b) or any other section of the CWA.

A. EPA Should Not Encourage More Stringent § 316(b) Requirements Under Color of State Law

EPA authorizes States to apply any additional requirements the State deems necessary to implement State law, including State water quality standards (designated uses, criteria and antidegradation policy). This provision is inconsistent with the statute, unnecessary, and bad public policy.

1. Section 510 of the Clean Water Act Merely Preserves State Authority to Set More Stringent Standards Under State Law – It Does Not Create Such Authority

Section 510 of the CWA provides that "except as expressly provided in this chapter" nothing in the CWA displaces the authority of a State to impose more stringent requirements than are required by federal law. We might concede that this gives the states the ability, under State laws or rules adopted wholly independent of the CWA, to impose more stringent requirements. However, we do not believe this gives States the authority to impose more stringent requirements for CWIS – which the CWA regulates only under § 316(b) – under the auspices of State water quality standards adopted by states pursuant to the federal CWA. In other words, § 510 does not preserve a State's ability to interpret requirements adopted pursuant to federal law (i.e., technology-based requirements adopted under § 316(b) and water quality standards adopted by a State to satisfy CWA § 303(d) and approved by EPA) more stringently than EPA has.

Nowhere has EPA adopted any rule saying that limitations on cropping of fish by CWIS (or any other intake or instrumentality, for that matter) are necessary or appropriate parts of State water quality standards (which focus primarily on water quality conditions, not on use of resources). Nowhere has EPA suggested how cropping might factor into the designation of uses or the setting of criteria for parameters necessary to attain those uses. And nowhere has it adopted any rule or offered any guidance suggesting how cropping effects might be factored into the antidegradation policy EPA has established in its water quality standards rules. In fact, one can look through many volumes reflecting years of water quality standards rules, criteria, and guidance without finding any allusion to cropping effects. Thus, it is totally inappropriate for EPA to suggest that States should be allowed to interpret (or re-interpret) such standards to cover cropping, when neither the States nor EPA have ever interpreted them as covering cropping before.

2. More Strict State Requirements Would Create Uncertainty

As a practical matter, the proposal to encourage State requirements is unwise for four reasons. First, it undermines the certainty that EPA says it intended to supply with the rule, both in the long and the short term.

Second, like EPA's position on revisiting § 316(b) at each permit cycle (EPA also invites permit writers to rethink § 316(b) requirements every five years), this provision could leave permittees guessing about what requirements they may have to meet and expose them to massive costs (and potentially inconsistent requirements) both on initial permit issuance and every five years thereafter, which could make many plants uneconomic.

Third, if EPA really means only to satisfy § 510, this provision is totally unnecessary. Section 510 would apply by its terms regardless of whether EPA reduces it to a rule (although EPA's rule, as we have said, goes far beyond § 510), and including such a rule only creates a new problem: does the rule itself now create an independent, federal requirement that CWIS meet water quality standards in some fashion?

Fourth, there is no apparent vehicle by which such requirements could be applied because, other than § 316(b), the Act gives authority to impose limits only on discharges (not intakes). Also, application of standards would infringe on resource management and allocation decisions typically made by other arms of state government. Is EPA eager to see States apply water quality standards for cropping to commercial and recreational fisherman as well? What about intakes for process water that are not even covered by EPA's data?

B. State Water Quality Standards Do Not Justify Additional Intake Requirements

For the reasons described above, water quality standards as we know them are ill-adapted to providing a basis for imposing CWIS requirements and would provide at best an open-ended and arbitrary standard. Most States adopted their standards over 25 years ago, based on little or no real data (either on uses attained or pollutant values needed to attain uses). Standards almost uniformly focus on water quality parameters, usually expressed as acceptable concentrations of specific pollutants. The exception is biological criteria, which an EPRI report (submitted as part of EPRI's comments on the proposed Phase I rule for new facilities) showed were poor predictors of CWIS effects. EPRI 2000. EPA appeared to agree with this view in the rule for new facilities.

Section 316(b) is a narrowly drafted provision, unique in the CWA, that requires the application of certain technologies that qualify as the "best available" and are relevant to specific attributes of a CWIS, where necessary, to minimize AEI.

Furthermore, all limits must be applied through the NPDES permit program under CWA § 402, 33 U.S.C. § 1342. The NPDES permit program applies only to point source discharges – not to intake structures of any kind. While § 402 authorizes permits that require compliance with both §§ 301 and 316 (§ 402(b)(1)(A)), nowhere does it suggest that Congress intended to give EPA or States authority to impose additional limits on intake structures based on water quality. CWISs directly affect aquatic organisms, not water quality. The emphasis that § 402 places on discharges of pollutants, and limits on those discharges – with the sole exception of its one reference to § 316 – shows that this was not Congress' intent. In an analogous context, the United States Court of Appeals for the District of Columbia Circuit agreed, saying that § 402 allows EPA to impose limits on discharges to protect water quality only, not other attributes of the facility. See Natural Resources Defense Council v. EPA, 859 F.2d 156, 169-71 (D.C. Cir. 1988). <FN 55>

Further evidence of this is found in the water quality standards themselves. They consist of designated uses and numeric or narrative “criteria” for pollutants, <FN 56> which reflect State or federal judgments, adopted by rule, about what levels of pollutants will protect the designated uses. <FN 57> See 40 C.F.R. § 131.3(b) (1999) (criteria are elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing the quality of water that supports a particular use (emphasis added)).

Although we understand that EPA has begun to encourage the States to adopt “biocriteria” that attempt to measure, based on biological indices, the health of a waterbody, EPA has no rule requiring such criteria. Nor should it, since such criteria have not been widely validated for many waterbody types and may not be feasible for some types of waterbody. In short, State water quality standards are not well adapted for precise interpretation with respect to § 316(b)-related effects. EPA should not invite State reinterpretation of water quality standards in this proceeding.

Finally, such a rule is simply unnecessary to achieve an appropriate level of protection. In adopting § 316(b), Congress recognized that it was important to protect aquatic populations and communities from over-cropping but that technological availability and cost also are relevant. This is the same sort of analysis a State can and should make when it sets water quality standards, which Congress said should take into account attainability of designated uses. See CWA § 303(c)(2)(B), 33 U.S.C. § 1333(c)(2)(B) (states shall set standards that include the highest uses whenever attainable, after considering the use and value of waters for various uses, including industrial use). Section 316(b) allows both a better-calibrated, site-specific assessment of whether CWIS effects will cause “adverse” environmental effects and a more accurate assessment of what level of minimization is attainable than a water quality standard ever could.

Footnotes

55 As the NRDC Court stated:

EPA can properly take only those actions authorized by the CWA – allowing, prohibiting, or conditioning the pollutant discharge. And, contrary to EPA’s assumption, the CWA does not empower the agency to regulate point sources themselves; rather, EPA’s jurisdiction under the operative statute is limited to regulating the discharge of pollutants. Thus, . . . the agency is powerless to impose permit conditions unrelated to the discharge itself. . . . EPA may not, . . . under the guise of carrying out its responsibilities under NEPA, transmogrify its obligation to regulate discharges into a mandate to regulate the plants or facilities themselves. To do so would unjustifiably expand the agency’s authority beyond its proper perimeters.
Id. at 169-70.

56 EPA also has said that “antidegradation” provisions are enforceable components of the standards. But under EPA’s water quality standards regulations, those provisions too apply only to water quality and effects on water quality, not to intake effects. See 40 C.F.R. § 131.12 (1999).

57 In other contexts, EPA has suggested that State and federal permit writers should “interpret” their designated uses or narrative criteria on an ad hoc basis, whenever they are concerned about a pollutant for which the State has not adopted a criterion. See 40 C.F.R. § 122.44(d)(1999). While the United States Court of Appeals of the D.C. Circuit upheld this rule in a challenge brought by industry, it also clarified that any ad hoc interpretation proposed in a permit must be justified by an adequate record and remain subject to challenge. See American Paper Institute v. EPA, 996 F.2d 346 (D.C. Cir. 1993). In any case, this rule, which until now has been EPA’s only regulation governing when and how water quality-based limits may be established, speaks to the establishment of limits only on pollutant discharges, not intake structures. EPA may not reinvent its interpretation of the water quality provisions of the statute without a good reason, and it does not have one in this

case.

EPA Response

Today's rule recognizes a State's authority to adopt more stringent requirements. EPA disagrees with the commenter's assertion that today's action encourages states to adopt more stringent 316(b) requirements. Rather, as the commenter correctly notes, EPA is fulfilling its obligation under § 510 of the Clean Water Act to maintain a State's authority to determine for itself if more stringent requirements are appropriate.

Comment ID 316bEFR.041.114

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

EPA'S PROPOSED TRADING AND BANKING PROGRAMS ARE GOOD POLICY

EPA has proposed trading and banking programs for § 316(b). UWAG strongly supports trading and banking. They are desirable because they are flexible and market-based and can be watershed-based. They are also consistent with EPA's long-term strategy of emphasizing market incentives and other nontraditional regulatory mechanisms instead of "command-and-control" regulations. See EPA Strategic Plan 2000.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.041.115

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.03

Spatial scale for entrainment trading

Trading should be allowed among facilities (1) on the same waterbody, (2) in the same watershed, and (3) among all coastal stocks in the oceans. EPA should allow one species to be traded for a different species, if the trade makes sense for the management of fishery resources.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale of trading. EPA expects that it would have difficulty approving programs that do not trade numbers of the same species because EPA does not believe it is possible at this time to quantify with adequate certainty the potential effects on ecosystem effects on ecosystem function, community structure and biodiversity when one species is traded for a different species.

Comment ID 316bEFR.041.116

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.04

RFC: Potential trading units/ credits

At 67 Fed. Reg. 17,171-72 EPA discusses what units (or credits) might be used for trading. As EPA's discussion shows, several different approaches have their various benefits and limitations. The suitability of any one of these approaches depends on the species of fish, its life history, the lifestage that is of concern, and other site-specific factors. Therefore, EPA should keep the trading system flexible and allow a variety of units to be used. With time, experience may show that some units work better than others, but limiting the types of units at the outset would limit the ability to gain that type of experience.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading.

Comment ID 316bEFR.041.117

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Hunton & Williams

Organization obo Utility Water Act Group

EPA NEEDS TO CLARIFY WHAT DATA NEED TO BE COLLECTED

A. Permittees Should Be Able to Use Existing Data for the Comprehensive Demonstration Study

EPA's proposal to allow the use of existing data, so long as the data still reflect current conditions, is appropriate and important. Starting fresh with new studies and ignoring already-existing data would be expensive and inefficient.

EPA Response

EPA agrees that existing historical data, as long as it reflects current conditions, should be available for use in completing studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.041.118

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Some of the Criteria for the Impingement and Entrainment Characterization Study Should Be Clarified

EPA invites comment on whether the narrative criteria it uses to describe the required impingement mortality and entrainment characterization study <FN 58> "are sufficiently comprehensive and specific to ensure that scientifically valid, representative data are used to support the various approaches for determining best technology available for minimizing adverse environmental impact." <FN 59> 67 Fed. Reg. 17,148 col. 3. EPA further invites comment on whether it should set specific minimum monitoring frequencies or specific requirements for dealing with the uncertainty inherent in biological sampling. Id.

EPA's proposal requires characterizing (a) the biological community and (b) the vicinity of the intake and mentions "community-level" information. It is not clear what "in the vicinity" means or what use community-level information has in applying the rule. EPA should clarify these points.

In general, due to the differences between aquatic biota and the environments they inhabit, specifying sampling frequencies and attempting to deal with uncertainty in some abstract fashion is not effective. The permittee, having evaluated available data and being familiar with the facility's operation, is in the best position to design an appropriate sampling program. The permittee also has a strong interest in reducing – to the degree feasible – the uncertainty of any study results. It is simply impossible to set generic sampling standards that would be equally effective in all locations. Therefore, the rule should provide that the permittee, with review and approval from its permitting authority, should design and implement an impingement mortality and entrainment characterization study and that the resulting report should describe areas of uncertainty.

EPA's criteria for the characterization study are quite rigorous, and EPA should explicitly recognize that the characterization study need not present comprehensive, site-specific data for all the criteria EPA lists. For example, the proposal requires the permittee to conduct enough sampling to define diel variations in species location (due to such factors as climate/weather differences, spawning, feeding and water column migration). Proposed 40 C.F.R. § 125.95(b)(3)(ii). Even a several-year period of sampling may be inadequate to capture and assess the diel movements of numerous species.

For these reasons, EPA should endorse the appropriate use of literature information on species behavior as a surrogate for some portions of the characterization study. For example, it is well documented that some estuarine species (such as herrings, anchovies, and opossum shrimp) generally move into deeper waters during the daylight hours to avoid predators and disperse up into the water column at night to feed.

The permittee ought, therefore, to be able to use available literature to make reasonable assumptions about fish movements when there is no reason to suspect that site-specific conditions interrupt a species' normal behavior. Literature information may also be important in identifying species likely to be "most susceptible" to impingement and entrainment and in estimating likely impingement mortality. In short, the characterization study, while documenting the primary species most susceptible to impingement mortality or entrainment, should rely on a mix of information from various sources, including scientific literature, previous studies of the facility, and, where necessary, newly collected data.

Footnotes

58 As pointed out in other sections of these comments, UWAG strongly recommends that EPA focus on entrainment survival, rather than entrainment, due to the proven, high entrainment survival rates for some species.

59 Apparently, EPA means to refer to § 125.95(b)(3) in this comment request, rather than § 125.95(b)(1).

EPA Response

EPA agrees that the permittee is in the best position to design an appropriate sampling program; because of this, EPA has required a sampling plans to be included when a facility submits a Verification Monitoring Plan. Today's rule also specifies requirements for the Technology Installation and Operation Plans and Restoration Plans, if used. All of the parameters presented in the plans must be reviewed and approved by the Director.

EPA also agrees that existing information pertaining to the species found in the vicinity of a facility's intake is acceptable for use in the Comprehensive Demonstration Study, and will welcome information from a variety of sources so long as they are reflective of the species or conditions at the facility. For EPA's position on using historical data, please see EPA's response to comment 316bEFR.034.005.

Regarding the definition of "in the vicinity" of the facility, EPA disagrees that it should put forth a "one-size-fits-all" definition. The permittee and Director will be best positioned to determine which species are located in the vicinity of, and therefore potentially affected by, the facility's intake.

Finally, the term "community-level" refers to the assemblage of species found at a facility's intake.

Comment ID 316bEFR.041.119

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 21.03
Monitoring requirements

Compliance Monitoring Should Be Tailored to the Technology and the Site

Any compliance monitoring requirement in the permit should be tailored to the intake technology selected and the amount of data already collected. Further, once the permittee has completed its compliance monitoring for the initial permit term, it should not be required to repeat the monitoring after every permit renewal.

For innovative, largely untried technologies, the rule should be especially flexible and allow permittees to tailor a reasonable monitoring plan to the technology. For emerging technologies with more experience, more monitoring might be required than for established technologies. For established technologies, the permittee should have to demonstrate only that the technology approved by the permitting agency has been properly installed, operated, and maintained.

EPA proposes that verification sampling be done once a month for impingement and biweekly (every two weeks) for entrainment. This, again, is too inflexible. The sampling schedule should be tailored to the needs of the site.

EPA Response

EPA agrees that compliance monitoring should be tailored to the needs of the site. For this reason, in each of the monitoring plan submittals, the permit applicant must specify monitoring parameters for review and approval by the Director. Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.041.120

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

NUMERIC PERFORMANCE STANDARDS CANNOT BE USED AS NUMERIC PERMIT LIMITS

A. Under UWAG's Simpler Alternative, Compliance Monitoring Should Be Based On Technology Operation and Maintenance Requirements

As indicated in Section VI, UWAG's simpler alternative to EPA's performance standards approach involves selecting the most cost-effective technology from EPA's list of recommended technologies, taking into account site-specific factors. Under UWAG's alternative, permit conditions relating to § 316(b) would address only whether the permittee properly operates and maintains the selected and approved technology. Permit conditions, for instance, might require the permittee to inspect the technology regularly and document its inspections. The conditions might also require the permittee to maintain the technology according to the manufacturer's recommendations. In any event, since the UWAG alternative does not use impingement/ entrainment reduction performance standards to address technology selection, it would be infeasible to apply such performance standards as a compliance measurement, because there would be no "baseline" data to measure reductions against. Further, as discussed in Section VI, there is no legal reason why a technology-based regulation under § 316(b) has to have numerical standards. EPA may adopt other, non-numeric permit conditions.

EPA Response

Please see response to comment 316bEFR.307.064 and 316bEFR.311.002. Please see response to comment 316bEFR.029.040. For a discussion of Technology Installation and Operation Plans and their role in compliance with the requirements of today's rule, please see the preamble. In addition, EPA agrees that it is not required under section 316(b) to express today's requirements as numerical standards. EPA's decision today to express the rule's requirements both numerically and non-numerically reflects EPA's attempt to ensure that all facilities within the scope of Phase II would implement what was for them the best technology available for minimizing adverse environmental impact.

Comment ID 316bEFR.041.121

Subject Matter Code 21.04
Determination of compliance

Author Name Hunton & Williams
Organization obo Utility Water Act Group

If EPA Retains the Performance Standard Approach, Compliance Monitoring Should, At the Most, "Benchmark" Reductions

UWAG firmly believes that its site-specific approach, or its simpler EPA-recommended technology approach (Section VI), are more valid and defensible regulatory options than EPA's performance standards. If EPA nonetheless persists in its conviction that technologies ought to be chosen on the basis of its proposed performance standards, the best solution for compliance monitoring would be to use operation and maintenance permit conditions, as suggested above for the UWAG approach. If, after installation of the chosen technology, there remains a significant degree of uncertainty about how well it is working, the permitting authority would have the option of requiring a reasonable amount of impingement/entrainment monitoring, considering site-specific circumstances, during the permit term. The results of the monitoring would be measured against the performance standards, but the standards would be considered benchmarks or targets, rather than rigid limits. If the technology's performance fell short of the performance standards, the permittee would have the option of demonstrating that the cost of achieving additional incremental controls necessary to meet the target was not warranted by either the cost-cost test or the cost-benefit test.

In any event, and under any regulatory option that EPA may choose, it is important that compliance with any numeric performance standards or targets not be judged during the permit term, but rather in the subsequent permit renewal process. In most cases, it is simply not feasible to evaluate biological monitoring data over the course of a few months and reach any firm conclusion.

EPA appears to acknowledge the need for an approach of this kind in the preamble to its proposal. 67 Fed. Reg. 17,143 col. 3. There, it specifically asks for comment on whether compliance with appropriate operation and maintenance requirements should be used as the gauge for compliance with the permit, so that any shortcomings in technology performance vis-à-vis the performance standards would trigger only evaluation of other possible technology alternatives. UWAG agrees with this concept and suggests that EPA follow the approach outlined above to implement it.

EPA Response

EPA disagrees that monitoring should be conducted only to gather information or should be discontinued if a facility achieves the performance standards. However, EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. For a discussion of how compliance is to be determined, please see , e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

For an explanation of why EPA did not choose UWAG's recommended approach, please refer to the final rule preamble section VII. E., Major Options Considered for the Final Rule and Why EPA Rejected Them.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

PERMIT REQUIREMENTS MUST ALLOW FOR THE TIME NEEDED TO COLLECT DATA, ANALYZE IT, AND DESIGN, INSTALL, AND TEST INTAKE TECHNOLOGY

Because of the unusual nature of § 316(b), a good case can be made that it should be a one-time only requirement – that is, once "best technology available" is determined for a plant, installing and operating that technology ought to relieve the plant of further § 316(b) obligations for life. The "location, design, construction, and capacity" of the cooling water intake structures are matters of design and construction, not operation, and Congress could not have intended that power plants be in the business of redesigning, demolishing, and reconstructing key components of their physical plant every five or ten years.

Taking into account § 316(b)'s uniqueness in the CWA scheme, the most appropriate way to apply it would be as the National Environmental Policy Act (NEPA) is applied to, for example, a construction permit: a one-time review designed to achieve minimal "adverse environmental impact" at a reasonable cost.

If, on the other hand, EPA holds to its proposal to implement the § 316(b) rule by requirements in NPDES permits (which have to be renewed every five years), then two important questions arise. First, how are new requirements of the rule to be implemented for the first time? Second, what effect is the new rule to have on subsequent permit renewals that must take place every five years over the life of a facility?

A. The Application Process Requires Certain Steps to Be Completed, Some of Them Time-Consuming

A permit application addressing § 316(b) will presumably have to be submitted 180 days before an existing permit expires. The 180 days is the time provided in the current permitting regulations between permit application and expiration of the permit to allow for agency review.

EPA's Information Collection Request (ICR) (DCN:4-0001) raises puzzling questions about EPA's intentions as to the initial implementation schedule. For example, on page 47, the ICR says that 350 of the 539 in-scope facilities are scheduled to have permits issued during the first three-year ICR period (9/2000-8/2004). It adds that:

These facilities [i.e., the 350] will be on an accelerated schedule and thus will receive their permits as scheduled. Since these are existing facilities, it is assumed that they will be able to draw on some existing data. In addition, EPA assumes that these facilities will have reopener clauses included in their permits to allow for the results for the Impingement Mortality and Entrainment Characterization Studies to be submitted after permit issuance and for the permits to be modified based on the results of these studies, if necessary. The remaining 189 facilities will not receive their initial permit renewals until after the ICR approval period, and thus will have the full three years to perform their Impingement Mortality and Entrainment Characterization Studies prior to receiving their initial permit renewals.

Although this passage is not entirely clear, it does recognize the need to consider where a permittee is in the application process when the § 316(b) rule becomes final. For example, a permittee who has already submitted an application for permit renewal when the new rule comes out in the Federal Register should not have to go back and rewrite the application to satisfy the new rule. Likewise, a permittee who is only a few days or weeks before the deadline for application cannot be expected to comply with the new regulation on the old permitting schedule.

Moreover, EPA needs to give some thought to the different amounts of time that will be required to determine what will satisfy the new rule at different sites. Consider a best-case situation, where a facility already has performed a § 316(b) demonstration, where the data are still representative of current conditions in the waterbody, and where no additional construction or modification of the intake structure or installation of screens will be required. Even then, a permittee still might require six months to analyze existing data to demonstrate compliance with the 80-95% impingement mortality reduction and 60-90% entrainment reduction and then to write up a permit application.

A different facility might need far more time. It could easily require two, three, or even more years of biological monitoring to collect the data needed to calculate the impingement mortality and entrainment for the baseline, determine what technology might be required, calculate the impingement mortality and entrainment reduction to be accomplished by the new technology, and write up all this information in a permit application. If part of the solution was to create or improve a wetland, even more time would be needed to find a suitable wetland site and prepare a plan for improving it, let alone for doing the work and monitoring its success.

1. The Best Way to Implement the BTA Requirements Would Be to Impose a Permit Condition Setting Out a Process for Choosing BTA

The best way to implement the § 316(b) rule would be to have the permittee, as part of its permit application package, propose a schedule for developing the data collection plan, getting approval from the Director, collecting and analyzing the data, using the data to assess technologies, and preparing the BTA recommendation. This process, once approved by the permitting agency, would be written into the permit as a permit condition, as would be the physical implementation or installation of the BTA once it was selected.

The permit could require that once the technology was finally selected, it would be installed within a certain amount of time (which time limit would have to be chosen carefully, since at the time the permit was written the choice of technology would not yet be known). Alternatively, the permit could be modified, once the technology was chosen, to require that it be installed and operated. This would allow permits to be issued faster and eliminate most of the timing problems.

2. Time Must Be Built In for Agency Review

In the schedule described above for gathering data and choosing BTA, time must be allowed for the permitting agency (the Director) to review and approve the key steps. For example, the Director will need to approve the data collection program and also, later, the permittee's choice of technology. The § 316(b) rule should make clear that time for agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition.

3. A “Grandfather” Period Is Needed for Permittees Who Are Very Near the Application Deadline

If EPA does not adopt the above-suggested reasonable approach of prescribing a data collection and analysis schedule in the permit, it will have to be much more careful about thinking through the timing of the § 316(b) requirements in the future. For permittees who have applied already for a permit renewal when the § 316(b) rule becomes final and are thus in the period of agency review of the application, the permittee should not have to redo its application on account of the new rule. In such a case, the succeeding five-year permit term should be the time in which the permittee complies with the new rule.

Similarly, if the new rule becomes final when a permittee is very near the time when his or her renewal application is due (for example, between 18 months and six months before his permit expires), it would be almost as unreasonable to require him to adjust his application process to the new rule. The practical difficulties in preparing a permit application, especially if biological monitoring is needed, suggest that the new rule should not apply, until the succeeding permit term, to anyone who has 18 months or less until his permit expires when the § 316(b) rule becomes final.

4. Time Is Needed to Collect Data and Prepare the Application

Assuming a permittee is more than 18 months away from having his permit expire (that is, more than 12 months away from having to file a renewal application), then it might be reasonable to expect him to complete an application to comply with the new rule during the present permit term. Whether this is possible depends on the permittee’s situation. UWAG has said all along that how § 316(b) applies is site-specific, and that is as true of scheduling as of biology.

a. Collecting Data Will Take Time

If the permitting authority expects to approve a permit requirement for new § 316(b) technology, then it will have to have a good deal of information. Assuming that some change will be required to meet the 80-95% and 60-90% reduction criteria, such as new fine mesh or wedgewire screens, then the applicant will have to provide, and the agency will have to review, several things. First, the permittee may have to collect biological data. In particular, if the facility is subject to the entrainment standard and its present configuration is not a shoreline intake with no impingement or entrainment reduction controls, then the permittee may have to sample the density of entrainable eggs and larvae at the place where such a baseline intake structure would have been placed. It may have to collect these data at certain times of the year when eggs or larvae are present, such as the spawning season, and this monitoring may have to be done for several different species. Then the egg and larvae density data will be used, along with information about the volume or flow of the waterbody and the intake flow, to model the number of eggs and larvae entrained for the baseline, for the existing intake technology, and for any new intake technology that may be required. An analysis will have to be done for impingement as well. <FN 60>

b. Analysis and Preparation of the Permit Application Will Take Time

The permittee then will have to calculate the impingement mortality and entrainment at the plant as it is now configured to determine whether the 80-95% and 60-90% criteria are met by the plant “as is.”

If not, the permittee must explore new technologies, such as installing wedgewire screens, fine mesh screens, or an aquatic filter barrier. The permittee then has to do an analysis to show that one or more new technologies would reduce impingement mortality by 80-95% and (except for lakes and a few other waterbodies) entrainment by 60-90%. This analysis might have to be done for a variety of technologies and combinations of technologies, and the permittee might choose to analyze restoration measures or operating restrictions as well. If the costs are too high, the permittee may opt to do a site-specific cost-cost or a cost-benefit analysis of available technologies. The results then would have to be written into a permit application and the data presented in a format that allowed the permit writer to review them.

c. Preparing the Application Could Require Two Years or More

Depending on the complexities of the site and the amount of data already available, then, preparing an application could take two or more years – let us say at least two years to collect data and half a year to analyze the data and write a permit application. Even this 2½-year period might not be enough to compare alternative intake technologies and design a new set of screens, let alone plan a wetland restoration. For a facility that required all this work before an adequate application could be completed, it would be unreasonable to require a completed application less than 2½ years after the rule became final.

d. EPA Could Allow a Simpler, Interim Application

One solution would be to require a complete application in compliance with the new rule only for permittees whose permits are due to expire more than three years after the rule becomes final (thus allowing 2½ years to prepare the application before it is due). A shorter period could be provided if the application was not required to have the final answer of what BTA to install, but rather a conceptual plan for gathering the biological data and designing the intake technology.

Thus, EPA could require a full-fledged application with proposed technology for permittees whose permits expired more than three years after the rule becomes final and no compliance with the new rule (until the following permit term) for those with only one year or less left to prepare an application for renewal (that is, 18 months or less before permit expiration) when the rule becomes final. EPA could require a more abbreviated, conceptual application (including a plan for data collection and analysis) for those in the middle – those with less than three years before their permit expires (that is, less than 2½ years before the application is due) but more than one year before the application is due. Thus:

Time Before Permit Expiration When § 316(b) Rule Becomes Final

[see hard copy for figure]

If a less ambitious, conceptual application was allowed for people in the middle group, it would have to satisfy the permit writer that the permittee had an adequate plan for collecting data. The permit, when issued, would need to allow a reasonable compliance schedule for collecting the data, designing new screens or procuring an aquatic filter barrier, installing the equipment, and testing it. This compliance schedule should take into account what seasons of the year data might have to be collected in and should provide for doing construction, installation, and testing during planned outages so as to minimize the impact on electric power supply.

e. Despite the Need for a Grandfather Period, EPA Should Allow a Facility to Choose to Comply with the New Rule Early

Notwithstanding the timing requirements outlined above, some facility operators may prefer to meet the requirements of the new § 316(b) rule even though they are already well into the application process when the rule becomes final. EPA should permit such operators to choose to comply with the new rule earlier than required, rather than take advantage of any grandfather period that might be allowed. Although a grandfather period is definitely necessary, the rule should not require anyone to use it.

B. Time Is Needed to Install and Test Equipment

Even a permittee who has time to prepare a complete application by 180 days before his permit expires will need a compliance schedule after the permit is issued, if changes in the intake are needed to satisfy the new rule. He will need this in order to install and test the new screens or filter or fish return system. A compliance schedule should provide for installing the new equipment during a regularly planned outage. If part of the solution was restoring a wetland or building a fish hatchery, of course, more time might be required. The rule should allow for this contingency.

C. It Would Be a Mistake to Make the New Rule Immediately Effective and Rely on Administrative Consent Orders While New Technology Was Being Installed

Because so much time has passed since § 316(b) was originally enacted by Congress, there may be some inclination by EPA to make the technology requirements of the new rule immediately effective. Since this would put some facilities overnight in violation of the law, it probably would violate due process. EPA might try to alleviate the hardship by some stopgap measure such as wholesale resort to administrative consent orders.

However, it would be neither fair nor appropriate to make the requirement for BTA immediately effective and then use administrative consent orders to suspend enforcement until the technology could actually be installed. Nor is it necessary to do this. EPA has the authority to define "compliance" as an approved program or plan for collecting the necessary data and choosing and installing appropriate technology.

Section 316(b) says that "[a]ny standard established pursuant to Section 1311 of this title or 1316 of this title and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). In this sense, § 316(b) is tied to the "standards" of § 301. (Since the present rulemaking is for "existing" facilities, the reference to "standards of performance for new sources" in § 306(b)(1)(B) does not apply.)

Section 301(b) provides that "best practicable control technology" and water quality standards-based limitations should have been achieved by July 1, 1977. 33 U.S.C. § 1311(b)(1)(A). "Best available technology" requirements for toxic pollutants are to have been achieved no later than 1981. § 1311(b)(2)(C), (D). Finally, §§ 301(b)(2)(E) and (F) provide for compliance in no case later than

March 31, 1989. Thus, the requirements of § 301 for "existing" facilities, according to Congress' original intent, are supposed to have been achieved by March 31, 1989.

Nevertheless, this cannot mean that the § 316(b) rule for existing facilities must be effective by that date. The reasons are three:

1. The statute does not say that the § 301 deadlines apply to § 316(b). The statute is (at best) ambiguous on the deadline for § 316(b), and EPA is entitled to interpret it in a reasonable way.

2. It is impossible to have immediate compliance with a rule that will require in many cases biological studies, analysis, design, and construction. Congress could not have intended that existing facilities comply with a complex new § 316(b) rule instantaneously.

3. It would be a denial of due process of law to require immediate compliance with a new rule that requires expensive and time-consuming construction.

Section § 316(b) is separate and distinct from § 301 and does not itself contain a deadline. It is hardly necessary to point out here that "best technology" under § 316(b) is different and distinct from, for example, "BAT" under § 301. The § 301 standards apply to the discharge of pollutants; § 316(b) regulates features of intake structures. All § 301 says is that § 301 standards "shall require" that § 316(b) be met; it does not say when.

Moreover, § 316(b) clearly requires, at least in some cases, significant construction. It is not possible to comply with regulations that require construction instantly upon promulgation of the regulations. It would be irrational to suppose that Congress intended instantaneous compliance, especially since in other sections of the Act Congress painstakingly laid out schedules for phasing in new requirements.

Finally, it would violate due process to require instant compliance with a new rule that requires extensive analysis and construction. The Due Process Clause of the Constitution requires that regulated entities have reasonable notice of legal requirements to which they will be subject. There can be no reasonable notice when a new requirement is made to apply instantly.

The notion of throwing many facilities into noncompliance and solving the problem by consent orders is a very poor one. Consent orders may carry the stigma of breaking the law and may not prevent citizen suits by third parties. EPA would do better simply to write a reasonable compliance schedule into the rule and provide for compliance schedules in NPDES permits.

D. Reasonable Compliance Schedules Are Necessary to Avoid Disruption of the Permitting Process

The above scheduling concerns are important because of fairness to permittees, but they are important also for practicality. If EPA were to make the new § 316(b) rule immediately applicable, it would lead to more, rather than less, delay in the NPDES permitting process. For one thing, the available consultants who can help with biological monitoring and design of intake technology would undoubtedly be overworked and would have to put many permittees on waiting lists. Moreover, negotiations over consent orders might well bog down the permit process in some States. Undoubtedly the backlog of unprocessed NPDES permit applications would grow worse. Reasonable compliance schedules are a matter of administrative necessity as well as of fairness to permittees.

Footnotes

60 There is a current shortage of trained larval taxonomists, especially those capable of identifying freshwater larvae. UWAG believes there may be only 12-15 freshwater larval experts nationwide. Therefore, if many facilities need to perform studies requiring larval identification within a short period of years, there will be an extreme shortage of experts capable of performing this work.

EPA Response

See response to comment 316bEFR.040.011.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

The Time Needed for Compliance Monitoring Differs from Site to Site

Since § 316(b) is different from either the water quality-based requirements of § 303 and § 301(b)(1)(C) or the technology-based requirements of §§ 301 and 306 and since EPA's performance standards are based on certain specific intake technologies that EPA has found to be effective (wedgewire screens etc.), the most appropriate way to ensure compliance would be to require the permittee to install one of the selected technologies and then monitor simply to be sure that it was being maintained and operated correctly.

As EPA has constructed the rule, facilities may need to do impingement/entrainment compliance monitoring, but only as specified by their permitting authority. Proposed 40 C.F.R. § 125.96. This flexibility make sense, since many facilities have been thoroughly studied and their regulators have adequate data already about the performance of impingement/ entrainment reduction equipment. Yet EPA also would require facilities subject to the rule to design and submit a two-year plan for compliance monitoring. Proposed 40 C.F.R. § 125.95(b)(7). This provision may, for all practical purposes, remove the flexibility provided in § 125.96, because regulators may simply require that the submitted two-year plan be carried out, without considering whether such a plan is necessary in light of existing data or adequate to access accurately the efficacy of the installed technologies.

To take another example, on larger river systems like the Mississippi River and Illinois River, it may take as many as 10 years to effectively demonstrate that new technology has achieved reductions consistent with EPA's performance standards. This may indicate a need to perform source water sampling after the monitoring phase. Such monitoring is costly and subject to seasonal river variations that may have to go on for years until such time as an improvement in impingement or entrainment can be demonstrated. In Midwest river systems that are subject to river flooding in the spring and summer, flooding may coincide with typical fish spawning periods. At such times environmental conditions would have more impact on entrainment than intake technology would. It would be difficult to compare a reduction in entrainment or impingement numbers and take credit for it when environmental conditions, not newly installed technology, would be determinative.

But a period of two years as a minimum is needlessly inflexible. At some facilities, much less than two years of monitoring will be required. This would be the case, for example, if a plant had collected copious data already and if no change to the plant was required by the new rule. On the other hand, two to five years of monitoring might be required at some estuarine sites where fish populations vary widely from year to year.

If biological monitoring is required, UWAG recommends that, after a verification monitoring period, the data should be analyzed to determine whether the newly installed technology is indeed achieving 80-95% reduction in impingement mortality and 60-90% reduction in entrainment. As long as the data showed performance within these ranges, the technology should be deemed to comply with the rule. For example, if the entrainment reduction technology was predicted to reduce entrainment by 85% but in fact achieved only 80%, that should be sufficient.

Assuming the data showed performance within the ranges, then no further biological monitoring should be required. Instead, the permittee should be required thereafter simply to monitor and document that it continued to operate and maintain the technology.

If the initial monitoring showed that the technology was not achieving reductions with the performance standards, on the other hand, then there seems to be no fair alternative but to provide for a period of additional study to determine what went wrong and what should be done to fix it, including the replacement of the technology with something different, if necessary and if the cost is not excessive.

EPA Response

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director. For a discussion of EPA's reasons for choosing a two-year minimum monitoring period, see the preamble and other comment responses in this record.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Permit Terms Should Use Appropriate Averaging Times

As already noted, the best solution to the compliance issue would be to require in the NPDES permit that the appropriately selected intake technology be installed and then maintained and operated properly. The alternative of requiring a permittee to prove periodically that he is entraining or impinging a specified percentage of fish would be highly variable, very expensive, technically unsound, and unfair.

Suppose, however, that EPA retains its numeric performance standards and that a permittee has chosen a technology (wedgewire screen, fine mesh screen, or aquatic filter barrier) that it predicts will reduce entrainment (compared to the baseline) by 75%, thus meeting the entrainment performance standard. How should the permit requirement be written to implement its commitment to install and operate this technology?

Because of the variability of biological systems and the lack of control that a permittee has over fish and shellfish in the water, it would be unfair to write a permit term requiring the permittee to reduce entrainment by 75% or, for that matter, to achieve any fixed numerical limit on the biomass or number of organisms entrained. Any performance within the specified ranges of 80-95% and 60-95% should count as compliance.

Over what period of time should the percentage reductions be calculated? As suggested above, the permittee would be required to monitor for a period of time, which would be two years or less for most plants and possibly up to 5 years for some estuarian plants. The averaging time for determining compliance should be the period of monitoring, usually two to five years. Thus, if a plant were required to monitor for two years after installation of new technology and calculated that the technology reduced entrainment by 50% the first year and 70% the second year, for a two-year average of 60%, then it should be considered in compliance with § 316(b). Because of the natural fluctuation of aquatic populations, a short averaging time would be unfair.

But a longer averaging time can be unfair as well. For example, if the plant has monitored for two years and discovered only at the end of that time that it has not achieved the 60-90% reduction in entrainment, then it might, in theory, face two years' worth of penalties for "noncompliance." For the same reasons as cited above (the natural variability of aquatic populations and the lack of control of the permittee), failure to meet the performance standards after several years of monitoring should not be considered a "violation." It should be a signal that additional study is needed, with a suitable compliance schedule for improving performance.

The above recommendation means that, once the permittee has demonstrated that his technology performed within the performance standard ranges, he would have only to maintain and operate the same technology for the life of the plant and would not have to make repeated demonstrations. This is a fair proposal, given that § 316(b) is a construction-type requirement, that fish populations are highly variable and subject to many stresses besides cooling water intakes, and that the permittee has limited control over what animals approach its intake.

EPA Response

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

In meeting performance standards, any percentage within the rule specified range (80%-95% for impingement mortality, 60%-90% for entrainment), would be deemed in compliance. For a discussion of how compliance with today's rule will be determined, please see the preamble to the final rule.

Comment ID 316bEFR.041.125

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.0

Implementation

The Permit Should Allow the § 316(b) Technology to Be Bypassed if Necessary for Plant Operation

The permit should have a provision, analogous to EPA's "upset" and "bypass" provisions in the NPDES permit regulations, to allow an intake technology to be bypassed, if necessary, for plant operation. For example, if the screens are fouled so as to jeopardize plant operation, the permittee should be allowed to bypass them until they can be cleared. Such exceptional bypasses should be allowed only for short periods of time, until the emergency has passed and the permittee has had time to restore the intake technology to proper operation. A bypass provision also could be useful in the event that an emergency situation beyond the control of the plant operator (such as terrorist threats or actions to destroy dams) arose.

EPA Response

For a discussion of compliance, see response to comment 316bEFR.063.005.

Comment ID 316bEFR.041.126

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

THERE IS NO NEED TO RE-DO THE § 316(b) ANALYSIS EVERY FIVE YEARS

EPA's proposed rule suggests a "comprehensive reevaluation" of the § 316(b) demonstration every time a permit is renewed. This is unnecessary. Once a successful § 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be enough. At a minimum, there should be no reconsideration for at least ten years, absent evidence that conditions have so changed that the aquatic community is threatened.

Another way to put it is that, after a successful demonstration of compliance with EPA's performance standards, at each later permit renewal the permit writer should accept the initial demonstration, unless there have been significant changes in plant operations or material adverse changes to the aquatic populations. This has been EPA's position, as reflected in guidance issued by EPA's Office of General Counsel to the regions over 20 years ago (Cooper 1982). Conservation of scarce administrative resources (which EPA claims is essential) and practicality weigh in favor of retaining that policy.

EPA Response

EPA agrees that a Comprehensive Demonstration Study may not need to be conducted each time a permit is renewed. As such, under 125.95(a)(3) of today's final rule, EPA offers an opportunity for reduced Comprehensive Demonstration Study requirements at each permit renewal cycle. Under this provision, the facility may receive reduced information collection requirements if conditions (such as biological, chemical, or physical) at the cooling water intake structure and waterbody remain substantially unchanged since the last permit issuance. The facility must request the reduced information requirements at least one year prior to the expiration of the existing permit and provide justification for each information requirement in 122.21(r) and 125.95 that they believe has not changed.

Comment ID 316bEFR.041.127

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

EPA MAY NOT APPLY § 316(b) TO FACILITIES SUBJECT ONLY TO PERMITS FOR STORM WATER

EPA proposes to apply § 316(b) to existing facilities covered by NPDES permits (whether general or individual) applicable solely to storm water. UWAG believes that EPA lacks authority to do this, because such facilities are not subject to effluent limitations under §§ 301 and 306, which is a threshold requirement for applying § 316(b). Also, EPA's proposal to cover these facilities vastly increases the number of permits covered and raises numerous administrative issues that will serve only to increase burdens on State and federal permit writers – the opposite of EPA's avowed intention.

EPA's proposal also raises complex and troubling legal issues – for instance, does EPA have authority, as it claims, to issue to a general permittee a separate permit containing only intake limits? Section 402 of the CWA suggests it does not. If EPA were to take the position that it could require storm water permittees to obtain individual storm water/CWIS permits, would it not have to amend the storm water rules and the storm water general permits, estimate and justify the additional reporting and recordkeeping burden, and obtain OMB approval? If EPA were to attempt to include CWIS conditions in general permits, would it not need to prepare burden estimates, obtain OMB approval, and develop special mechanisms to ensure that such conditions apply only to relevant facilities?

All of these factors weigh against EPA's proposal to apply the § 316(b) rule to storm-water-only permittees with cooling water intake structures.

EPA Response

Regarding EPA's authority to address facilities permitted for storm water, see response to 316bEFR.035.001. With regard to the other issues raised, the commenter does not explain why EPA lacks authority to issue to a general permittee a separate permit containing only intake limits, other than to state, "Section 402 of the CWA suggests it [EPA] does not [have such authority]." CWA section 402 provides authority to issue NPDES permits to any facility that discharges any pollutant from a point source to waters of the U.S. By definition, any general permittee meets these requirements. In addition, section 316(b) requirements apply to any standard established pursuant to CWA sections 301 or 306, including standards applicable to the discharge of pollutants in storm water discharges. How such permits are administered concerns program implementation, rather than Agency authority. Implementation of this rule will comply with all relevant NPDES program regulations.

Similarly, the comment does not explain the commenter's other two concerns, but poses them as questions. In general, EPA notes that the existing general permit regulations (40 CFR 122.28) provide that individual permits can be required in certain circumstances. In addition, this Phase II final rule has been developed and promulgated according to applicable rulemaking requirements and includes appropriate provisions for its implementation. Finally, Directors will continue to follow applicable rulemaking and permit issuance requirements in pursuing any of the alternatives discussed.

Comment ID 316bEFR.041.128

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

EPA HAS NOT ADEQUATELY ASSESSED THE COSTS OF THE RULE

A. EPA Has Not Adequately Defined the Scope or Extent of the Impingement Mortality and Entrainment Characterization Study

In the proposed rule, EPA indicates that applicants are to conduct an Impingement Mortality and Entrainment Characterization Study (I&E Study) (see proposed § 125.95 b(3)). However, the only guidance provided is that the study should be "based on the collection of a sufficient number of years of data to characterize annual, seasonal, and diel variation in impingement and entrainment." 67 Fed. Reg. 17,222 col. 3.

The ICR bases its cost estimate on a three-year monitoring program, but EPA nowhere indicates whether a three-year program is the minimum EPA expects, the maximum applicants should plan for, or a mean period of time. In fact, there is no guidance whatever regarding the effort to be expended over the three-year program (assuming that is the duration EPA wants). Since this is the largest single cost identified by EPA (over $300,000 in Exhibit 35, 67 Fed. Reg. 17,209), EPA should make clear what it expects so that industry and the public can determine whether what is requested is reasonable. However, given the lack of details, we cannot comment either on the reasonableness or the cost of implementing the I&E Study.

Also, UWAG does not understand why there is such a large discrepancy in laboratory costs between the I&E Study and Verification (O&M) Monitoring. EPA estimates that lab costs (i.e., for enumerating and identifying larval samples) for the I&E Study will cost $117,000 in freshwater and $197,730 in marine water (ICR, Exhibit A.11). This is apparently in addition to the $300,000+ for the basic I&E Study referred to above. EPA estimates that the lab cost associated with verification monitoring will be only $7,800 in freshwater and $10,140 in marine waters. Even if these costs are doubled to account for a two-year verification monitoring period, there is still a fivefold difference in annual lab costs ($7,800 per year for verification monitoring vs. $39,000 per year for the I&E Study). Without details on study duration, sampling frequency, etc., UWAG cannot even speculate on why these annual lab costs are so different. UWAG's contractor tried repeatedly to obtain answers to these questions, but was unable to obtain the needed information.

EPA Response

EPA made available additional information regarding the Impingement Mortality and Entrainment Characterization Study at the time it published the NODA. For additional information see Updated Information Collection Costs for the 316(b) Phase II Notice of Data Availability, January 31, 2002 and Information Collection Request for the final rule.

Comment ID 316bEFR.041.129

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.06

Burden to facilities (general)

A Two-Year Verification Monitoring Program Will Cost Permittees More Than EPA Has Estimated

The proposed rule requires compliance monitoring, but does not specify minimum sampling frequencies or durations. However, in its Information Collection Request for the Rule (ICR) (DCN:4-0001), EPA developed costs for verification monitoring that apparently are based on the following level of effort:

-Duration – 2 years

-Impingement – samples collected at least once per month over a 24-hour period

-Entrainment – Samples collected at least biweekly over a 24-hour period during the primary period of reproduction, larval recruitment, and peak abundance.

To collect these samples, EPA estimated that annual costs (in 2001 dollars) would be as follows:

	Freshwater	Marine
Impingement	$16,985	$21,623
Entrainment	$37,369	$46,044
TOTAL	$54,354	$67,667

ICR, Table 8.

A review of these estimates shows clearly that EPA made several mistakes. EPA correctly assumes that much of the monitoring will be conducted by contractors hired by the facilities. According to information presented on page 54 of the ICR, the total markup on contract employees will be 2.2 to 2.3 times their actual salaries. Based on the utility industry's experience, markups of 2.5 to 3.0 on contract labor of this kind would be more realistic.

EPA assumes that consultants will collect and process the samples, but facility personnel will prepare all reports. Over the years, the utility industry has cut back greatly on the number of biologists it employs. Thus very few facilities have staff with the expertise (or time available) to prepare the required reports. As a result, most reports will be written by consultants at higher rates.

In Appendix A to the ICR, EPA developed cost estimates for activities required by the proposed rule. In all the tables, EPA has transposed the labor rates for statistician (shown as only $36 per hour) and biological technician (shown as $57 per hour). Thus, all estimates that include hours for one or both of these categories are wrong.

EPA correctly assumes that impingement sampling would usually be performed by contract labor. However, EPA incorrectly assumes that all sample processing will be done onsite and that no travel costs are associated with the contract labor. UWAG agrees that most specimens in a given impingement sample will be processed onsite. However, impingement samples are dominated by small species (minnows, silversides, etc.) and juveniles of larger species. In freshwater, numerous minnows, suckers (especially redhorse), and other taxonomically difficult species (e.g., hybrid Morone) are often present. Such specimens would need to be returned to the contract lab for proper identification.

Parallel taxonomic problems exist in marine waters. In the industry's experience, few samples can be processed entirely in the field. Samples that must be returned to the lab need to be preserved, labeled, and examined under microscopes, all of which will add to the cost estimates developed by EPA.

EPA has assigned "other direct cost" (ODC) amounts of only $500 and $650 for verification impingement monitoring in freshwater and marine systems, respectively (ICR, Table 8). EPA apparently assumes not only that all the sample processing will be done onsite, but that no travel costs will be associated with getting to the site. To the contrary, for the level of effort suggested by EPA (monthly impingement collections), technicians will not be stationed onsite. Instead, they will make monthly trips to the facility. Contrary to what EPA may be assuming, there is not a biological contractor working at or even nearby every facility. Based on the industry's experience, reputable, experienced contractors may be 100-300 miles or more away. If we conservatively assume that the contractor is an average of 150 miles from the facility, then there would be on average six hours' travel associated with each monthly collection.

For entrainment samples, EPA has already assumed that specimen identification will take place offsite. However, it does not appear that the labor and travel costs associated with the biweekly visits to the site were incorporated into EPA's estimates. Including these necessary costs will add substantially to the estimates EPA developed.

UWAG developed its own estimate for a two-year impingement verification program that EPA has estimated to cost only $16,985 (ICR, Table 8). We used the same hourly rates used by EPA (even though we believe higher labor mark-ups are appropriate), but added in labor and travel costs associated with getting to and from the site for a contractor located 150 miles away and also included the costs of identifying some specimens in the contractor's lab. Our estimate for two years of monthly impingement monitoring is $38,724, exclusive of preparing a report (which the facility could prepare but is not likely to). Thus, we estimate that at freshwater sites verification impingement monitoring will cost more than double EPA's estimate. Since EPA made the same erroneous assumption regarding marine sites, the cost of impingement monitoring at marine sites should also at least double compared to EPA's estimate.

Furthermore, UWAG believes these costs likely represent the low end of the spectrum. The proposed rule would require the permittee to prepare a plan for at least two years of verification monitoring, so it is likely that two years of monitoring will be the norm. It is also possible that, regardless of the duration, the frequency of sampling might need to be increased.

UWAG agrees with EPA that less frequent monitoring might be appropriate, depending on the technology chosen (67 Fed. Reg. 17,149 col. 1). For example, a Gunderboom barrier should essentially eliminate the impingement of juvenile and adult fish. Unfortunately, some facilities will not be able to take advantage of this technology due to site-specific constraints. Many plants may have to monitor impingement more frequently than once a month to ensure that they are not deemed to be in noncompliance as a result of variability in impingement rates or episodic events that can greatly skew catch estimates when the sample size (i.e., number of collections) is low. In such cases, the costing errors made by EPA would be accentuated, because more sample collections would be needed.

EPA Response

In the Phase 2 NODA ICR, EPA corrected the transposition mistakes, revised costs, and clarified monitoring assumptions. EPA believes that the resulting revised costs provide a reasonable estimate of monitoring costs that may be incurred, however some facilities may have higher or lower costs depending on site specific issues.

As stated in 125.96, monitoring must be conducted in accordance with the verification monitoring plan, the Technology Installation and Operation Plan, as appropriate, and the Restoration Plan, if relevant. The Director may set additional monitoring requirements. EPA believes that two years of monitoring is a reasonable period of monitoring to assess if a facility's design and construction technologies, operational measures, and/or restoration measures are satisfying the performance requirements promulgated under today's final rule.

Comment ID 316bEFR.041.130

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 22.03

Other regulatory requirements

The State of the Record Makes it Impossible to Follow EPA's Reasoning on Many Aspects of its Benefit-Cost Analysis

It is virtually impossible to assess EPA's analysis of costs and benefits, because nowhere has EPA clearly explained its reasoning. Although it has summarized the benefit-cost analysis in the preamble to the proposed rule and included underlying technical documents and a large number of worksheets in the record, the method EPA used to determine costs and benefits is so poorly articulated that a reader cannot follow it. For example, many of the background documents in the record are merely pages of spreadsheet formulas that EPA's contractors apparently used to calculate their numbers.

Generating many pages of calculations and tables of numbers is not enough to satisfy the Administrative Procedure Act or due process of law. EPA is required to provide enough explanation of its reasoning to enable reviewers to identify the strengths and weaknesses in the analysis.

UWAG acknowledges that EPA has provided several opportunities to question its consultants by telephone. But allowing the regulated community to develop an understanding of the agency's rationale laboriously by question-and-answer does not satisfy the Administrative Procedure Act or due process of law.

EPA Response

EPA provided adequate notice of the final rule and its bases and therefore, EPA has complied with the Administrative Procedure Act's requirements and due process requirements.

EPA published the proposed rule on April 9, 2002, and made the supporting records and technical development documents available to the public. EPA published the NODA on March 19, 2003, along with support documents to update the data, information, and rulemaking process for the public consideration. In addition, as described in detail in section III of the preamble to the final rule, EPA has conducted extensive public outreach throughout this rulemaking and the Phase I rulemaking that preceded it, including holding or participating in stakeholder meetings, forums, workshops, and technical symposiums. Further, in a concerted effort to respond to a questions concerning the data and analyses that EPA developed as part of the Phase II proposal, EPA held a number of conference calls with multiple stakeholders to clarify issues and generally provide additional information. To supplement these verbal discussions, EPA drafted three supporting documents: one that explained the methodology EPA used to calculate entrainment rates; and two others that provided specific examples of how EPA applied this methodology to calculate benefits for the proposed rule. In addition, EPA prepared written responses to all questions submitted by the stakeholders involved in the initial conference calls. Thus, EPA has made substantial efforts to make information available, be responsive to inquiries, and to generally provide reasonable notice regarding this rulemaking. EPA notes that given the complex technical issues addressed in this rule, and the variety of comments and information developed and received, final rule development has been very dynamic. For example, much of the information presented in the NODA was generated based on comments on the proposal. Throughout this process and to the extent consistent with the defined schedule under the consent decree, EPA has provided reasonable notice of, and access to, available information and how the Agency anticipated using such information, particularly with respect to the core aspects of the rule, including the scope of the rule, the basic options proposed and considered, and the performance standards. EPA notes that the Agency received a significant number of substantive comments (i.e., estimated in excess of 3000 distinct comments) in response to the public notice provided in the proposal and NODA.

With regard to EPA's peer review of its assessment of entrainment survival data, EPA notes that EPA initial findings were fully described and discussed in the proposal and NODA. The peer review process was sought to gain an additional level of review of these data. EPA also notes that the final rule allows for consideration of an entrainment survival rate other than zero based on a study approved by the Director where a facility is seeking a site-specific determination of BTA.

EPA provided adequate notice of the methodologies it used to assess cost and benefits in the proposal, the NODA, and supporting documents.

Comment ID 316bEFR.041.131

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

EPA Should Reconsider the Impact of the Rule on Energy Supply

In Chapter B6 of the Phase II EBA, EPA concludes that the proposed rule is a “significant regulatory action” but not a “significant regulatory action”:

This proposed rule does not qualify as a “significant energy action” as defined in Executive Order 13211 because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The proposed rule does not contain any compliance requirements that would directly reduce the installed capacity or the electricity production of U.S. electric power generators.

Phase II EBA, Chapter B6, B6-7.

EPA should reconsider this conclusion. Based on our current understanding of the proposed rule, UWAG believes it will have a significant adverse effect on the supply of energy. Some generators would be forced to cease operations while others would suffer the consequences of higher generation costs. A valid economic analysis should be performed and a Statement of Energy Effects be furnished as required by Executive Order 13211.

EPA’s analysis is not sufficient to show that there will be no significant adverse effect on energy supply. UWAG therefore asks EPA to revisit this issue and justify its conclusion that the proposed rule is a significant regulatory action but not a significant energy action.

EPA Response

EPA did re-evaluate the conclusion that the rule is not a significant energy action in the light of re-estimated costs of compliance for the final rule. EPA reached the same conclusion as at proposal: while the final rule is considered a “significant regulatory action” it is not considered a “significant energy action.” Executive Order 13211 states criteria that a regulation must meet to be considered a “significant energy action.” As documented in Chapter B6 of the Economics and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule (DCN 6-0002), the final Phase II rule meets none of these criteria. Therefore, a statement of energy effects is not required for this final rule.

Comment ID 316bEFR.041.132

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 22.05

Burden (facility information collection)

EPA'S ICR LACKS PRACTICAL UTILITY AND DOES NOT JUSTIFY THE BURDENS OF THE RULE

As noted in the introduction to these comments, UWAG intends these comments to address both the proposed rule and the proposed information collection request (ICR) that accompanies the rule (ICR No. 2060.01, DCN:4-0001). UWAG finds that the ICR lacks practical utility because EPA has not provided significant supporting materials to explain how it arrived at its conclusions. Also, in some instances EPA has underestimated the costs of complying with the ICR.

The ICR would permit EPA to require facilities subject to the rule to provide the following types of information:

-source water physical data, which shows the physical configuration of all source waterbodies used by the facility, and identifies and characterizes the source water body's hydrological and geomorphological features;

-cooling water intake structure data;

-cooling water system data, which characterizes the operation of the cooling water system;

-information for the comprehensive demonstration study, including:

---historical information;

---source water body flow information;

---impingement mortality and entrainment characterization study information, which would provide information to support the development of the calculation baseline and characterize current impingement/entrainment;

---preparation of the design and construction technology plan;

---information to support any proposed restoration measures;

-preparation of the verification monitoring plan; and

-data requirements for a site-specific technology determination, such as preparation of a comprehensive cost evaluation study; valuation of the monetized benefits of reducing entrainment and impingement; and development of a site-specific technology plan.

ICR, pp.2-4. There are at least two problems with the ICR: (1) EPA has not provided enough information to verify its cost estimates but has underestimated at least the costs of the impingement mortality and entrainment characterization study and all other activities requiring statisticians or biological technicians, and (2) the ICR continues to overstate the environmental impact of power stations.

A. EPA Has Not Provided Supporting Information

EPA priced out the burdens for the facility in gathering and analyzing the required data. UWAG, despite its best efforts and numerous requests to EPA, has been unable to obtain information necessary to understand some of EPA's price estimates. For example, despite several requests, EPA was unable to provide a general scope of work for the impingement mortality and entrainment characterization study.

1. EPA Does Not Provide Important Details Like the Number of Samples Required and the Sampling Methods Used

The ICR says that EPA assumed the sampling for the study would take place over a three-year period, but it does not indicate: (1) the number of samples for both impingement and entrainment, (2) the timing of sampling events, or (3) the sampling methods used for estimation purposes. EPA assumes that a contract laboratory will perform taxonomic classification and data tabulation on the samples and that the total for these laboratory services over the entire three-year period will be $117,000 for facilities located in freshwater rivers/streams or lakes/reservoirs and $199,230 for facilities located in the Great Lakes, estuaries, and tidal rivers. ICR, p. 55. These numbers, however, cannot be evaluated without knowing the numbers and types of samples (i.e., either impingement or entrainment samples) being analyzed. UWAG's consultant contacted EPA on more than four occasions <FN 61> on this issue, and EPA was not able to supply any sort of scope of work for the impingement mortality and entrainment study or any details about how the cost-of-sampling numbers were generated, until August 5, just two days before the filing deadline. UWAG reserves the right to comment on the new information EPA supplied at a later date.

In short, information critical to EPA's calculations is not available in the ICR, the proposal, the record, or from direct and repeated inquiry from the Agency. If EPA cannot explain the scope of the study it is costing out, then it is clear the ICR is flawed and cannot be used to justify the burdens EPA would impose.

2. EPA Has Mixed Up the Hourly Rates of Statisticians and Biological Technicians

In addition to lacking critical information and analysis, the ICR obviously underestimates the costs of the impingement mortality and entrainment characterization study and all other activities involving either a statistician or a biological technician. As noted in Section XIX above, EPA transposed the labor figures for statisticians and biological technicians when putting together the summary tables of costs. On page 54 the ICR states that the average hourly pay of statisticians and biological technicians is $57 and $35 per hour, respectively. But in the Appendix A tables detailing the costs of the study, EPA transposed these hourly rates, and therefore the estimates provided are invalid. This error occurs in Exhibits A.1.g, A.1.h, A.1.i, most of the tables in Exhibit A.2., and Exhibit A.9 (Costs for the ICR Approval Period Year by Year for Facilities).

Therefore, even if EPA properly estimated the number of facilities affected by the rule and otherwise made sound basic assumptions, the ICR is flawed and should be redone.

Footnotes

61 Personal Communications of Greg Seegert, EA Engineering, Science and Technology, to Dana Thomas (early June), Lynne Tudor (early June), Deborah Nagle (June 10), and Deborah Nagle, Blaine Snyder and others (June 20).

EPA Response

EPA has a practical utility for the data collection requirements in the final rule. (See the preamble of today's final rule.) In general, the information requested will facilitate evaluation of potential impacts to the source waterbodies and their associated aquatic communities and to demonstrate that facilities have implemented the appropriate technologies to minimize adverse environmental impacts from Cooling Water Intake Structures. EPA also expects permit writers to use the information to identify species at risk or other potential concerns that might necessitate the specification of additional permit limits or special conditions. In addition, EPA believes the information is similar in scope and detail to that collected under other NPDES programs, including previous 316(b) efforts.

With respect to providing supporting information for the ICR, EPA made available additional information at the time it published the NODA. (see “Updated Information Collection Costs for the 316(b) Phase II Notice of Data Availability, January 31, 2002). The document summarized the general derivation of information collection, study, and monitoring activity costs associated with the Phase II rule. Labor categories, labor rates, monitoring components, and associated costs are outlined and additional cost details were presented in summary tables to facilitate ease of review and understanding.

EPA agrees the hourly rates of statisticians and biological technicians are incorrect in the proposed ICR. The labor figures were inadvertently transposed when EPA put together the summary tables of costs. EPA has recalculated the ICR cost to rectify this error. The following corrections and revisions were made since proposal: 1) EPA corrected the hourly rates for the statistician and biological technician labor categories, which were inadvertently transposed at proposal; 2) EPA increased the burdens associated with impingement and entrainment monitoring associated with the Impingement Monitoring and Entrainment Characterization Study; and 3) EPA revised the pilot study costs to assume that only facilities which are projected to install new technologies in order to comply with the rule will perform pilot studies; EPA further assumed that the costs of these pilot studies would be proportional to the projected capital costs for installing these new technologies. (see “Information Collection Request for Cooling Water Intake Structures Phase II Existing Facility Final Rule”)

See Comment 316bEFR.041.133 for discussion on environmental impact of power stations.

Comment ID 316bEFR.041.133

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 22.05

Burden (facility information collection)

The ICR Repeats Errors About Potential Impacts

The ICR perpetuates inaccuracies about the alleged adverse impacts caused by power plants. ICR, pp. 6-9. For example, the ICR, like the New Facilities Rule ICR, continues to cite the loss of one million fish in three weeks at the D.C. Cook Nuclear Plant as evidence of unacceptable impact. As UWAG explained in response to the New Facilities Rule, the great majority of the fish impinged at Cook were alewives, a non-native species introduced into the Great Lakes by the opening of the St. Lawrence Seaway. In the context of the Great Lakes ecosystem, one million alewives impinged in three weeks is not evidence of adverse impact.

1. Alewives in the Great Lakes Were Abundant and Undesirable

Originally alewives were an undesirable species in the Great Lakes. When they entered the Great Lakes, there were no natural predators to control their numbers, and the alewife population grew until there were too many for the lake ecosystem to support. In the early 1960s and 1970s, billions of alewives died each spring and washed up on the shores of Lake Michigan. When the Cook Nuclear Plant impinged the one million alewives in three weeks, the alewife population had been reduced by introduction of predatory species, but it was still the most abundant species in the lake. One positive result of the reduced alewife population was an increase in yellow perch, a highly prized game fish.

2. EPA Relies on Information from Before Brunswick Added Fish Protection Equipment

The ICR likewise makes several misleading statements about Progress Energy's Brunswick Nuclear Plant, located near Southport, North Carolina. The ICR asserts that "specific losses associated with individual steam electric generating facilities include 3 billion to 4 billion larvae and post larvae per year" (ICR, p. 7). The ICR also alleges that "a modeling study of the impact of entrainment mortality on the population of representative fish species in the Cape Fear estuarine system predicted a 15 to 35 percent reduction in the species population" (id.). In support of both statements, EPA cites Brunswick Station's "Historical Summary and Review of Section 316(b) Issues" prepared by EPA Region IV (September 19, 1979).

This information, which dates from the early stages of Brunswick operation, is out of date. The original facility owner took steps many years ago to address the alleged impacts. Although no adverse environmental impact would have occurred at the Brunswick facility even without mitigation, the owner installed mitigation measures in the 1980s. These include a diversion fence at the mouth of the intake canal (installed in 1982), fine mesh screens (1983 and 1987), and a fish return system. Studies conducted since the installation of these mitigation measures indicate that they have significantly reduced entrainment. Reductions in entrainment of total organisms as a result of the combination of voluntary flow minimization and fine-mesh screens ranged up to approximately 90 percent, depending on species and life stage. (See CP&L 1985.) Thus, EPA has used extremely outdated information to characterize impacts from the Brunswick Station, even though UWAG had in the past informed EPA that its information was misleading and inaccurate.

3. EPA Ignores San Onofre's Attempt to Correct the Record

Similarly, EPA continues to use inaccurate information about the San Onofre Generating Station. First, the ICR claims that "the operation of cooling water intake structures resulted in a 60 percent (80 hectare) reduction in the area covered by moderate to high density kelp" (ICR, p. 8). But the kelp bed impacts are discharge issues, not intake issues, and are not related to entrainment and impingement. See Appendix I to UWAG's 2000 Phase I Comments for further information about the kelp bed impacts.

Also, EPA makes several misleading statements about alleged fish impacts attributed to the San Onofre Generating Station. Southern California Edison, in a letter dated January 7, 2002 to Tracy Mehan (DCN:4-022A), the Assistant Administrator for Water, strongly objected to EPA's mischaracterization of San Onofre's impacts, and yet the ICR perpetuates these errors. For example, the ICR notes that "within 3 kilometers of SONGS, the density of queenfish and white croaker decreased 34 to 63 percent in shallow water samples and 50 to 70 percent in deep water samples." ICR, p. 9. As pointed out in the January 7, 2002 letter, this is incomplete and misleading. In fact, the data show density increases for these species of 80 and over 100 percent in the same vicinity as the supposed decreases, but nearer to the ocean bottom, indicating not fish loss, but simply local fish movement. <FN 62>

For further discussion of the misleading statements regarding environmental impacts in the ICR, see Appendix I to UWAG's comments on the New Facilities Rule.

Footnotes

62 EPA largely corrected these misleading assertions in the preamble to the proposed rule, but they continue to appear in the ICR.

EPA Response

The examples cited by EPA in the Information Collection Request (ICR) were intended to illustrate that the numbers of organisms impinged and entrained by a facility can be substantial. EPA believes that it has used the best data available.

With respect to the commenter's concerns about nuisance species, EPA agrees that they are an environmental problem. Cooling water intake structures, however, do not discriminate as to the organisms they impinge and entrain.

EPA acknowledges that historical data from selected facilities may not reflect current impingement and entrainment rates at certain facilities, particularly if technologies and other operational measures for reducing impingement and entrainment rates at the facility have been implemented since the original study. With respect to the comments that no adverse environmental impact would have occurred at Brunswick Nuclear Plant even without mitigation, EPA disagrees: the statement is conclusary as to what constitutes adverse environmental impact and is unsupported by any data. Historical studies like those documented at Brunswick provide only a partial picture of the severity of environmental impact associated with cooling water intake structures.

In response to comments about inaccuracies related to facility-specific impacts caused by impingement and entrainment at San Onofre Nuclear Generating Station (SONGS), EPA provides the following clarification. Specifically, the ICR for the proposed rule described entrainment losses at SONGS. EPA received updated information from SONGS facility scientists that clarified actual entrainment losses in normal (non-El Nino) years and described trends in shallow-water and deepwater fish species affected by entrainment. In addition, prior to publication of the proposed rule, EPA concluded that kelp bed losses in proximity to the SONGS intake were attributable to turbidity increases caused by cooling water discharges, not cooling water withdrawals. The updated information for SONGS was placed in the preamble to the proposal (see 67 FR 17138-17139), but was inadvertently omitted from the ICR. EPA has corrected the final ICR to reflect the changes described above.

Comment ID 316bEFR.041.134

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 1.01

Comment period

UWAG RESERVES THE RIGHT TO COMMENT ON NEW DATA AND INFORMATION

In addition to the analyses of EPA's benefits analysis undertaken by UWAG and EPRI experts, many of the companies whose facilities are the subject of the EPA case studies on which EPA's benefits assessments tests have undertaken detailed analyses of the Agency's studies and conclusions. For UWAG and the individual member companies, the process of obtaining and deciphering what EPA did has been extraordinarily difficult and complex. In many cases, the data on which EPA relied were confidential business information and, thus, unavailable. In many other cases, EPA's explanation of what it did, presentation of information it used, and description of results were incomplete and confusing.

As UWAG said in its May 13, 2002 letter requesting an extension of the comment period (Bailey 2002), these issues, as well as the amount of material involved, made it nearly impossible to meet EPA's original July 8 comment deadline. In its May 14, 2002, letter to Tom Wall, UWAG counsel further identified the problems UWAG had encountered with the record (Bulleit 2002a). EPA agreed to extend the comment period to August 7 (67 Fed. Reg. 41,668 (June 19, 2002)) and to engage in a series of discussions with UWAG and individual companies to address the industry's questions about what data EPA used to estimate benefits and where in the record that information could be found. As a result of those discussions, UWAG submitted written questions to which EPA supplied some written answers (Potter 2002; Bulleit 2002b; Wall 2002a; Wall 2002b; Wall 2002c).

UWAG appreciates EPA's willingness to engage in those discussions. Although EPA's answers were in some respects cryptic or non-responsive, some were quite helpful. See Appendix 16. However, UWAG and the affected companies did not receive them until July 2, 2002 (almost three months into the comment period). Therefore, UWAG and the affected companies requested a further 14-day extension, to August 21, 2002, to submit comments on all issues relating to EPA's benefits estimates (Bulleit 2002c). Although EPA was unwilling to reopen the comment period officially, the Agency agreed, in a letter dated July 12, 2002, to include in the record comments on benefits estimate topics from UWAG and to make its best efforts to consider those comments (Grubbs 2002).

UWAG and its members have made every attempt to develop complete comments, including comments on EPA's benefits estimates, for submission on August 7. We are supplying much of that material today. Despite those enormous efforts, some companies have not completed their evaluations, and UWAG as a whole has not had an opportunity to review many such reports. Therefore, UWAG endorses in these comments the case study evaluations that we understand will be submitted by American Electric Power Service Corporation (on behalf of itself, Cinergy, First Energy, Ohio Valley Electric Corporation, Tennessee Valley Authority, Vectren, Buckeye Power, and Alcoa), Consumers Energy Company, Entergy, Conectiv, Mirant Corporation, PG&E National Energy Group, and PSEG. We reserve the right to review reports that we understand are under development by other companies, and to submit by August 21, 2002, new or amended comments endorsing those reports and, as appropriate, incorporating the results into our analysis.

EPA Response

EPA accepted and considered all comments. EPA considered those that were submitted after the official close of the comment period to the extent it was able. Those comments were included in the public rulemaking record.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 1.01

Comment period

PROBLEMS WITH THE RECORD HAMPERED UWAG'S ABILITY TO COMMENT

Despite its best efforts, UWAG encountered several problems with the rulemaking record which hampered the development of these comments. Our greatest problem was simply understanding, in the face of the 57,000+ pages in the record, how EPA conducted critical portions of its analyses. For example, it took direct inquiries to EPA before we were able to locate within the record EPA's list of 539 in-scope facilities. While the list was in the record, it was not clearly labeled in the index, and was inserted as part of a larger document. By the time EPA identified the list, several weeks of the comment period had elapsed.

As explained in the preceding section, we also had great difficulty understanding many aspects of the Case Study Analysis and the Economic and Benefits Analysis. Although the CSA is 1,074 pages long, UWAG's experts had difficulty understanding how EPA reached some of its ultimate conclusions, <FN 63> because it was not clear how tables presented in the CSA related to each other. The same was true of the Phase II EBA. This confusion resulted in a series of conference calls between UWAG experts and representatives and EPA experts and representatives regarding the CSA. Despite the lengthy conference calls, and despite UWAG's submission of questions to EPA in advance of the conference calls, EPA was unable, in many instances, to provide answers to the questions posed. Appendix 16 lists (1) questions about the Case Study Analysis and Phase II EBA that UWAG posed to EPA, (2) provides UWAG's reaction, and (3) where necessary formerly requests some additional response.

Footnotes

63 Other members of the public, including the Riverkeeper, Inc., also had trouble understanding the CSA. The Riverkeeper submitted numerous questions to EPA regarding the CSA.

EPA Response

EPA has made substantial efforts to help explain the complex issues involved with 316(b), and done a great amount of public outreach, including responding to comments, creating a publicly available record and hosting conference calls. EPA notes that no specific questions were identified by the commenter.

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Organization obo Utility Water Act Group

Subject Matter Code 17.08

Option: UWAG's recommended approach

UWAG's Proposed Decision Principles for Applying 316(b) to Existing Facilities

Overview

UWAG believes that any rule implementing 316(b) should be written to achieve both its goals of protecting the environment and of providing the flexiblity to do so cost-effectively. To that end, UWAG is recommending an approach for 316(b) decisionmaking that has the following components:

1. A definition of Adverse Environmental Impact (AEI)

2. Use of Representative Indicator Species (RIS) for AEI assessment. (In the past, "RIS" has traditionally stood for Representative "Important" Species. We have chosen a different term for reasons given below.)

3. Making 316(b) decisions consistent with, but not duplicative of, other regulatory programs such as the Endangered Species Act.

4. Use of a de minimis criterion to exempt small cooling water users that pose no appreciable risk of causing AEI because only a small amount of water (in a relative and absolute sense) is withdrawn from a waterbody, at a location that does not require special protection.

5. Determination of Adverse Environmental Impact or its absence using any of three methods either alone or in combination:

a. Use of previously conducted 316(b) demonstrations that are still relevant for the present conditions of the facility, waterbody, and RIS

b. Use of ecological risk assessment by means of:

i. Demonstration of "no risk" (ie, no appreciable risk) of AEI using very specific conservatively protective decision criteria or

ii. Assessment of risk using a structured AEI decisionmaking process consistent with EPA's Ecological Risk Assessment Guidelines

6. A "maximize net benefits" approach for selecting Best Technology Available (BTA)

7. At the option of the permittee, recognition of voluntary enhancements (for example, fish stocking or habitat improvements)

8. Providing data or information with NPDES permit renewals if new information shows that the previous 316(b) demonstration is no longer scientifically valid

Each of these components is discussed below in terms of what it contributes to a sound approach to 316(b) decisionmaking that is environmentally protective, scientifically based, and socially responsible.

Not every component of this proposal will be relevant to every existing facility. For example, a facility might decide not to apply the conservative criteria (step 5.b.i above) at all and instead go directly to a more detailed risk assessment (step 5.b.ii).

II. Terms and Principles

A. Defining AEI

UWAG believes that defining AEI is critical to the 316(b) rulemaking in order to provide the basis for 316(b) decisionmaking. A defintion of AEI sets the benchmark for the BTA determination.

UWAG has worked to develop a definition of AEI that is both implementable and based on sound science. The following definition was submitted to EPA as part of UWAG's comments on EPA's proposed 316(b) rule for new facilities:

Adverse environmental impact is a reduction in one or more representative indicator species (RIS) that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure.

This defintion is scientifically sound and environmentally protective because it focuses on protecting populations of species that are subject to impingement and /or entrainment by CWISs and because it requires that the level of population be adequate to ensure protection of ecosystem integrity (community structure and function). The definition is socially sound because it is consistent with universally accepted and applied principles both of natural resource management and of ecological risk assessment. Fisheries management science provides goals and tools (field and analytical methods) that are used to monitor the fishery resource. Risk assessment provides the tools and process for determining when the risk of AEI is acceptable.

By defining AEI in terms of "unacceptable risk", this approach recognizes that there is no "bright line" test, based on engineering or science, that can make the AEI decision. Whether AEI is occurring or will occur at an existing facility is a question of risk, not certainty, and combines science with value judgments that society must make about the value of different resources. But that mixture of scientific and social judgments does not preclude a rational process. The approach to AEI decisionmaking presented in this paper allows the AEI decision to be made without a "bright line" test by using three approaches.

First, under the approach proposed in this paper, the facility can make use of previous 316(b) studies. If the 316(b) decisionmaking process has been engaged in the past, then decisions have already been made about the appropriate level of risk that is "acceptable" or "unacceptable" on a particular waterbody. The decisionmaking approach presented here allows maximum use of the technical, scientific, and decisionmaking resources that have already been expended, but with the possibility of "fine-tuning" past decisions if conditions have changed.

Second, the facility can use ecological risk assessment. One approach is to demonstrate that there is no risk of AEI by using very conservative criteria that are below the level of harm that would create an unacceptable risk to populations, communities, or the fishery. Such criteria are proposed in Attachment A, and additional biocriteria are undergoing peer review.

A second risk assessment approach is to demonstrate no risk of AEI using EPA's Ecological Risk Assessment Guidelines. The risk assessment approach offers not so much a test for AEI as a process by which the facility can work with regulators and stakeholders to determine what level of risk is tolerable. This approach recognizes that risk tolerance is a social decision based on tradeoffs. Using the risk assessment guidelines allows the decisionmaker (a state regulator in most cases) to balance, for example, the risk to the fishery of open-cycle cooling against the risks presented by cooling towers, such as energy penalties, visibility impairment, noise, land use, increased solid waste, and air emissions.

In short, the decisionmaking process presented here is not, and need not be, based on "bright line" tests. Instead, it is based on either very conservative risk criteria or a site-specific assessment (taking into account information already gathered and decisions made in past studies) to determine the appropriate level of risk.

B. Representative Indicator Species

UWAG believes that the use of Representative Indicator Species (RIS) for 316(b) decisionmaking is important to provide a focus for biological investigations, thereby ensuring that the permitting process is not unduly complex and is manageable for permit writers. Use of this concept was proposed in EPA's 1977 draft 316(b) guidance, Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b), and has also been used in 316(a) demonstrations and in many state programs as well. EPA's 1977 draft guidance document used the term "Critical Aquatic Organisms" (CAO) rather than RIS.

UWAG uses the term RIS, instead of "Critical Aquatic Organisms" or other terms that have been used in various state regulatory programs, to avoid any confusion associated with the history of these terms and to avoid the implication that some species are unimportant. This choice would allow EPA flexibility to tailor the concept for the current rulemaking. Although EPA used six criteria for CAO selection in the 1977 guidance document, all of the selection criteria are captured in the following four categories:

-Commercial and recreational importance;

-Federal or state threatened or endangered or specially designated species;

-Importance in local ecological community structure and function; and

-Species and life stage vulnerability.

In evaluating AEI under 316(b), the issues of specially designated species and areas designated for special protection must be considered. Examples include federal or state threatened and endangered or otherwise specially protected species, marine sanctuaries, and jurisdictional wetlands. Considering the risk of impacts to such legally protected species and areas is a necessary part of the AEI determination. However, because there are already legal mechanisms in place to protect such species and areas, the existing legal framework should be used in order to avoid duplication of the existing programs and conflict between them and 316(b). UWAG's recommended approach to 316(b) would complement rather than duplicate other federal, state, and local regulatory programs, and this Decision Principles document assumes such assessment has taken or will take place.

The approach taken here to 316(b) decisions is compatible with the companion provision 316(a), which addresses the effects of heated effluent. If a facility has performed a 316(a) demonstration for its thermal discharge, the information collected for that demonstration may be useful for addressing the 316(b) entrainment and impingement issues as well. Section 316(a) also has a population and community focus (the statutory standard is "the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife"), which is compatible with the definition of "adverse environmental impact" proposed here. Many of the scientific methods that are used to assess the impact of a thermal discharge on an aquatic population can also be used to assess other impacts, such as entrainment and impingement.

D. De Minimis Criteria

UWAG also continues to endorse setting a scientifically supportable threshold exemption for de minimis intake flows. EPRI is conducting (and will be reporting) research to address the relationship between flow withdrawal and AEI. (As with other aspects of this proposed decisionmaking process, the de minimis criterion would be applied in conjunction with regulatory programs for protected species or areas.)

III. Determining Adverse Environmental Impact

One of the key issues in developing an implementable 316(b) regulatory program is crafting a workable approach for determining when there is AEI. Lack of clarity for permit writers as to the specific endpoints or process is a concern that EPA has expressed. To address this concern, three options are proposed here for making the AEI determination. They are (1) the use of a previously conducted 3 16(b) demonstration or demonstrations as appropriate and (2) the use of ecological risk assessment, by means of (2a) a demonstration of no risk of AEI using conservatively protective decision criteria or (2b) the use of a structured AEI decisionmaking process consistent with EPA's Ecological Risk Assessment Guidelines.

Previous 316(b) studies and decisionmaking endpoints established prior to the current study can often serve as the basis for the AEI decision (in some cases augmented, as necessary, with current studies to address any newly identified issues). The use of previously conducted 316(b) demonstrations recognizes that many states have already developed 316(b) regulatory programs with significant information-gathering requirements, which in many cases have already identified the level of CWIS impacts. It is recognized, however, that previous studies must meet certain standards if they are to be used in current or future 316(b) decisions.

The second approach, based on ecological risk assessment, involves either a demonstration of no risk, based on explicit AEI decisionmaking criteria that have conservative thresholds (with the thresholds so low that, for all practical purposes, the risk of AEI is eliminated) or a structured AEI decisionmaking process using the EPA Ecological Risk Assessment Guidelines (based on establishing a clear process in which the facility works with permit writers, resource managers, other technical experts, as appropriate, and stakeholders to decide what constitutes an unacceptable risk of AEI in the waterbody).

A facility should be free to pursue an AEI determination using any of these options (use of previous 316(b) demonstration, demonstration based on conservative criteria, or structured process consistent with the EPA Ecological Risk Guidelines), either independently or in any combination. For example, if a facility has a previously approved demonstration that is scientifically sound and that remains current from a waterbody biological perspective, as well as in terms of the facility location, design, construction and capacity, then that demonstration could serve as the basis for an AEI determination. However, if the demonstration did not focus on a species that is currently an issue in the waterbody, the facility might use the no-appreciable-risk criteria, either alone or in combination with a structured AEI decisionmaking process consistent with EPA Risk Assessment Guidelines, to make an AEI determination. Another example might be the use of a demonstration of no risk using the percent population reduction criterion to address AEI for some RIS, but to use the structured AEI decisionmaking process based on the EPA Risk Assessment Guidelines to make the final determination for other RIS.

A. Use of a Previously Conducted 316(b) Demonstration

UWAG believes that previously conducted 316(b) demonstrations should be considered in making AEI determinations to the degree they reflect current biological conditions in the waterbody and the current CWIS location, design, construction, and capacity. Previous 3 16(b) demonstrations may need updating, in some cases, to reflect current conditions. If 316(a) studies have been conducted, they may also be relevant to the evaluation of CWIS effects on the RIS, since 316(a) requires assessment of indigenous populations. Specific issues to be considered include:

1. Are the RIS still the appropriate ones? — This question recognizes that the RIS in a waterbody may change as a result of changes in habitat, long-term population fluctuations or fisheries management policies and goals. This may require collecting additional data or information to evaluate one or more RIS.

2. Were the data collection and analytical tools adequate? — This question recognizes that both fluid dynamics engineering and fisheries science have generated new methods, analytical tools, and knowledge of hydrodynamics and fisheries. In particular, there have been significant advances in fisheries assessment, modeling, and risk analysis. Previously collected data may need to be reviewed, if the permitting agency has information that circumstances have changed, to verify that the data were adequate and that the methods used were sufficiently robust to support conclusions regarding AEI.

3. Were waterbody biological conditions at the time of the study reflective of current biological conditions? — This question recognizes that there may have been significant changes in the waterbody, such as improvement or degradation in water quality, changes in physical habitat such as an increase in or loss of vegetation or occurrence of an exotic or invasive species that could alter the risk of AEI in the waterbody.

4. Has the CWIS been altered in terms of facility location, design, construction and capacity from that at the time the previous demonstration was conducted? — If a CWIS was altered in terms of its technology to address AEI, was the alteration successful? If the CWIS or its operation were altered for some other reason, could the change reasonably be expected to result in an increased risk of AEL?

The above list is not exhaustive; other significant changes (for example, a climate change that has affected reproduction of marine species) should be considered if there is reason to believe they have made the previous 316(b) demonstration inadequate.

B. Use of Ecological Risk Assessment

1. Demonstrating No Risk of AEI Using Conservatively Protective Decision Criteria

Another approach is a demonstration of no risk of AEI using explicit conservative criteria. The criteria should be set at a level that, if not exceeded, would result in no risk of AEI in the waterbody on which the facility is located.

UWAG recognizes that there will always be some level of background risk to RIS, with or without a CWIS. “No risk” in this proposal means no appreciable risk. Because the decision criteria are set well below levels that would result in AEI, these criteria would not be appropriate for use as performance standards. Thus, although meeting the criteria shows that there is no risk of AEI, the converse is not true: exceeding them does not mean that AEI exists. Rather, additional criteria are required to make an AEI decision. Any additional information can be gathered and criteria considered in the structured decisionmaking process described below.

The use of clear, specific criteria allows the permit writer for the facility to determine readily if the facility’s CWIS meets one or more of the “no risk” criteria. There are physical criteria based on CWIS location, on facility design, and on the proportion of the source waterbody used and biological criteria based on the percentage of the population lost due to impingement and/or entrainment and on no significant downward trend in population abundance. Other biocriteria are undergoing peer review.

Each of these criteria is applied independently; passing a single criterion can serve as the basis for a successful demonstration of no risk of AEI for a facility. However, if population-based biological criteria are used, they must be independently applied to each RIS species, and each species must meet the criteria for the facility to demonstrate no risk of AEI. (RIS not meeting the no-risk criteria can be addressed either by the structured AEI decisionmaking process or by implementing the BTA assessment process.)

The following specific conservative criteria are proposed:

A. Physical Criteria

(1) Locational Criterion - A CWIS does not create a risk of AEI if it withdraws water from a zone of a waterbody that does not support aquatic life due to anoxia or other reasons.

(2) Design Criterion - An existing CWIS does not create a risk of AEI if it uses wet closed-cycle

cooling or technologies that achieve a level of protection reasonably consistent with that achieved by wet closed-cycle cooling.

(3) Proportion of Flow or Volume Criteria - On freshwater rivers, lakes (other than the Great Lakes), and reservoirs, a CWIS does not create a risk of AEI if it withdraws no more than 5% of the source waterbody or the "biological zone of influence," as defined below in Attachment A.

b. Biological Criteria

(1) Percent Population Loss Criteria - On freshwater rivers, lakes (other than the Great Lakes), and reservoirs, a CWIS does not create a risk of AEI if it causes a combined loss from entrainment and impingement of no more than 1% (for harvested species) or 5% (for nonharvested species) of a RIS population.

(2) No Significant Downward Trend Criterion - On freshwater rivers, lakes (other than the Great Lakes), and reservoirs, a CWIS creates no risk of AEI if adequate data show no statistically significant downward trend in the population abundance of RIS.

(3) Other - Other biological criteria are undergoing peer review.

Most of these criteria have limitations on their use, such as being limited to certain waterbody types or for only impingeable or entrainable organisms. This is important, because some facilities may use the criteria not to make the risk-of-AEI decision for all RIS, but more narrowly, to help focus studies during the structured AEI decisionmaking process. This focusing can be accomplished by using the criteria to help select or eliminate from concern one or more RIS species or to limit AEI risk assessment studies to address only impingeable or only entrainable organisms. The benefit of eliminating entrainable organisms from concern would be that subsequent analysis could focus entirely on conducting population studies of impingeable organisms (species) or on determining what CWIS technology would minimize any AEI from impingement. (Note that in this example, even though the entrainment level is below the threshold, the combined effect of impingement and entrainment for a given RIS must be considered in the assessment of potential impingement AEI.)

These criteria are not intended to replace federal or state programs for threatened or endangered or otherwise protected species or to affect areas designated for special protection. The criteria apply only to the 316(b) decision.

UWAG believes additional conservative no-risk criteria can be developed and provides the above examples to demonstrate that such criteria with clear decisionmaking endpoints are feasible.

These criteria are explained in more detail in Attachment A.

2. Structured AEI Decisionmaking Process Consistent with EPA Ecological Risk Assessment Guidelines

Under the second option, the "structured decisionmaking process," the facility would use a structured process, based on EPA's 1998 Ecological Risk Assessment Guidelines, to make an AEI determination. Key steps in this process are as follows:

1. Stakeholders will be involved in identifying issues of concern caused by the cooling water intake structure relative to the RIS. Previous 316 studies, results of demonstrations using the "no AEI" criteria, information on the design and operation of the facility, waterbody fisheries management data and plans, and other relevant waterbody information may be used to focus the effort to identify RIS at risk for AEI due to the CWIS.

2. The permit writer, with input from the facility, will then determine what data collection and assessment studies are necessary to address the RIS of concern. Decisions regarding the assessment scope will include identification of RIS; study design, sampling methods, locations and durations; and analytical methods and/or models to be employed.

3. The facility and regulators will also identify explicit measurement endpoints and criteria for assessing AEI before any studies are conducted. If the studies demonstrate that predetermined endpoints are not exceeded, the proposed intake structure will be considered not to cause AEI. If not, the facility will proceed to identify alternative options for BTA or to identify enhancements that will eliminate AEI.

UWAG believes this structured process addresses many of the concerns raised regarding site specific 316(b) decisionmaking. It explicitly includes participation by all stakeholders, including state natural resource managers, to identify issues of concern. It then allows resource managers and the facility to determine the nature of studies necessary to address issues of concern and set predetermined endpoints and criteria for decisionmaking. It is anticipated that EPA staff who are working on the 316(b) rulemaking would work with EPA Headquarters risk assessment staff to develop this approach for application to 316(b) decisions.

If it is determined, using one of the above approaches, that there is no AEI, then the existing intake structure satisfies 316(b). If it is determined that there is an appreciable risk of AEI, however, then a facility moves on to evaluate alternative technologies using the "maximize net benefit" approach and/or may offer environmental enhancements in place of or in combination with BTA, as explained in sections IV and V below.

IV. Maximizing Net Benefits for BTA Selection

If the above steps fail to demonstrate that the existing cooling water intake structure is not causing AEI, then the permittee must proceed to the next step of determining the "best technology available" (BTA). The permittee does this by, first, identifying and listing all intake structure technologies that are reasonably "available" for the site in question.

Each of these BTA candidates must then be evaluated to determine its net costs and benefits at the site. The analysis should be as complete as possible in terms of identifying and quantifying net costs and benefits. The "benefits" of an intake structure technology typically include the fish and other aquatic organisms expected to be saved by the candidate technology, compared to the existing technology, and economic benefits to recreational and commercial fisheries, as well as any other benefits that can be identified The costs of each technology include the capital costs of constructing it; the operating and maintenance costs of using it each year, including the energy penalties associated with its use; adverse environmental effects such as evaporative loss, salt drift, visible plumes, noise, or land that must be devoted to cooling towers; and, for those technologies that will lower the generating output of the facility, the cost of replacement power and the environmental effects of increased air pollution and waste generation from generating that replacement power.

For each candidate technology, the total costs should then be subtracted from the total benefits to determine the net benefit of each technology. Ideally, the available technologies should be rank-ordered by cost-effectiveness and the ones whose marginal costs exceed their marginal benefits should be discarded. The technology with the greatest net benefit (the “maximum net benefit”) is the “best” technology for the site.

In short, the steps of the BTA determination are these:

1. Identify 316(b) BTA alternatives

2. Develop estimates of the costs and benefits of the alternatives

3. Organize the alternatives by increasing cost

4. Calculate the marginal costs and marginal benefits (relative to the next least expensive) of each of the alternatives

5. Identify the best alternative, i.e., the alternative with the highest net benefit (benefits minus costs)

The calculation of costs and benefits for a candidate technology need not be elaborate. For over twenty years the federal government has, under a variety of environmental programs, undertaken to assign dollar values to environmental amenities and impacts. This is done, for example, in preparing environmental impact assessments under the National Environmental Policy Act, in calculating the “benefit” of violating the environmental laws using EPA’s BEN model, in calculating natural resource damages under CERCLA, and in a variety of other contexts. While UWAG does not necessarily endorse any of these approaches per Se, UWAG does believe that cost-benefit analyses adequate for § 316(b) purposes can be done with existing techniques for a reasonable amount of time and effort. In particular, a “tiered” approach can be developed in which simplified methods can be used for cases in which the facts are simple or the costs low and more elaborate methods used for more complicated cases.

V. Enhancements

UWAG believes that voluntary use of enhancements can play a beneficial role in the 316(b) regulatory process. UWAG considers enhancements to be actions taken to address AEI other than changes to the location, design, construction or capacity of the CWIS. This concept is increasingly being employed by EPA and the states to address environmental issues and has been demonstrated to be an effective method of addressing 316(b) issues in a number of instances. The concept of enhancements is being used in Maryland, for example, as part of the nutrient TMDL program. In this Maryland program, trades can be made to achieve nutrient reductions between different sources, so long as specific criteria are met.

If it is determined that a facility’s CWIS may potentially cause AEI, this means that a risk of impairment exists for one or more species that would create an unacceptable risk to a population's ability to sustain itself, or to commercial or recreational harvests, or to ecological integrity within the waterbody. If a facility proposes an enhancement within the waterbody that will remove AEI or achieve a substantial benefit to the resource, then the goal of 3 16(b) of minimizing AEI to the waterbody is achieved. UWAG believes that voluntary enhancements should be considered instead of, or in combination with, changes to the CWIS, so long as the criteria of(l) directly addressing the AEI in the waterbody and (2) removing AEI or achieving a net benefit are achieved.

Types of enhancements that might be considered include stocking fish to replace impaired RIS, creating or restoring spawning or nursery habitat for RIS, raising the dissolved oxygen in anoxic areas to expand carrying capacity of the RIS in a waterbody, or removing obstructions to migratory species. In essence, focusing in this manner on what would help the fish, rather than narrowly on what can be done to modify the CWIS, might have the triple benefit of achieving a greater benefit to the RIS, doing so at less cost, and creating an environmental benefit in perpetuity (not just for the life of the CWIS). Any current enhancements implemented by existing facilities to address AEI directly should be considered in final AEI decisionmaking.

If NPDES permits include conditions based on enhancements, objectives should be established before implementation, and appropriate monitoring and/or reporting obligations should be included in the permit to confirm that enhancement requirements and/or objectives have been achieved.

VI. Periodic BTA Review

UWAG recognizes that, over time, changes may occur in the waterbody or the facility design, or operations may change, so as to potentially alter a CWIS BTA determination. Therefore a facility may need to provide information to confirm a previous BTA determination at the time of NPDES renewal (taking appropriate credit for previous CWIS investments that continue to have beneficial effects). A reassessment may be advisable at permit renewal if the permitting agency has information suggesting that:

-The RIS selected in the past are no longer the relevant ones for the waterbody,
-The previous 316(b) decision was based on inadequate data collection or analytical methods,
-There have been changes in the waterbody that could alter the AEI determination, or
-There have been changes in facility operation or the CWIS that could alter the AEI determination.

The amount and nature of additional data and/or information will vary on a site-specific basis.

Attachment A

Conservative Decision Criteria for Determining No Risk of AEI

I. Physical Criteria

A. Locational Criterion

The locational criterion applies to any waterbody type and to both entrainable and impingeable organisms. A facility will not be considered to pose an AEI risk if it:

withdraws water from a zone of a waterbody that does not support aquatic life due to anoxia or other reasons.

Many waterbodies have deep-water zones coincident with stratification that cannot support RIS due to anoxia/hypoxia, lack of habitat, poor habitat, or water quality conditions. In some deep parts of the Chesapeake Bay, for example, dissolved oxygen can be as low as 1 - 1.5 ppm (Dauer et al. 2000; Malone et al. 1988; Malone 1992). These zones are often the hypolimnia or bathypelagic zones of lakes, reservoirs, and estuaries (Anderson and Taylor 2001; Ritter and Montagna 1999; Brietburg 1994; Coutant 1990; Oliver and Hudson 1987). Impingeable nektonic or meroplantonic organisms will generally avoid these areas (Knights et al. 1995; Das and Stickle 1994; Brietburg 1994; Coutant 1990; Kramer 1987), and entrainable life stages of an RIS drifting through such areas would not be expected to survive in these zones (USEPA 2000; USEPA 1986). Thus there is no appreciable risk of AEI from impingement and/or entrainment by a CWIS located in such areas.

If such areas are uninhabitable only for certain time periods, certain RIS, or certain impingeable or entrainable life stages, then the locational criterion and the “no risk” decision also apply only to those time periods, RIS, and impingeable or entrainable life stages. Use of other criteria, or the structured risk assessment approach described in UWAG’s proposed “316(b) Decision Principles for Existing Facilities,” may be used for time periods, species, or life stages not covered by the locational criterion.

To account for the possibility that an area of the waterbody may be anoxic (or otherwise unable to support life) only part of the time, these conditions should be present at least 95% of the time for nonharvested RIS and 99% of the time for harvested ones in order to satisfy the locational criterion. This is consistent with the protection level embodied in other biological criteria. As for longer-term fluctuations in conditions such as dissolved oxygen, such conditions can be reviewed at the five-year permit renewal if there is new information showing they have changed significantly.

B. Design Criterion

The proposed “design” criterion applies to any facility in any waterbody type. An existing facility is not considered to pose a risk of AEI if it:

uses wet closed-cycle cooling or technologies or other measures□that achieve a level of protection reasonably consistent with that achieved by wet closed-cycle cooling.

“Reasonably consistent with” wet closed-cycle cooling means in the range of protection that would be provided by a wet cooling tower at the same site. UWAG believes that existing facilities using closed-cycle cooling do not pose any appreciable risk of causing AEI and should be considered to comply with 316(b). The Nuclear Regulatory Commission has concluded that for facilities with cooling towers, environmental effects related to impingement and entrainment are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource (see USNRC 1996; CFR 2001).

Wet closed-cycle cooling or reasonably consistent protection will be insufficient only if there are specific local circumstances such as impacts to threatened and endangered or otherwise protected species or areas designated for special protection. (The NPDES permitting agency and/or fishery and wildlife management agency would be aware of such circumstances.) Permit writers and natural resource agencies, who would normally review the draft permit, can be expected to identify any such special circumstances and impose requirements under existing laws such as state or federal endangered species acts.

C. Entrainment Criterion Based on Proportion of Source Waterbody Flow or Volume Used

This criterion, which amounts to 5% of flow or volume, is available only to facilities located on freshwater rivers, lakes (other than the Great Lakes), or reservoirs and applies only to entrainable life stages. It is listed as a “physical” criterion because its focus is a calculation of the facility’s cooling water use as a percentage of the source waterbody flow or volume. Because it may not be appropriate for many RIS to consider the entire source waterbody in making this decision, determining the appropriate flow for a river or volume for a lake or reservoir is of critical importance.

The appropriate flow or volume for RIS assessment is identified as the “biological zone of influence.” Discussed in more detail below, this is the zone that is occupied by an RIS. In contrast, the portion of the source waterbody hydraulically affected by the CWIS withdrawal of water is identified as the “hydraulic zone of influence.” For an RIS to be considered to be at risk of AEI, the biological zone of influence and the hydraulic zone of influence must overlap. In essence, the hydraulic zone of influence serves as the numerator, while the biological zone of influence serves as the denominator for these criteria.

The criterion applies only to smaller fresh waterbodies because, in larger waterbodies, identifying the biological zone of influence is more complex, and due to the size/complexity of these waterbodies, the criterion might not meet the test of being universally conservatively protective and explicitly quantitative, which forms the basis of these criteria. The concept of the biological zone of influence in general and its application in these criteria are discussed below.

The biological zone of influence as used in this proposed decisionmaking process applies only to freshwater rivers, reservoirs, and lakes. For any RIS, the biological zone of influence is defined as the zone (cross-sectional for rivers and volumetric and geographic for lakes and reservoirs) within a waterbody that is occupied by an RIS. The biological zone of influence is expected to vary for different species, and so the RIS with the most limiting biological zone of influence will determine whether a facility meets the criteria. If only one RIS exceeds the criterion, the value of the criterion is to focus the analysis on that species (the one that may be at risk), so that the more detailed risk assessment process can be applied to that species.

The biological zone of influence has the following components:

(1) Facilities must be able to define the biological zone of influence using new or existing data or information sufficient to determine the distribution patterns of vulnerable RIS.

(2) For smaller fresh waterbodies (rivers, reservoirs, and lakes other than the Great Lakes):

(a) In freshwater rivers the biological zone of influence for RIS entrainable life stages is the portion of the cross-sectional flow of the river occupied by the RIS where the river flows past the CWIS. If an RIS is found primarily along the shoreline, the biological zone of influence is the sum of the flow along the shorelines on both sides of the river. (This is a conservative definition of the biological zone of influence, to be used only for these conservative entrainment criteria and not for more detailed ecological risk assessments.)

(b) In smaller freshwater lakes and reservoirs, and in controlled-flow rivers that have lake-like characteristics, the biological zone of influence is the volumetric area occupied by the RIS during the time when the RIS is vulnerable to entrainment. Each RIS will be evaluated for three distribution patterns:

(i) Pattern 1 — The RIS has a relatively well-mixed distribution throughout the waterbody in which the CWIS is located. With this pattern, the entire waterbody is the biological zone of influence.

(ii) Pattern 2 — The RJS is essentially limited to a subarea of the waterbody. In this case the smaller subarea within the waterbody is the biological zone of influence. (But note: If the hydraulic zone of influence of the CWIS is not located in the limited volumetric area occupied by the RIS, it can be assumed that there will be no risk of AEI for the RIS.)

(iii) Pattern 3 — The RIS is limited to two or more areas within the waterbody (e.g., for entrainable life stages there may be multiple spawning and nursery areas associated with some habitat or water quality condition). In this case, the biological zone of influence is the sum of those areas within the waterbody unless one of the subareas in which the CWIS is located supports a distinct subpopulation, in which case the biological zone of influence is limited to the area occupied by that subpopulation. (Note: If the hydraulic zone of influence of the CWIS is not located in the subarea(s) occupied by the RIS, it can be assumed that there is no risk of AEI for the RIS.)

A CWIS presents no appreciable risk of AEI by entrainment if it withdraws no more than 5% of the source waterbody or the appropriate biological zone of influence, whichever is smaller. The specific criteria for waterbody types are the following:

1. Rivers — No more than 5% of the 90% exceedance flow of the biological zone of influence, measured during the period when entrainable life stages of RIS are present. (The “90% exceedance flow” is the flow that is exceeded 90% of the time, that is, the 10th percentile flow and would be determined based on the available period of record for the current hydrological flow conditions.)

2. Lakes — No more than 5% of the volume of the biological zone of influence during the period when entrainable life stages of RIS are present.

Reservoirs and large rivers with controlled flow may have either riverine or lake-like characteristics. In such waters there may be several types of spawners (migratory, nest building, broadcast, vegetation, etc.), and suitable habitat may be disproportionately distributed (up-versus downstream of the plant). For such waters the more appropriate of the above two criteria must be determined and applied.

Facilities employing these criteria may consider entrainment survival data to the extent such data are available and appropriate for the flow circumstance at hand. Also, if a facility has made quantifiable environmental enhancements related to the production of entrainable life stages, these enhancements may likewise be taken into account.

II. Biological Criteria

This section describes biological criteria based on percent of population loss and no significant downward trend. Other biocriteria are undergoing peer review.

A. Biological Criteria Based on Percent of Population Loss

The criteria based on the percent of population lost apply to both impingeable and entrainable organisms. The application of these criteria is limited to facilities located on freshwater rivers, reservoirs, and lakes other than the Great Lakes.

A facility design will be considered to create no appreciable risk of AEI if the CWIS causes the combined loss, from entrainment and impingement, of:

1. No more than 1% of the population of any harvested RIS AND
2. No more than 5% of the population of any nonharvested RIS,with fractional losses summed over life stages for the entire lake, reservoir, or river reach included in the evaluation.

There are two options for making this determination. One option is to compute a conditional mortality rate (EPRI 1999; Vaughn 1988; Boreman and Goodyear 1988; Boreman et al. 1981) for the combined effects of entrainment and impingement. Conditional mortality rate estimates of loss to adult populations are conservative because they do not include compensation (Barnthouse 2000; Boreman and Goodyear 1988; Vaughn 1988).

Another option, for sites where the population of a harvested species is unknown, is to express the loss as an equivalent number (EPRI 1999; Boreman 1997) at some life stage and compare that to a sustainable harvest for the same life stage. If the loss is less than 1% of the sustainable harvest, then the percent loss to the overall population must be even smaller. If the loss is much less than 1% of the harvest, it may not even be necessary to make the equivalent adult conversion; natural mortality experienced by juvenile fish subsequent to impingement might be ignored (see, e.g., Matty et al. 1999). The same cohort (a group of fish spawned during a defined time period, usually one year) may be impinged or harvested in more than one year, so that care would be required to take all harvest and impingement losses into account and to ensure that comparable values were compared.

The rationale for limiting these 1% / 5% criteria to fresh waterbodies other than the Great Lakes is the greater complexity of identifying the biological zone of influence for an RIS in larger waterbodies and the difficulty of identifying explicit protective conservative criteria with universal applicability.

The 1% / 5% population loss criteria are based in part on recognition that these percentages are small relative to the inter-annual population fluctuations typical of fish populations and also small relative to the compensatory responses typical of many species. Under commonly used modeling methods, if compensation is excluded, any increase in mortality leads to extinction (Ginzburg et al 1990; Rose and Cowan 2000; Rose et al. in press). (Thus, if there were no compensation, even a 1% increase in mortality could be deemed too high. And, since compensation decreases with decreasing stock size, a

1% loss could in fact be too high for a population on the verge of collapse.) Rose et al. (in press) provide a comprehensive review of compensation, including its importance, associated controversy, and needed research. Also, a meta-analysis by Myers et al.(1999) shows that fish species have substantial compensatory reserve. Compensation is recognized as a factor that reduces the actual population decrease associated with a given conditional mortality rate, particularly when the population is at or above some equilibrium level (Rose et al. in press; Rose and Cowan 2000; Van Winkle 2000). It is not included in the computation of percent loss for the purposes of these “no risk” criteria but could be included more formally in a subsequent risk analysis, if required and if there were data to support its use for a particular application.

The topic of how much loss a fish population can tolerate has been addressed by a number of researchers. Fishery managers consider removal of 70 to 80 percent of an unfished stock’s biomass (Spawning Stock Biomass or SSB) and 65 to 80 percent of a stock’s reproductive potential (Spawning Stock Biomass per Recruit or SSBPR) to be safe, given the compensatory reserve inherent in most fish stocks. The National Marine Fisheries Service (NMFS 1996) recently reviewed overfishing definitions proposed by regional fisheries management councils for 117 fish stocks. For most of these stocks, overfishing was defined in terms of SSBPR, with the overfishing definitions ranging between 65% and 80% reduction in SSBPR.

While the compensatory ability of specific species will vary, UWAG believes that the criteria of 1% for harvested species and 5% for non-harvested species are so far below levels at which stocks are typically managed for harvest — are so conservative, in other words — that they would ensure no appreciable risk of AEI. The 1% value for harvested species is lower than the 5% for non-harvested species because there is existing fishery management exploitation of these species. For the smaller waterbodies to which these criteria apply, in almost all cases harvesting will be limited to recreational, rather than commercial, harvest. However, there may be instances in which these criteria would not be sufficiently conservative at a particular site (due to overexploitation as a result of commercial or recreational fishing, resulting in a fishery management recovery plan, or the presence of threatened or endangered species).

Facilities employing these criteria should include impingement and/or entrainment survival data to the extent such information is available. If a facility has made environmental enhancements, such as aquaculture or habitat creation for a specific RIS, the quantifiable benefit of these enhancements should be considered.

B. Biological Criterion Based on No Significant Downward Trend

The following criterion applies to both entrainable and impingeable life stages but is limited to freshwater rivers, reservoirs, and lakes other than the Great Lakes:

A CWIS will be considered not to create an appreciable risk of AEI if there are adequate data collected over a representative period of years (representative in terms of meteorology, hydrology, biology, and plant operations), including pre-operational data, showing no statistically significant (95% confidence interval) downward trend in the population abundance of MS.

The adequacy and robustness of the data and the use of the data for meaningful trend analysis in this context are achieved, ideally, by publication in a peer-reviewed journal. However, acceptance for use in a source waterbody by appropriate fishery and wildlife managers and water quality regulators, based on sample size and design adequacy, would be sufficient.

C. Other Biological Criteria

Other biological criteria are undergoing peer review.

Attachment B

Proposed 316(b) Decision Principles for Existing Facilities

[see hard copy for diagram]

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.041.201

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

Is my Facility Covered if it is a Point Source Discharger Subject to an NPDES Permit?

-EPA invites comment on the approach of drafting an individual NPDES permit containing requirements for cooling water intake structures when a facility's only NPDES permit is a general permit for storm water discharge.

17,129, col. 2

Section XXI: EPA lacks authority to apply § 316(b) to existing facilities covered by an NPDES permit only for storm water because such facilities are not subject to effluent limitations under § 301 and§ 306.

-Alternatively, EPA invites comment on the approach of adding requirements applicable to cooling water intake structures into general permits.

17,129, col. 2

See preceding comment.

EPA Response

See response to 316bEFR.035.001.

Comment ID 316bEFR.041.202

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 3.06

RFC: Cooling water withdrawal thresholds of 25%

Who Is Covered Under the Thresholds Included in This Proposed Rule?

EPA requests comment on the thresholds included in the proposal, which focus the rule on facilities that 1) withdraw cooling water from waters of the U.S. and use at least 25% of the water withdrawn for cooling purposes and 2) have at least one cooling water intake structure with a design intake capacity of 50 MGD or more.

17,130, col. 1

Section VII: Rarely used emergency service water should not count toward the 50 MGD threshold.

Also, (1) facilities whose operators agree to limit actual intake flows to less than 50 MGD should be excluded from Phase II, and (2) EPA should rethink the 25% threshold and, at any rate, should revise the calculation to ensure the test is not reapplied each month, but instead only once when the permit is issued.

EPA Response

The final rule does not explicitly exclude emergency cooling water and emergency service water intakes from consideration in determining which facilities are in-scope. Although EPA does not have detailed data on emergency cooling water and emergency intakes, based on other available data EPA does not believe that including consideration of emergency intakes within this rule significantly alters the scope of the rule. EPA estimates that 84 percent of in-scope facilities have an average flow that equals or exceeds 50 MGD. Since such facilities would by necessity require a design intake flow that also equals or exceeds 50 MGD, and given that the average flow data represent normal operation and, therefore, are not significantly affected by emergency cooling water use, EPA believes that relatively few facilities are potentially affected by this issue. EPA notes that under § 125.94(f), if compliance with Part 125, Subpart J results in a conflict with a safety requirement established by the Nuclear Regulatory Commission, the Director must determine best technology available for minimizing adverse environmental impact on a site-specific basis such that it would not result in a conflict with the Commission's safety requirement.

Please see response to comment 316bEFR.0035.002.

Comment ID 316bEFR.041.203

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.0

Costs

Repowering of Steam Electric Power Generating Facilities (Utility and Nonutility)

In order to determine compliance costs, EPA will consider the results of its repowering research and any comments provided on this subject for the final rule. EPA requests comment on all repowering activities and the above summary of its repowering research. Of particular interest is information from facilities that have enacted repowering changes and the degree to whichthese changes have changed their design intake flow.

17,134, col. 1

Because EPA did not (perhaps due to CBI restrictions) provide full data for the facilities it considered in either its original cost analysis or its repowering analysis, UWAG was unable to develop comments on this point.

EPA Response

The Agency provided its repowering analysis at 66 FR 17134. There the Agency explained that it analyzed a proprietary database (NewGEN) for information on plants that planned to undertake repowering activities. The Agency outlined the data sources it utilized and provided all of the summary data on the subject. Other commenters were able to provide critiques of EPA's approach or respond to EPA's direct request for information from facilities enacting repowering changes. EPA notes that the commenter represents a vast majority of facilities within the scope of the rule, and yet did not respond to EPA's direct request for more information on facilities enacting repowering changes. In addition, the commenter did not respond to or provide general comments on the conclusions of EPA's repowering research. The Agency notes that other commenters without access to the NewGEN database were able to provide detailed comments in response to EPA's analysis summarized in the preamble to the proposal.

Comment ID 316bEFR.041.204

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 17.08
Option: UWAG's recommended approach

How Will Requirements Reflecting Best Technology Available for Minimizing Adverse Environmental Impact be Established for My Phase II Existing Facility?

-EPA invites comment on all aspects of this proposed regulatory framework as well as the alternative regulatory approaches discussed later in this section.

17,140, cols.1 -2

All UWAG comments are relevant here.

-EPA seeks comment on its proposal to allow three different methods to establish the best technology available for minimizing adverse environmental impacts. The three methods include 1) a facility would demonstrate that the existing design meets minimum performance standards; 2) a facility would select a design and demonstrate it meets minimum performance standards; or 3) a facility would prove that costs are significantly greater than EPA's estimates or site-specific benefits and would qualify for site-specific determination of best available technology.

17,142 col. 1

Executive Summary; Sections II, III, VI, XII: Although UWAG believes that a site-specific approach would be superior to a technology-based approach, we also believe that many aspects of EPA's proposal have merit. In particular, its inclusion of a cost-benefit test for setting site-specific alternative limits and its recognition of the efficacy of CWIS technologies (not cooling systems retrofits involving closed-cycle cooling) are important. UWAG recommends in these comments a number of ways in which this approach could be improved.
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EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.041.205

Subject Matter Code 7.02

Performance standards

Author Name Hunton & Williams

Organization obo Utility Water Act Group

How Could a Phase II Existing Facility Use Newly Selected Design and Construction Technologies, Operational Measures, and/or Restoration Measures to Establish Best Technology Available for Minimizing Adverse Environmental Impact?

In the event that a design was not achieving compliance, EPA solicits comment on whether the proposed regulation should specify that proper design, installation, operation and maintenance would satisfy the terms of the permit until the permit is reissued pursuant to a revised Design and Construction Technology Plan. If EPA were to adopt this approach, EPA would specify in the regulations that the Director should require as a permit condition the proper design, installation, operation and maintenance of design and construction technologies and operational measures rather than compliance with performance standards.

17,143, col. 3

Sections VI, XVIII: UWAG believes strongly that any NPDES permit provisions should not specify a rigid numeric performance standard for compliance assessment. Rather, as EPA suggests, performance standards, if adopted at all, should be used to select technology and the permit should specify that that technology must be properly operated and maintained.

UWAG’s comments suggest a simplified approach to choosing among EPA’s recommended technologies. That recommended approach also addresses this issue.

EPA Response

Please see response to comment 316bEFR.029.040. For a discussion of Technology Installation and Operation Plans and their role in compliance with the requirements of today's rule, please see the preamble.

Comment ID 316bEFR.041.206

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Site-Specific Determination of Best Technology Available

EPA invites comment on whether a "significantly greater" cost test is appropriate for evaluating requests for alternative requirements by Phase II existing facilities.

17,146, col. 1

Section XII B 5: According to EPA, the "significantly greater" cost test is not as stringent as the "wholly disproportionate" test. That does not make it a rational test, however, because it could still result in costs greater than benefits. EPA should adopt a benefit-cost standard that maximizes net benefits.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.041.207

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

Site-Specific Determination of Best Technology Available

-EPA invites comment on whether the standards proposed today might allow for backsliding by facilities that have technologies or operational measures in place that are more effective than in today's proposal.

17,146, col. 2

EPA need not be concerned about "backsliding" (that is, abandoning a more effective technology in favor of one less effective, as a result of a relaxation of the rules) for three reasons. First, EPA's proposal is very stringent. Second, Phase II facilities are highly unlikely to abandon a significant investment in an existing CWIS technology, assuming that it is operating effectively, whether or not the rules change. Third, the CWA includes, and EPA has promulgated as part of the NPDES rules, anti-backsliding provisions. To the extent those rules apply to situations of this kind, there is no reason to duplicate them in this rulemaking. To the extent they do not, EPA would have no authority to impose them.

-EPA invites comment on approaches EPA might adopt to ensure that backsliding from more effective technologies does not occur.

17,146, col. 2

Such provisions are unnecessary for the reasons explained above.

EPA Response

See response to 316bEFR.021.013.

Comment ID 316bEFR.041.208

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

What is the Role of Restoration Under Today's Preferred Option?

EPA invites comment on all aspects of using restoration measures in lieu of or in combination with reductions in impingement mortality and entrainment.

17,146, col. 3

Section XIII: UWAG supports the use of restoration on a voluntary basis, in lieu of or with CWIS technologies, where CWIS technologies otherwise would be needed to minimize AEI. UWAG also encourages flexibility in defining appropriate restoration projects, nature and extent of the project, species benefited, and extent and nature of information required to predict and verify project results. Such flexibility allows society to benefit from historical and ongoing experience with restoration efforts.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

The final rule allows permitting authorities the flexibility to make decisions on the feasibility of restoration measures on a site-specific, case-by-case basis. All restoration measures must meet the requirements of the final rule, including those described in sections 125.94 and 125.95.

Comment ID 316bEFR.041.209

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

What is the Role of Restoration Under Today's Preferred Option?

EPA specifically invites comment on whether restoration measures should be allowed only as a supplement to technologies or operational measures.

17,146, col. 3

Section XIII.A: Restoration should be allowed in lieu of technology measures, not merely as a supplement. Nothing in the CWA requires that restoration serve only as a supplement, nor would such a result reflect good public policy. The basis for restoration -- that is, avoidance of AEI in the first place -- applies whether restoration occurs in lieu of or supplementary to technology. In both cases, the goal of § 316(b) is met, because AEI is avoided or minimized.

EPA Response

Facilities may use restoration measures under the final rule either in lieu of or in combination with technologies that reduce impingement mortality and entrainment. All restoration measures must satisfy the requirements in the final rule, including those described in sections 125.94 and 125.95.

For a discussion of EPA's authority for including restoration measures as a compliance option in the final rule, the preamble to the final rule.

Comment ID 316bEFR.041.210

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 11.03
RFC: Appropriate spatial scale for restoration

What is the Role of Restoration Under Today's Preferred Option?

EPA also seeks comment on the most appropriate spatial scale under which restoration efforts should be allowed should restoration measures be limited to the waterbody at which a facility's intakes are sited, or should they be implemented on a broader scale, such as at the watershed or State boundary level.

17,146, col.3

Section XIII G: The spatial scale of restoration measures should be flexible to allow maximum short- and long-term environmental benefits. In light of the wide variety of situations in which restoration might be used and techniques that might be applied, it would be difficult for EPA to craft a uniform set of limitations that would not unduly constrain innovation in this area.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.041.212

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 11.04
RFC: Consultation with wildlife agencies

What is the Role of Restoration Under Today's Preferred Option?

EPA invites comment on the nature and extent of consultations with Federal, State, and Tribal fish and wildlife management agencies that would be appropriate in order to achieve the objectives of section 316(b) of the CWA, in cases where restoration is proposed.

17,146, col. 3

As a general matter, the nature of the information EPA suggests would be produced and considered where consultation is required is typical of current experience, with three caveats. First, formal consultations under the federal Endangered Species Act and other relevant federal statutes are not required where the state is the permit issuer. Second, any type of consultation should focus on species that are likely to be affected by the intake -- not all species that are likely to be anywhere in the vicinity but for which there is no evidence of contact or effect. For the same reason, it is not necessary or appropriate for EPA to require that consultations result in identification of all stressors to the waterbody, as EPA suggests it might. Third, it must be clear that the final decision remains with the permit writer and must be made consistent with § 316(b). Section 316(b) does not necessarily displace other applicable laws, which remain in full force, but neither do those laws expand EPA's or the permit writers' authority under § 316(b).

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

Comment ID 316bEFR.041.213

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.05

RFC: Info. to include in a restoration plan

What is the Role of Restoration Under Today's Preferred Option?

-EPA seeks comment on the type of information that would be appropriate to include in a written request for consultation on proposed restoration projects submitted to the State, Tribal, and Federal agencies responsible for management of aquatic resources within the waterbody at which the cooling water intake is sited.

17,146, col. 317,147, col. 1

The information EPA proposes to request for restoration measures generally appears reasonable. EPA should recognize, however, that the nature of and need for design and engineering calculations, drawings, and maps will vary based on the nature of the restoration project proposed.

-EPA invites comment on whether the following information proposed to be included in a request for consultation is appropriate and adequate or if it should be augmented or streamlined.
--- proposed restoration measures
--- summary of benefits
--- implementation and maintenance plan
--- summary of past or voluntary consultation with Federal, State, or Tribal fish and wildlife agencies
--- design and engineering calculations, drawings, and maps.

17,147, col. 1

See preceding comment.

-EPA invites comment on what specific, additional information should be included in a facility's restoration plan and/or which of the proposed information requirements are unnecessary.

17,147, col. 1

Section XIII: See preceding comment.

EPA Response

EPA believes the requirements in the final rule provide permit applicants and permitting authorities with the flexibility to perform an assessment of a restoration measure that is commensurate with the restoration measure's level of complexity.

Comment ID 316bEFR.041.214

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

What is the Role of Restoration Under Today's Preferred Option?

EPA invites comment on how to measure "substantially similar performance" of restoration measures and methods that can be used to reduce the uncertainty of restoration activities undertaken as part of today's preferred option.

17,147, col. 2

Section XIII C: EPA should emphasize the scientifically sound design of restoration projects in the first instance. Any demonstration should then focus on whether or not the physical structures or other attributes that were designed have been put in place as proposed. EPA should not require unduly burdensome "species replacement"-type demonstrations.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.041.215

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

What is the Role of Restoration Under Today's Preferred Option?

-EPA seeks comment on how it may measure the success or failure of restoration activities given the high degree of uncertainty associated with many areas of this developing science and that many of these activities do not produce measurable results for many months or years after they are implemented. For these reasons, EPA requests comment on whether to require that a facility using restoration measures restore more fish and shellfish than the number subjected to impingement mortality or entrainment.

17, 147, cols 2-3

Section XIII C: Physical demonstrations should be used including aerial imaging to verify changes in water quality (clarity), habitat quality and quantity, and sedimentation as determined by bathymetric measurements.

EPA should not require that restoration programs address uncertainty by increasing the scale of the project or otherwise assigning an inflated restoration/loss ratio. Rather, EPA should promote restoration projects, and the broader, typically longer-term benefits they yield, by giving permit writers broad flexibility to decide exactly how much restoration is enough. This will vary, depending on the amount of uncertainty, the extent and value of the impingement or entrainment losses to be offset, the nature of the proposed restoration project and experience with projects of that kind, and many other site-specific factors. Rigid requirements for a high degree of precision will increase demonstration costs unnecessarily and divert resources that otherwise could be used to enhance the project itself. While experimental projects should be subject to more rigorous evaluation, EPA should not impose unreasonable burdens of proof.

-EPA requests comment on establishing margins of safety for restoration measures (particularly for activities associated with outcomes having a high degree of uncertainty) and identifying the appropriate authority for establishing safety measures.

17,147 col. 3

See the preceding comment

-EPA also seeks comment on an appropriate basis for establishing safety margins (e.g., based exclusively on project uncertainty, relative functional value or rareness of the system being restored, or a combination of these) to ensure that restoration measures achieve performance comparable to intake technologies.

17,147, col. 3 - 17,148, col. 1

See the preceding comment

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.041.216

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

What is the Role of Restoration Under Today's Preferred Option?

EPA requests comment on whether and how additional environmental benefits provided by restoration measures should be considered in determining appropriate fish and shellfish rates for restoration projects.

17,148, col. 1

Section XIII: UWAG’s comments describe very generally the need to account for non-aquatic life benefits of restoration as well as benefits that extend beyond the life of the plant. In general, UWAG believes that there is no single method of accounting for these factors and that flexibility will be required. That they must be considered is evident from the terms of § 316(b) itself, which refers to “environmental impacts,” not to aquatic organism impacts alone.

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.041.217

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

What is the Role of Restoration Under Today's Preferred Option?

EPA seeks comment on whether habitat conservation would be an appropriate component of a facility's restoration efforts.

17,148, col. 2

Section XIII E: Habitat conservation should be considered a restoration technique. In many cases, important habitat might be lost if private resources are not found to ensure its conservation. As a matter of public policy, it makes more sense to allow permittees to put resources into conservation rather than forcing them to wait until habitat is lost and then replace it. Habitat conservation yields tangible and immediate benefits and should play an important role in restoration.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.041.218

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

What is the Role of Restoration Under Today's Preferred Option?

EPA invites comment on the role of restoration in addressing the impact of cooling water intake structures. EPA invites commenters to suggest alternative approaches to ensuring that restoration efforts are successful.

17,148, col. 3

See preceding comments.

Flexibility is the key to encouraging restoration and ensuring successful programs. There is no surer way to stifle innovation in this regard than to impose too many constraints on permit writers. Instead, EPA should set reasonable goals and appropriate, flexible standards for demonstration (such as a “reasonable amount of relevant and scientifically credible data supports the proposal”) and allow the public comment process to ensure full airing of any issues.

Also, as UWAG has noted, in many instances natural resource managers find greater benefit overall from projects that focus on benefits to a waterbody’s living resources different from those impinged or entrained.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others. Evaluation and monitoring difficulties are two reasons why restoration measures may not be suitable for a particular site.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule are written with a significant amount of flexibility.

For a discussion of the role of ancillary benefits in restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.041.219

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

What are the Minimum Elements of an Impingement Mortality and Entrainment Characterization Study?

EPA invites comment on whether the narrative criteria at § 125.95(b)(1) are sufficiently comprehensive and specific to ensure that scientifically valid, representative data are used to support the various approaches for determining best technology available for minimizing adverse environmental impact in today's proposal.

17,148, col. 3

Section XVII B: In general, UWAG agrees that the narrative criteria set an appropriate standard. However, in other parts of our comments, we describe ways in which the performance standards and demonstration requirements and schedule could be made clearer, more reasonable and consistent, and less burdensome.

EPA Response

EPA appreciates the Utility Water Act Group's support of the narrative criteria at § 125.95(b)(1) of the proposed rule. EPA believes that it has greatly streamlined today's final rule. See response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.041.220

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.02

RFC: Monitoring frequencies

What are the Minimum Elements of an Impingement Mortality and Entrainment Characterization Study?

-EPA invites comment on whether it should set specific, minimum monitoring frequencies and/or whether it should specify requirements for ensuring appropriate consideration of uncertainty in the impingement mortality and entrainment estimates.

17,148, col. 3

Sections VI, XVII, XVIII: EPA should not set inflexible minimum or maximum monitoring requirements, either as to monitoring intervals or total duration. Rather, any monitoring should be tailored to the site, considering the amount and reliability of existing data, the nature of the species of interest, and the type of technology or other alternative used to satisfy § 316(b). Permittees should have the initial responsibility for developing and supporting an appropriate monitoring plan. EPA could provide guidance on factors that weigh in favor of different monitoring frameworks.

The simpler approach UWAG recommends avoids the need for such monitoring in most cases, and focuses on evaluation of proper operation of the selected technology.

What Should be the Minimum Frequencies for Impingement and Entrainment Compliance Monitoring?

-EPA invites comment on including minimum sampling frequencies and durations as follows: for at least two years following the initial permit issuance, impingement samples must be collected at least once per month over a 24 hour period and entrainment samples must be collected at least biweekly over a 24 hour period during the primary period of reproduction, larval recruitment, and peak abundance.

17,149, col. 1

Section XVII: See preceding comment.

-EPA invites comment on whether more frequent sampling would be appropriate to accurately assess diel, seasonal, and annual variation in impingement and entrainment losses.

17,149, col. 1

Section XVII: See preceding comment.

-EPA also invites comment on whether less frequent compliance biological monitoring would be appropriate (perhaps depending on the technologies selected and implemented by a facility).

17,149, col. 1

Section XVII: See preceding comment.

EPA Response

Please see EPA’s response to comment 316bEFR.034.050.

Comment ID 316bEFR.041.221

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

How is Entrainment Mortality and Survival Considered in Determining Compliance With the Proposed Rule?

EPA invites comment on regulatory approaches that would allow Phase II existing facilities to incorporate estimates of entrainment mortality and survival when determining compliance with the applicable performance standards proposed in § 125.94(b) of today's proposed rule. EPA invites commenters to submit any studies that document entrainment survival rates for the technologies used as the basis for today's performance standards and for other technologies,

17,149, col. 2

Sections V, VIII E: UWAG believes that EPA should allow for consideration of entrainment survival, where scientifically sound studies show it occurs. That entrainment survival occurs for some species and life stages at some plants is proven fact, and ignoring it would be bad science and bad policy.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.041.222

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.02
Benefit Estimation Methodology

What Should be the Appropriate Methodology for Benefits Assessment?

EPA invites comment on which of these methodologies (environmental and economic analyses) or any other, is the most appropriate for determining a fair estimate of the benefits that would occur should the Phase II existing facility implement technology to comply with the applicable performance standards. In addition, EPA invites comment on whether narrative benefits assessments should supplement these methodologies to properly account for those benefits which cannot be quantified and monetized.

17,149, col. 2

Section V and Appendices 9 and 13: RUMs and, in appropriate cases, benefit transfer methods are best, but must be carefully and appropriately applied. EPA's Habitat Replacement Cost (HRC) and Societal Revealed Preference (SRP) methods are not benefits estimation methods at all, but instead estimate costs. Use of those methods is wholly invalid.

As for narrative benefits assessments to capture non-monetized benefits, such assessments could be used, albeit with great care. In particular, any narratives should be based on appropriate economic assessment principles. Also, if EPA includes monetized estimates for nonuse values, the narrative should explain the relationship between the nonmonetized and monetized assessment of non-use benefits. Conceptually, such an approach would be better than EPA's wholly illegitimate HRC and SRP methods, and less resource intensive than Contingent Valuation (CV) methods. But narrative assessments are necessarily somewhat subjective and cannot be treated on the same level as more objective economic methods and data. And, most important, before any method is used to try to capture non-use benefits, there must be at least some legitimate linkage between the regulations and the hypothesized effects and values.

EPA Response

EPA agrees that RUMs and benefit transfer are the best available methods for valuing recreational use benefits. The Agency believes that it has carefully applied these methods to evaluate benefits to recreational anglers for the final 316(b) regulation. For detail on recreational fishing benefits analysis, see Chapter A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through H in the Regional Case Study report (DCN # 6-0003). See responses to comments #316bEFR.041.452, #316bEFR306.320, and #316bEFR337.010 for additional details regarding EPA's RUM analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment # 316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For

EPA's response to comments on the SRP method, please see comment # 316bEFR.005.006.

The Agency disagrees that qualitative assessments are more subjective and cannot be treated on the same level as other economic methods and data. EPA's Guidelines for Preparing Economic Analyses (DCN #6-1931) recommend that benefits be considered from a qualitative perspective when developing monetized estimates is not feasible. The Agency believes that it adequately considered the benefits of the environmental protections at issue in the final 316(b) rule and carefully developed a qualitative assessment of ecological benefits stemming from the final 316(b) regulation.

Comment ID 316bEFR.041.223

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Quantified and Monetized Baseline Impingement and Entrainment Losses

EPA invites comment on including its approach for estimating nonuse or passive values. It estimates nonuse impacts at 50% of the value of recreational use impact.

17,149, col. 3

Section V D: This is a wholly unfounded assumption on which EPA should not rely for any purpose. If EPA were sure that appreciable non-use benefits existed for the forage effects in question, it could attempt to capture those by doing careful, unbiased CV studies (although the reliability of such studies is the subject of debate among many economists). But EPA has no basis for believing that such non-use values really exist in this context, much less that they are 50% of use values. Even if it does not revise its own benefit estimates, EPA cannot legitimately endorse or require this approach for future benefit estimates.

UWAG also notes that EPA's unfounded and highly conservative approach addressing any uncertainty regarding the existence and value of non-use benefits contrasts markedly with its approach to accounting for uncertainty with regard to entrainment survival. There, even in cases for which some data exists to show that survival occurs, EPA has chosen to assume that none occurs. As to non-use values, even in the absence of any evidence that non-use values exist for the types of forage fish losses at issue here, EPA has assumed that such values are 50% of its already inflated use values.

EPA Response

For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Please see response to comment #316bEFR306.105 for additional discussion of the potential use of stated preference (e.g. CV or CVM) approaches to address the nonuse valuation issue.

Please see response to comment #316bEFR306.306.506 for additional discussion of issues related to entrainment survival.

Comment ID 316bEFR.041.224

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Should Estimates of Entrainment Mortality and Survival be Included in Benefits Assessments?

-EPA requests comment on whether it is appropriate to allow consideration of entrainment mortality and survival in benefit estimates, and if so, should EPA set minimum data quality objectives and standards for a study of entrainment mortality and survival used to support a site-specific determination of best technology available for minimizing adverse environmental impact. EPA may decide to specify such data quality objectives and standards either in the final rule language or through guidance.

17,150, col. 2

Section VIII E: Yes, EPA should consider entrainment survival and net it out of any loss estimates it derives for purposes of assessing regulatory options. Equally important, EPA should ensure appropriate consideration of such survival during future benefit estimates (assuming the Agency does not amend the performance standard for entrainment so that it applies only to entrainment mortality).

-EPA could provide guidance on appropriate survival studies, but it should not set inflexible criteria that would preclude use of otherwise legitimate data. Alternatively, EPA could look to a knowledgeable scientific or technical association to develop such guidelines.

17,150, col. 3

See EPRI comments on this issue.

-EPA invites comment on its preliminary review of the data quality of entrainment survival studies provided in Chapter D7. EPA also requests that commenters submit additional entrainment survival or mortality studies for review.

17,150, col. 3.

See EPRI comments on this issue.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.041.225

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 13.0

More Stringent Requirements

When Could the Director Impose More Stringent Requirements?

-EPA requests comment on specifying that more stringent requirements would be appropriate when compliance with the applicable requirements in § 125.94(b) and (c) would (1) result in unacceptable effects on migratory and/or sport or commercial species of concern to the Director; and (2) not adequately address cumulative impacts caused by multiple intakes or multiple stressors within the waterbody of concern.

17,151, col. 1

Section XV: No such additional limits are justified. Indeed, as UWAG's comments show, even the ambitious standards EPA proposes probably are well in excess of what is justified by the need to minimize AEI by protecting aquatic populations. Moreover, if EPA is convinced that § 316(b) merits a consistent, technology-based approach, any additional requirements such as it describes would undermine such consistency. Last, UWAG does not believe that § 316(b) authorizes EPA to require power plants to remediate the consequences of "multiple stressors" as this language suggests. While effects of a CWIS in light of other sources of cropping are relevant, § 316(b) does not make that CWIS responsible for cutting losses to zero where its effects are de minimis.

-EPA requests comment on whether any explicit regulatory provision for more stringent requirements is needed in light of section 510, which does not apply when EPA is the permitting authority.

17,151, col. 1

Section XV: An explicit regulatory provision applying CWA §510 is unnecessary, because the statute applies of its own force, as states are well aware. Adding such a provision also would serve only to create confusion and muddy the distinction between state and federal requirements. Also, serious constitutional issues are raised if EPA is suggesting that EPA should be able to impose requirements more stringent than federal law in jurisdictions where it is the NPDES permitting authority.

EPA Response

Please see response to comments 316bEFR.002.016 and 316bEFR.041.113.

With respect to the last portion of this comment, EPA observes that, as the permitting authority, it must not only impose permit requirements that satisfy the applicable section 316(b) regulations but also include requirements consistent with the conditions in a certification made by a state under section 401 of the Clean Water Act.

Comment ID 316bEFR.041.226

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

When Could the Director Impose More Stringent Requirements?

EPA requests comment on whether recovery of aquatic communities in such waterbodies designated for propagation of fish and shellfish might be delayed by use of the significantly greater cost-to-benefit test proposed today.

17,151, col. 2

Such a result is unlikely because in most cases cropping by the CWIS is not the proximate cause of any non-attainment and thus will have little or no effect on achievement of fishable/swimmable uses. Experience over the years with numerous waterbodies which, once impaired by pollutants, are now supporting such uses despite the de minimis cropping of burgeoning populations by existing CWIS, bears this out.

EPA Response

The comment generally supports the rule. However, EPA notes that impingement and entrainment can affect achievement of some designated uses (e.g., "fishable").

Comment ID 316bEFR.041.227

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 13.0

More Stringent Requirements

When Could the Director Impose More Stringent Requirements?

EPA requests comment on a regulatory alternative that would explicitly allow the Director to require more stringent technologies or measures where not doing so would delay recovery of an aquatic species or community that fish and wildlife agencies are taking active measures to restore, such as imposing significant harvesting restrictions.

17,151, col. 2

The CWA only allows EPA to impose requirements on CWIS location, design, construction and capacity reflecting “BTA.” Those requirements must be selected by reference not just to impingement and entrainment, but to minimize adverse environmental impact in light of technology practicability, costs and overall benefits.

Equally important, such a provision is unneeded, since (1) what EPA already proposes would require appreciable loss reductions, whether necessary or not (unless the benefits do not justify the costs) and (2) there is no evidence that CWIS-related losses are likely to be a determining factor in cases where harvest restrictions need to be imposed due to fishing pressure or other factors.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.041.228

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Discussion of the 5% Flow Threshold in Freshwater Rivers

-If a facility withdraws more than 5% of the mean annual flow of a freshwater river or stream, the facility would be required to reduce entrainment by 60- 90%. EPA invites comment on the use of the 5% threshold and its supporting documents in the NODA for New Facility Rule (66 FR 28863).

17,151, cols.2-3

Section VII A: UWAG believes that this requirement is arbitrary and unfounded. EPA should not impose across the-board entrainment control requirements for freshwater facilities withdrawing a given percentage of the instream flow.

If it retains this provision, however, EPA should give permittees who have or wish to collect the necessary data the opportunity to show that the mean flow criterion should be applied only during a portion of the year when entrainable-sized organisms are relatively abundant.

-EPA also requests comment on the following alternative withdrawal thresholds for triggering the requirement for entrainment controls: (1) 5% of the mean flow measured during the spawning season (to be determined by the average of flows during the spawning season, but remaining applicable to non-spawning time periods); (2) 10% or 15% of the mean annual or spawning season flow; (3) 25% of the 7Q10; and (4) a species-specific flow threshold that would use minimum flow requirements of a representative species to determine allowable withdrawals from the water body.

17,151, cols. 2-3

See preceding comment.

EPA Response

Please see response to comments 316bEFR.099.018 and 316bEFR.063.005.

Comment ID 316bEFR.041.229

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 15.01

RFC: State or Tribal alts. achieve comparable perf.

State or Tribal Alternative Requirements that Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed

EPA requests comment on its proposal to include an alternative where an authorized State or Tribe may choose to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions in impingement mortality and entrainment otherwise achievable under § 125.94.

17,151, col. 3

Section II B: UWAG agrees. EPA should encourage successful state programs. EPA's rule requires some refinement, however, so that good programs will not fall short just because they have not in the past met what EPA now envisions as the appropriate procedural or paperwork requirements, or do not ensure numerically equivalent loss reductions across the board.

EPA Response

Today's final rule maintains the prerogative of a permitted State to demonstrate to the Administrator it has adopted alternative requirements that will result in reductions in impingement mortality and entrainment within a watershed comparable to those that would be achieved under § 125.94. This alternative recognizes the successful achievements of many states in regulating environmental impacts associated with cooling water intakes.

Comment ID 316bEFR.041.230

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 15.01.01

Definition and geographic scale of a watershed

State or Tribal Alternative Requirements that Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed

-EPA also requests comment on the appropriate definition of watershed.

17,151, col. 3

No one-size-fits-all definition is necessary or appropriate, especially given the widely different waterbody types that predominate in different states and regions. EPA either should defer to an existing state definition or give states the flexibility to craft their own with public input.

-EPA invites comment on use of the USGS eight-digit hydrologic unit (generally about the size of a county) as the maximum geographic scale at which an authorized State or Tribe could establish alternative regulatory requirements.

17,152, col. 1

See preceding comment.

EPA Response

In the proposal, EPA requested comment on the appropriate definition for watershed with regard to achieving comparable environmental performance through alternative regulatory requirements in a State (125.90(c)). In today's final rule, EPA has deferred the decision on the appropriate definition of watershed to the permit director; however, EPA will review the State's alternative regulatory requirements. EPA believes that allowing a State to use an existing definition will allow the State greater flexibility in their NPDES permitting process which is sometimes done on a watershed basis. With regard to watersheds that cross political boundaries of a Tribe or State, the permit directors involved should consult each other.

Comment ID 316bEFR.041.231

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

State or Tribal Alternative Requirements that Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed

EPA requests comment on whether it should instead allow States to demonstrate comparable environmental performance at the State level, thus allowing States the flexibility to focus protection on priority watersheds.

17,152, col. 2

Section II B: UWAG Agrees. EPA should give the states maximum flexibility and allow them to set their own priorities.

EPA Response

EPA believes today's final rule allows ample flexibility with section 316(b) determinations. In addition to five means with which to comply with the applicable performance standards, the rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. Additionally, § 125.90(d) states that nothing in today's rule precludes a State or Interstate Agency from adopting or enforcing any requirement that is not less stringent than those required by Federal law.

Comment ID 316bEFR.041.232

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 15.01.01

Definition and geographic scale of a watershed

State or Tribal Alternative Requirements that Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed

-EPA invites comment on the most appropriate scale at which to define a watershed to reflect the variability of the nature of theecosystems impacted by cooling water intake structures within a State or Tribal area and on methods for ensuring ecological comparability within watershed-level assessments.

17,152, col. 2

See comments above

-EPA also invites comment on whether defined watershed boundaries for the purpose of section 316(b) programs should lie entirely within the political boundaries of a Tribe or State unless adjoining States and/or Tribes jointly propose to establish alternative regulatory requirements for shared watersheds

17,152, col. 2

See comments above

EPA Response

Please see response to comment 316bEFR.041.230.

Comment ID 316bEFR.041.233

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Comprehensive Cost Evaluation Study

EPA invites comment on whether it should establish minimum standards for a Comprehensive Cost Evaluation Study and on whether such standards should be established by regulation or as guidance only.

17,153, col. 1

See Section XII E: In general, UWAG believes that establishing inflexible minimum standards in this regard is unnecessary and will serve only to increase burdens on the permit writers and the regulated community. While some guidance to provide greater clarity might be helpful, any such guidance should be developed with substantial input from engineers and other experts with substantial experience developing estimates for and implementing actual projects (not vendors, who may not know, and are not responsible for, the final costs).

EPA Response

The final rule includes provisions that allow a site-specific determination of BTA in certain circumstances. To support this approach, the rule also includes requirements for existing facilities to submit information needed by the permit writer to determine whether the facility meets the requirements for a site-specific determination of BTA and what requirements represent BTA for that facility. These requirements, which include the requirements for the comprehensive cost evaluation study, are generally specified in 125.95(b)(6) and consist of the minimum criteria necessary to ensure that sufficient and appropriate information will be available for making permitting decisions. EPA has tailored these provisions so they only apply where necessary and appropriate. All of these provisions have developed based on the information and data available to the Agency during development of the rule.

Comment ID 316bEFR.041.234

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.08

Burden on permitting agencies (general)

Comprehensive Cost Evaluation Study

EPA also invites comment on the above discussion of the burden that reviewing site-specific cost studies poses for permitting authorities and on its belief that site-specific provisions to address cases of unusually high costs or unusually low benefits are necessary.

17,153, col. 1

Sections III VI, XII and XX: UWAG believes strongly that provisions for setting site-specific requirements that properly account for costs and benefits are an essential element of any rule. While cognizant of the resources required to make such determinations, UWAG believes (1) resource demands will not be excessive, given appropriate rules and guidance and the fact that permittees bear the bulk of the study and analytical costs; (2) some site-specific consideration would be needed to implement any reasonable rule; and (3) in any case, such concerns cannot outweigh the need to develop environmentally and economically sound rules.

EPA Response

Please see response to comment 316bEFR.019.014 for a discussion of site-specific study costs and considerations.

Comment ID 316bEFR.041.235

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

Cost Benefit Test

EPA requests comment on the cost benefit provision in §124.95.

17,153, col. 2

Sections V and XII and Appendix 13: UWAG strongly endorses inclusion of an appropriate benefit-cost test. Any such test must be economically and socially rational, however. UWAG does not believe the "significantly greater costs than benefits" test is rational, and the wholly disproportionate test would be even less so. We advocate a provision requiring the maximization of net benefits.

EPA Response

For a discussion of "maximization of net benefits" see response to comment 316b.EFR.005.020.

Comment ID 316bEFR.041.236

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.08

Burden on permitting agencies (general)

Cost Benefit Test

EPA requests comment on the burden estimates in docket items 2-034A and 2-034B. For example, EPA estimates 650 person hours per permit and 25,000 in contract dollars.

17,153, col. 2

UWAG is not in a position to provide information on state permit review costs. We note, however, that the limited cost data provided reflect decisions made in the absence of any EPA rules or final guidance. One would expect that costs incurred after rules and guidance are in place would be lower (perhaps much lower)

EPA Response

EPA hopes that this will be the case, but recognizes that this is speculation.

Comment ID 316bEFR.041.237

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.06.01

RFC: Incorp. costs/benefits without burden on Dir.

Cost Benefit Test

EPA invites comments on ways to incorporate site-specific consideration of costs and benefits without undue burden on the Director. In particular, EPA invites comment on decision factors and criteria for weighing and balancing these factors that could be included in a regulation or guidance that would streamline the workload for evaluating site-specific applications and minimize the potential for legal challenges.

17,153, col.2

See Sections V, XlI and Appendix 13: Using a "maximize net benefits" test would be clearer and reduce disputes because it allows for straightforward comparison of alternatives, without having to make subjective (and, we submit, irrational and counterproductive) decisions about whether a cost is or isn't "significantly' greater or "wholly" disproportionate. Other steps that would avoid disputes and streamline decisionmaking include: (1) authorizing use of only well-accepted and documented economic methods for estimating benefits, such as those set forth in EPA's own Guidelines for Preparing Economic Analyses (EPA 240-R-00-003, Sept. 2000) (2) avoiding unfounded multipliers and other factors, and (3) focusing on use values except where there is solid evidence that non-use values exist and would be affected.

See also comment above on guidance for cost estimates.

EPA Response

EPA has considered the suggestions provided by the commenter. See discussion regarding site-specific compliance alternative in the preamble to the final rule for additional information.

Comment ID 316bEFR.041.238

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Capacity Utilization

EPA invites comment on its proposed approach to regulating Phase II existing facilities with limited capacity utilization. EPA specifically invites comment on the above alternative thresholds (20% and 25% capacity utilization) for using capacity utilization to establish performance standard that address impingement mortality but not entrainment.

17,154, col. 1

Section VII: UWAG agrees that the alternative factors EPA identifies would be fairer than the 15% factor it has proposed, and would be more consistent with the way power companies (and, perhaps DOE) classify peaking plants. According to EPA's analysis of the issue in Ch. 2 of the TDD (which would benefit from substantial clarification), UWAG believes the incremental difference in protection associated with using a 20% or 25% capacity utilization rate would be insignificant.

Whatever rate EPA sets, it should (1) clarify how the rate should be calculated for facilities (vs. units) and (2) allow a facility whose rates in the past have not fallen below the annual threshold to (a) commit to maintaining its capacity utilization rate below the threshold in the future, and/or (b) show that its period(s) of operation do not overlap with the times that entrainable species are vulnerable.

EPA Response

The Agency has analyzed for the final rule the incremental protection potentially afforded with a 15 percent utilization rate as compared to the hypothetical 20 and 25 percent factors (see DCN XXXX). The Agency found that in considering a 20 percent factor for utilization rate threshold that the entrainment reduction potential of the rule decreased by 5 percent on a national level. With the 25 percent factor for utilization rate threshold, the entrainment reduction potential of the rule decreased by 8 percent on a national level. Considering the additional concern that the Agency has with extending the threshold to average periods of operation approaching an entire seasonal operation period (i.e., those likely covering peak spawning and migration periods) the 20 and 25 percent thresholds are not acceptable. Additionally, see comments 316b.EFR.038.024, 316b.EFR.330.032, 316b.EFR.002.028 for a sampling of comments that object to raising the threshold on the grounds of increased entrainment potential.

EPA has clarified the basis for calculating the utilization rate threshold (i.e., facility vs. units), see the definition of capacity utilization rate in the final rule. EPA has allowed facilities to commit to maintaining capacity rates below the threshold in the future. Also, the Agency has allowed for facilities to incorporate into their entrainment reduction calculations the effect of flow reductions through strategic operation that does not overlap with times that entrainable species are vulnerable. Hence, the commenter's requests on these matters have been met.

Comment ID 316bEFR.041.239

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Other Technology-Based Options Under Consideration

EPA invites comment on the alternative regulations requiring closed-cycle cooling for all existing Phase II plants, along with additional technologies where needed to address concerns about T&E species, migratory species, and the like.

17,154, col. 2

Section IV: UWAG believes that requiring retrofitting of close-cycle cooling is both unauthorized by the statute and wholly unjustified on environmental or economic grounds. The other concerns EPA raises are best addressed by a site-specific approach or, in the case of T&E species, by the specialized state and federal laws already designed to protect those species.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.041.240

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities

EPA requests comment on its decision not to base best technology available for all Phase II existing facilities on closed-cycle, recirculating technology.

17,155, col. 2

Section IV: EPA is right: cooling towers cannot be justified as a national standard.

Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type

EPA also invites comment on the option to require closed-cycle, recirculating cooling systems for all facilities on certain waterbody types.

17,156, col. 1

See preceding comments.

Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow

EPA invites comment on this alternative technology based option for establishing best technology available for minimizing adverse environmental impacts from cooling water intake structures at Phase II existing facilities.

17,158, col. 3

See preceding comments.

EPA Response

The final rule is not based on reducing intake capacity commensurate with closed-cycle, recirculating cooling systems for any facilities. Therefore, the commenter's concerns have been met.

Comment ID 316bEFR.041.241

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 17.06.01
Sample site-specific rule (p.17159-61)

Sample Site-Specific Rule

-EPA also invites comment on site-specific approaches for determining the best technology available for minimizing adverse environmental impact at existing facilities,

17,159, col. 1

As noted above, and in Section III of our comments, UWAG endorses site-specific processes for § 316 decisionmaking. We prefer either the option we have crafted, or that offered by PSEG (although we do not endorse the wholly disproportionate cost test which PSEG's approach mentions). The other alternative site-specific approaches described by EPA in its preamble have some merit, but have some problems that make them technically and practically inferior to either of these two processes.

-EPA invites comment on the framework included in the sample rule on 17,159, 17,160, 17,161 as an appropriate approach for implementing section 316(b) as an alternative to today's proposed requirements.

17,161, col. 2

See preceding comment.

-EPA also invites comments on the following site-specific approaches for implementing section 316(b) on a site-specific basis within the general framework set forth in the Sample Rule.

1) alternative based on EPA's 1977 Draft Guidance
2) UWAG alternative
3) PSEG alternative

17,161, col. 2

Sections III A, B, and C: UWAG prefers either the UWAG or PSEG approach (but does not endorse the "wholly disproportionate" cost-benefit test).

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment

316bEFR.338.002 for more information.

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.041.242

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Questions for Commenton the Determination of Adverse Environmental Impact

(a) EPA invites public comment on all aspects of the foregoing approaches to defining adverse environmental impact and for making the preliminary determination on adverse environmental impact, and on which approach should be included if it adopts a site-specific approach for the final rule.

17,164, col. 1

As explained in Section III of our comments, UWAG supports the approach it has presented to EPA in the past, which EPA describes in the preamble.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.041.243

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.01.03

RFC: EPA 1977 definition of "AEI"?

Questions for Commenton the Determination of Adverse Environmental Impact

(b) Should the final rule adopt the 1977 Draft Guidance approach to defining adverse environmental impact as any entrainment or impingement damage caused by a cooling water intake structure?

17,164, col. 2

Section III B: UWAG believes that, in framing its question, EPA has taken out of context one statement from a much larger EPA guidance document and used it inappropriately for purposes of characterizing the 1977 Draft Guidance.

In any case, UWAG recommends the following definition of AEI: "a reduction in one or more representative indicator species that (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to the operation of the cooling water intake structure."

UWAG believes that the 1977 Guidance (including the paragraph from which EPA lifted one short sentence) supports this definition.

EPA Response

EPA rejects UWAG's definition of adverse environmental impact because it seeks to limit the scope to large changes at the population level only. This definition is too broad and could allow too much damage to a population before controls on cooling water intake structures would be put in place as the best technology available. EPA believes the 1977 guidance contemplated recognition of adverse environmental impact on both the individual and population levels. Please see the response to comment 316bEFR.075.012.

Comment ID 316bEFR.041.244

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Questions for Commenton the Determination of Adverse Environmental Impact

-(c) Should the final rule state that any impingement and entrainment is an adverse environmental impact and focus site-specific assessment on whether that impact is minimized by technologies already in place or potential changes in technology? Alternatively, should the final rule define adverse environmental impact in terms of population-level or community-level effects?

17,164, col. 2

Section III B: EPA should not state that any impingement and entrainment is an adverse environmental impact. As discussed above, this is not the position EPA has taken in the past (either in the 1977 Draft Guidance or elsewhere), nor would it make any sense from a biological, economic, or public policy point of view.

UWAG believes that AEI occurs when the loss of fish or other organisms causes declines at the population level sufficient to affect the types of factors identified in our comment above.

-(d) Should EPA adopt an approach that makes more explicit use of threshold determinations of whether adverse environmental impact is occurring? If so, should EPA adopt any or all of the conservative decision criteria suggested by UWAG in a final rule?

17,164, col. 2

Section III B: UWAG supports its own approach. We stress, however, that the highly conservative decision criteria set forth in our approach were explicitly designed as screening criteria only, and were not intended for use as definitive criteria for determining that AEI will occur.

-(e) Should the structured risk assessment decision process that UWAG recommends for determining adverse environmental impact be adopted?

17,164, col. 2

Section III B: UWAG strongly supports the process it has proposed. As we have shown that process is useful for evaluating the risk of AEI, and the data collection and interpretation framework it provides also would be useful for evaluating benefits of various approaches for minimizing AEI where it occurs.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. For these same reasons, EPA has rejected the approaches proposed by UWAG.

Comment ID 316bEFR.041.245

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Questions for Comment on Using Previous Demonstration Studies

EPA invites public comment on whether a final rule should permit the use of a previous section 316(b) demonstration for determining whether there is adverse environmental impact and the best technology available for minimizing adverse environmental impact. If such a provision is included in the final rule, what criteria or conditions should be included to ensure that the previously conducted demonstration is an adequate basis for section 316(b) decisions?

17,165, col. 1

Section II A: This question could arise in two circumstances. The first involves using past § 316(b) demonstrations in lieu of the new technology-based assessments EPA has proposed. UWAG believes that, where a successful § 316(b) demonstration has been done, its conclusions should be accepted if its studies were scientifically sound and conditions have not changed. Making those judgments might require (1) a reasoned explanation by the permittee of the methods and data used and why it is reliable, and (2) some comparison of current conditions with the most important conditions under which the study was done.

The second involves using past § 316(b) demonstrations to provide, in whole or in part, data for the application of EPA's proposed technology-based approach. Again, UWAG believes strongly that such data should be usable, so long as they are scientifically sound and relevant to the conditions at the site.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.041.246

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Processes Structured on Incremental Cost-Benefit Assessment

EPA solicits comment on whether an evaluation of the cost-effectiveness (i.e., the incremental cost to benefit ratio) of cooling water intake structure technologies and any operational and/or restoration measures offered by the owner or operator of a facility is an appropriate component of the analysis that would be undertaken in a site-specific approach to determining best technology available for minimizing adverse environmental impact.

17,165, col. 3

Section XII: If by this question EPA is asking whether or not UWAG believes a cost-effectiveness test should be used when selecting among recommended technologies or other options, we agree strongly that it should. Where the performance of different technologies is relatively close, but one is less expensive, then all other things being equal the permittee should be allowed to use the less expensive technology. Similarly, where one technology produces a somewhat greater increment of reduction than the next most effective, but a reasonable person would, absent special circumstances, view that increment as trivial in comparison to the incremental cost, then the permittee should be allowed to choose the next most effective technology.

If, on the other hand, EPA's question goes to whether a cost-effectiveness test would serve as an appropriate means of comparing costs and benefits, that is another matter. As we have said, UWAG believes that any § 316(b) rule should include a cost-benefit provision. But a cost effectiveness test cannot be used for this purpose. But, UWAG would not support use of a cost-effectiveness ratio (or any ratio, for that matter) for making benefit/cost assessments, or framing a benefit/cost standard, because that is not what such a test is for.

A cost-effectiveness test (which seeks the least expensive way of achieving a given outcome or closely related outcomes) differs fundamentally from a cost-benefit analysis, which compares the costs of different options to the economic benefits they produce, based on the value individuals place on different goods and services as reflected by their willingness to pay.

If EPA is asking whether UWAG supports inclusion of an appropriate cost-benefit test for purposes of selecting BTA, we do for the reasons discussed in our comments. UWAG urges EPA to adopt a test that maximizes net benefits. We note that, if EPA uses the maximum net benefit criterion, it will, by definition, include the most cost-effective alternative.

EPA Response

See response to comment 316b.EFR.005.020.

Comment ID 316bEFR.041.247

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

EPA invites public comment on the standard that would be included in any site-specific final rule for determining best technology available for minimizing adverse environmental impact, including the appropriate role for a consideration of costs and benefits.

17,166 col. 2

Sections III, XII: UWAG believes the rules should first ask the permittee to assess whether or not AEI is occurring or is likely to occur. If the answer is yes, the rules should require the permittee to identify feasible CWIS technologies and select as BTA that technology or technologies that maximize net benefits. Voluntary restoration also should be an option for avoiding AEI.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020. EPA disagrees with this commenter that the plain language of section 316(b) provides for any threshold test that would require no technology unless an impact is determined to occur on an ecosystem, community, or population level and be attributable to a particular cooling water intake structure. Also, please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule.

Comment ID 316bEFR.041.248

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

EPA invites comment on whether the long-standing "wholly disproportionate" cost-to-benefit test is an appropriate measure of costs and benefits in determining best technology available for minimizing adverse environmental impact.

17,166, col. 2

Section XII.B, Appendix 13: As we have said above the wholly disproportionate test is irrational. It is neither clear nor consistent with fundamental principles of economics.

EPA Response

See response to 316bEFR.005.018.

Comment ID 316bEFR.041.249

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

EPA also invites comment on the use of the "significantly-greater" cost-to-benefit test in today's sample site-specific rule.

17,166, col. 2

Section XII B, Appendix 13: According to EPA, this test is less conservative than the wholly disproportionate test. In a purely relative sense, this makes it not quite as bad. But as a matter of economic and social principle, it still is irrational and should be rejected in favor of the "maximize net benefits" test.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.041.250

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

EPA also invites comment on whether a test based on the concept that benefits should justify costs would be more appropriate, as is used in various other legal and regulatory contexts (see, e.g., Safe Drinking Water Act Section 1412(b)(6)(A) and Executive Order 12866, Section 1(b)(6)).

17,166, col. 2

Section XII: A test based on the concept that benefits should justify costs is closer to the "maximize net benefits" test UWAG favors and, therefore, as a practical matter is better than either of the other two. Still, the maximize net benefits test would be clearer and more consistent with core economic precepts.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020. See also the preamble to the final rule.

Comment ID 316bEFR.041.251

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

Questions for Comment on a Process for Determining the Best Technology Available for Minimizing Adverse Environmental Impact and the Role of Costs and Benefits

EPA also invites public comment on whether variances are appropriate and, if so, what test or tests should be used for granting a variance.

17,166, col. 2

EPA does not explain what it means by “variances,” so UWAG is unable to comment effectively. We note, however, that variances have been used successfully and beneficially in a variety of regulatory programs.

EPA Response

The context for this request for comment is a discussion of a process for determining BTA and the role of consideration of costs and benefits. No substantive comment and therefore no response is necessary.

Comment ID 316bEFR.041.252

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Use of Voluntary Restoration Measures or Enhancements

EPA invites public comment on whether a final site-specific rule should permit voluntary restoration or enhancement measures to be taken into account in determining compliance with section 316(b) and, if so, what criteria should be included for evaluating the effectiveness of such measures.

17,166, col. 3

Section XIII: A number of states have used restoration successfully to avoid adverse impacts that might be caused by impingement or entrainment. As we've said above, allowing restoration, in lieu of or in addition to technology requirements, is good environmental and social policy. Measures of effectiveness need to be tailored to the project and should not be unrealistic or unduly burdensome.

EPA Response

Facilities may use restoration measures under the final rule either in lieu of or in combination with technologies that reduce impingement mortality and entrainment.

Permitting authorities have the flexibility under the final rule to make decisions on the necessary attributes of a restoration measure on a case-by-case, site-specific basis. All restoration measures must satisfy the requirements of the final rule, including those described under sections 125.94 and 125.95. Restoration measures may not be feasible for all sites.

Comment ID 316bEFR.041.253

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

Consultation With Fish and Wildlife Management Agencies

EPA invites public comment on the appropriate role of fish and wildlife management agencies if the final rule implements a site-specific approach.

17,167, col. 1

Such agencies typically are assigned an appropriate role by the laws they are charged with implementing. EPA should respect those laws.

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

Comment ID 316bEFR.041.254

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.08

Burden on permitting agencies (general)

Implementation Burden Under Any Site-Specific Approach

EPA seeks additional information and data on the resources necessary and available for the review of section 316(b) determinations in existing facilities' permit renewals

17,167, col. 3

This question appears to be directed at states. We note, however, that past resource demands associated with § 316(b) decisions made in the absence of a rule are not good predictors of the resources needed to implement this rule.

EPA Response

EPA disagrees. Burden information on historical 316(b) determinations may be qualitatively useful to gauge approximate resource needs for aspects of today's final rule.

Comment ID 316bEFR.041.255

Subject Matter Code 21.07

Alternative site-specific requirements

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Implementation Burden Under Any Site-Specific Approach

-EPA invites comment on whether the resource requirements of the site-specific approach also have served as a disincentive to a comprehensive revisiting of section 316(b) permit conditions during each renewal (typically every 5 years), despite advances in technologies for reducing impingement mortality and entrainment.

17,167, col. 3

Again, this question appears directed primarily to states. That said, UWAG members' experience suggests that permit writers do not have widespread concerns about past § 316(b) decisions, even though the spotlight on use attainment has intensified greatly over the past ten years. Equally important, many states have proven that they are not shy about requesting new data or making new determinations in cases where they have a concern or even a suspicion that an issue might exist.

Last, state decisions not to endlessly revisit § 316(b) decisions absent a good reason are consistent with existing EPA policy. See Section XX.

-EPA seeks comment on the above discussion of the resource implications of implementing the requirements of section 316(b) on a case-by-case basis

17,167, col. 3

Section III C: Again, this appears directed to the states. Nevertheless, UWAG emphasizes that resource implications should not drive how the rule is structured. It should be based on the sound science and good public policy.

-EPA invites comment on how the workload of a site-specific approach could be streamlined so as to provide for the benefits of a site-specific approach (e.g., application of technologies specifically tailored to site-specific conditions) while recognizing the resource constraints faced by so many permitting agencies.

17,167, col. 3

See preceding comments.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Comment ID 316bEFR.041.256

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.11

RFC: Mandatory restoration approach

Restoration Approaches Being Considered for the Existing Facilities Rule

EPA is also inviting comment on other restoration approaches it is considering, including discretionary restoration approach, mandatory restoration approach, and restoration banking.

17,169, col. 3

Section XIII H: Section 316(b) does not authorize mandatory restoration.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

For a discussion of the extent to which restoration measures are voluntary in the final rule, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.041.257

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Entrainment Reduction vs. Impingement Reduction as a Basis for Trading

EPA requests comment on whether to extend trading (which currently focuses on entrainment) to include impingement of aquatic organisms.

17,170, col. 3

For the reasons discussed in previous sections and in Section XVI, UWAG believes that trading should extend both to impingeable and entrainable organisms. Indeed, UWAG believes that if trading is to be most beneficial, EPA should allow as much flexibility as possible, as long as those wishing to trade can show a strong likelihood of achieving the anticipated results and are willing to be accountable for following through on the proposed actions.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.041.258

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.02

RFC: Would trading afford greater protection?

Entrainment Reduction vs. Impingement Reduction as a Basis for Trading

EPA seeks comment on whether a section 316(b) trading program would generally afford greater watershed protection by increasing the number of facilities meeting the performance standard and whether consideration of credit purchases should be mandatory prior to the Director setting alternative requirements.

17,170, col. 3

UWAG believes trading likely would have the benefits EPA describes.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.041.259

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.03

Spatial scale for entrainment trading

General Waterbody Type

EPA seeks comment on this approach which allows trades to occur among facilities on the same general waterbody type, but not necessarily the same waterbody.

17,171, col. 2

Section XVI: Because flexibility is so important, UWAG supports this option.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale of trading.

Comment ID 316bEFR.041.260

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.04

RFC: Potential trading units/ credits

What Should be the Unit (Credit) for Trading?

EPA is specifically interested in comments on whether entrainment trading should be species-specific, have weighted values for different species, or simply be net biomass entrainment expressed in mass.

17,171, col. 2

Section XVI: EPA should not dictate a single unit of trading. Flexibility will be needed to account for the differing life histories and values associated with projects involving recreational, commercial, and forage species, as well as differences in monitoring costs based on the number and types of species involved. Moreover, one species should be tradable for another if they have roughly the same value and the trade is not expected to have negative effects on diversity or other important indices.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading.

Comment ID 316bEFR.041.261

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 20.05
RFC: Include Phase I facilities in trading program

Trading Option for New Facilities

EPA invites comment on the option of extending a section 316(b) trading program beyond existing electric generation facilities to new facilities.

17,172, col. 3

Because it provides additional flexibility, UWAG endorses this idea.

EPA Response

Please see response to comment 316bEFR.005.045 regarding new facilities and voluntary trading programs.

Comment ID 316bEFR.041.262

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.06

Voluntary adoption of trading by States and Tribes

Voluntary Adoption of Trading by Authorized States and Tribes

EPA seeks comment on whether a national registry of trades and associated national trading guidance would be appropriate.

17,173, col. 1

Because it provides additional information which would promote trading, UWAG endorses this idea.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule. Please see response to comment 316bEFR.034.064 regarding a national register of trades.

Comment ID 316bEFR.041.263

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 20.07

RFC: Harmonize of permit reissuance with trading

-When Would the Permits be Reissued to Trading Partners?

EPA seeks comment on how to harmonize the reissuance of permits with trading among Phase II existing facilities under section 316(b).

17,173, col. 1

Many of these issues depend in turn on other issues EPA raises above. Until EPA narrows its options somewhat, it is difficult for UWAG to develop specific comments on these related issues. If EPA decides to provide additional information on these issues in its NODA, UWAG could offer more specific comments then.

-Implementation and Enforcement Issues for Section 316(b) Trading

EPA invites comment on the challenges presented by implementation, compliance assessment, and enforcement of a section 316(b) trading program.

17,173, col. 2

See preceding comment

-Proposal for Information Collection

EPA requests comment on whether it should specify a particular time frame for submitting the information collection proposal, or alternatively, whether it should remove the requirement for approval by the Director.

17,175, col. 2

See preceding comment.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.041.264

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 21.02

Director's role in determining requirements

How Would the Director Determine the Appropriate Cooling Water Intake Structure Requirements? What Are the Respective Federal, State, and Tribal Roles?

-EPA is interested in ways to decrease application review time and make this process both efficient and effective.

17,179 col. 3

Sections II, IV: UWAG offers simpler alternatives that conserve regulatory resources.

-EPA invites comment on such "functionally equivalent" programs. In particular, EPA invites comment on the proposed alternative and on decision criteria EPA should consider in determining whether a State program is functionally equivalent. If EPA adopts such an approach, it would also need to specify the process through which an existing State program is evaluated and whether such process can occur under the existing State program regulations or whether additional regulations to provide the evaluation criteria are needed.

17,180 col. 2

Section II B p. 11: Successful state programs should continue even if they do not conform to EPA's numeric performance standards. So long as a state has complied with state law in developing and implementing its § 316(b) program, it should be eligible for consideration as an alternative regulatory program that is functionally equivalent.

EPA Response

EPA disagrees that State programs should continue even if they do not conform to the performance standards set forth by today's final rule. It is possible that existing State programs are less stringent than the requirements set by today's final rule. While States have the authority to require more stringent standards, they are not authorized to set downward-departing standards. Nonetheless, if a State demonstrates that its regulatory program will result in reductions in impingement mortality and entrainment comparable to the standards at § 125.94, EPA will to approve the program. Furthermore, EPA has provided State permitting Directors with a great deal of authority over program implementation, including establishing how compliance will be determined at a facility (please see EPA's responses to comments 316bEFR.307.007 and 316bEFR.063.005). EPA believes that setting national performance standards for the reduction of impingement mortality and entrainment, whether alone or with restoration measures, will fulfill the Agency's obligation to minimize adverse environmental impact caused by cooling water intake structures.

Comment ID 316bEFR.041.265

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

How Would the Director Determine the Appropriate Cooling Water Intake Structure Requirements? What Are the Respective Federal, State, and Tribal Roles?

Finally, EPA invites comment on the role of restoration and habitat enhancement projects as part of any "functionally equivalent" State programs.

17,180, col. 2

Section II B p. 12: It also is appropriate to consider habitat restoration or enhancement projects when evaluating a state program.

EPA Response

For a discussion of state programs, see EPA's responses to comments 316bEFR.043.053 and 316bEFR.002.016.

Comment ID 316bEFR.041.266

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 22.01

Executive Orders (except EO 13211)

Executive Order 13132: Federalism

In the spirit of this Executive Order and consistent with EPA policy to promote communications between EPA and State and local governments, EPA specifically solicits comment on this proposed rule from State and local officials.

17,216, cols. 2-3

Not Applicable.

EPA Response

EPA has followed Executive Order 13132 regarding federalism and concluded that this rule does not have federalism implications.

FACTORS AFFECTING THE POTENTIAL FOR ADVERSE ENVIRONMENTAL IMPACT FROM COOLING WATER WITHDRAWALS

By
Edward P. Taft, Alden Research Laboratory, Inc.
William P. Dey, Applied Science Associates, Inc.
Lawrence W. Barnthouse, Ph.D., LWB Environmental Services, Inc.

PREPARED FOR UTILITY WATER GROUP

November 2001

EXECUTIVE SUMMARY

This report describes the primary factors influencing cooling water intake structure ("CWIS") entrainment and impingement of aquatic organisms at power plants. The report is intended to serve as basic technical background for rules under development to implement CWIS controls pursuant to § 316(b) of the Clean Water Act.

In describing the primary entrainment/impingement factors, the report illustrates the interrelationships among the factors (e.g., between organism swimming ability and behavioral cues in the area of the intake). The report also illustrates the advantages, in many circumstances, of site-specific evaluation, whether that evaluation is based on existing and readily available data reasonably transferable from other sites or on actual site-specific studies.

The report is organized around two broad categories of entrainment/impingement factors: (1) those that influence organism involvement with a CWIS, and (2) those that influence organism mortality due to entrainment or impingement. For entrainment, the primary biological factors affecting organism involvement with the CWIS include: (1) location of spawning and/or nursery areas in relation to the CWIS; (2) seasonal occurrence of species, including occurrence in relation to seasonal changes in power plant operation; (3) vertical distribution and movements of species; (4) cross-sectional distribution of species; (5) swimming ability of species and life stages; (6) growth rates and factors affecting growth; (7) species-specific morphometry; and (8) far-field hydrologic/hydraulic conditions that determine the probability that organisms will be transported into the zone of an intake's hydraulic influence.

As to entrainment mortality, the factors include: (1) organism sensitivity to physical stresses of entrainment; (2) organism sensitivity to thermal stresses; (3) acclimation temperature; (4) salinity of the source waterbody; (5) losses due to biofouling predation; (6) transit time through the cooling water system; and (7) losses due to biofouling treatment. The report notes that existing entrainment survival studies demonstrate that species exhibit a wide range of survival rates.

Factors affecting involvement of aquatic species with the intake resulting in impingement include: (1) location of the intake relative to areas of fish concentration; (2) species seasonal occurrence and non-random vertical and cross-sectional distributions; (3) species swimming ability; (4) species exposure to physiological stresses; (5) intake design features; (6) water quality; and (7) velocity and related hydraulic phenomena.

Impingement mortality factors include: (1) species sensitivity to physical stresses; (2) fish behavior (both in avoiding the intake or when encountering the intake); (3) intake screen type and operation; and (4) the deployment of other fish protection technologies, such as barrier nets.

The extent to which one or more of the factors described in this report may be conclusive as to whether adverse environmental impact is likely to occur at any site will vary according to the individual site and the species and life stages potentially involved with the intake. In some cases, evaluation of one or just a few factors may be conclusive. In other cases, a multitude of factors may warrant consideration.

Section 4 of the report discusses factors that affect an aquatic population's response to losses due to entrainment and/or impingement, including the potential for natural mechanisms to compensate for such losses. The section considers losses of individual organisms in a population context and explains why such losses of early life stage organisms often are not significant in terms of species sustainability or abundance.

In Section 5, we discuss factors such as the recreational or commercial value of some fish stocks and how such factors figure into society's perspective on the relative worth of species and individual organisms. In addition to engineering and biological factors, the risk manager should also examine the ways in which society values the potentially affected resource. Only through an integrated perspective that considers pertinent factors in light of existing research and the specifics of the site can the manager reach an appropriate decision regarding the potential for adverse environmental impact.

1. INTRODUCTION

In 1995, EPA entered into a consent decree that requires it to propose and take final action on regulations implementing § 316(b) of the Clean Water Act. <FN 2> Cronin v. Browner. 93 Civ. 0314 (AGS) (S.D.N.Y.). Section 3 16(b) provides that:

any standard established pursuant to section 1311 [effluent limitations] of this title or section 1316 [new source performance standards] of this title and applicable to a point source shall require that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

Under the consent decree (as amended), EPA released proposed § 316(b) rules for new facilities on August 10, 2000 (65 Fed. Reg. 49,060), and must propose rules governing existing larger-flow utility and non-utility power producing facilities by February 28, 2002.

Despite the absence of formal § 316(b) rules, EPA and the delegated states have regulated CWISs on a case-by-case basis at both new and existing facilities for many years. The purpose of this report is to organize and summarize the information gleaned from existing § 316(b) demonstrations, peer-reviewed literature and other sources for use by EPA, states, and other industries and organizations in working together to develop technically sound § 316(b) rules.

This report focuses on the primary factors (based on location, biology, and engineering) affecting entrainment and impingement, and how those factors interrelate with each other. In addition to the factors affecting impingement and entrainment discussed in this report, there are many other factors which could, considering site-specific conditions, be significant in determining AEI. This report is not intended to include every possible factor related to impingement and entrainment. At any individual site, it is possible that a factor other than those discussed in this report will be the primary factor for assessing AEI. Also, it is possible that the factors described in this report will be significant for the site in question, but that their interaction will differ from that reported here. However, the factors described in the report should be applicable in the majority of situations.

Report Organization

This report is divided into four major sections. The first two sections discuss factors affecting entrainment and impingement. Each of these sections is further divided into discussions of factors affecting potential organism involvement with the CWIS, and factors affecting the potential for mortality as a result of that involvement. The third section discusses factors (such as life history of the affected species, mean generation time, etc.) affecting population-level responses to entrainment and impingement. The fourth section briefly describes factors that may affect how society values fishery resources potentially impacted by CWIS operations.

2. FACTORS THAT AFFECT ENTRAINMENT LOSS

Organisms small enough to pass through the screens deployed at intakes for steam electric power plants may be entrained along with the cooling water flow, pass through the cooling water intake structure ("CWIS"), and enter other parts of the cooling water system. Entrainable organisms typically include smaller planktonic species and the early life stages of fish and larger invertebrates. The magnitude of entrainment loss of any species is a function of the involvement of the species with the intake (number or fraction entrained) and the subsequent mortality of those organisms as they pass through the cooling water system (entrainment mortality). This section discusses the primary factors influencing both entrainment involvement and entrainment mortality.

2.1 FACTORS THAT AFFECT INVOLVEMENT

Involvement refers to the actual entrainment of organisms through the cooling water system of a power plant along with the cooling water flow. Susceptibility to entrainment is affected by two processes. First, the organisms must be in the area of the source waterbody from which cooling water is withdrawn. Second, the organisms must be transported into the intake along with the cooling water flow. A variety of biological and CWIS factors affect these two processes, as discussed below.

2.1.1 Biological

This section discusses biological factors that affect potential involvement of aquatic populations with entrainment. These factors largely revolve around species and/or life stage considerations that can alter the susceptibility of potentially affected organisms to cooling water withdrawals.

Location of Spawning and/or Nursery Areas

One factor affecting potential involvement is the location of the intake in relation to primary spawning and/or nursery areas for species potentially entrained. As an initial screening step, the general presumption is that the closer a species' principal spawning and/or nursery areas are to the point of water withdrawal, the greater the likelihood that a larger proportion of that population will be entrained, all other factors being constant. Conversely, the greater the distance between these areas and the intake, the lower the chance of entrainment. The extreme case of reduced entrainment susceptibility occurs when the distance between principal spawning and/or nursery areas and the intake is so great relative to existing water current velocities that the time of transport to the vicinity of the intake would exceed the expected duration of the early life stage such that no entrainable stages would be present in the area of withdrawal.

This factor can be illustrated by example with a power plant intake located in the middle sections of a temperate estuary (Figure 2.1.1). While the fish community in the estuary can be comprised of a mix of estuarine, anadromous, freshwater, and marine species, only those species that use the area near the intake as spawning or nursery habitat would have any susceptibility to entrainment. Marine species, such as drums, croakers, and bluefish, which spawn offshore and principally enter the estuary as juveniles, would have low susceptibility to entrainment. Similarly, freshwater and anadromous species, such as shad, herrings, and freshwater minnows hat spawn in non-tidal areas and only enter the estuary as late larvae or juveniles would also have low susceptibility to entrainment.

While distance to the primary spawning and/or nursery area can be an important indicator of the fraction of the population susceptible to potential entrainment, many other factors, both hydrological and biological, interact with this factor to determine actual susceptibility to entrainment. For entrainable life stages that are planktonic (i.e., weakly swimming organisms passively transported by water currents), the hydrology of the source waterbody (e.g., current speed and direction) can have a major influence on how this factor is to be considered. For example in waterbodies with uni-directional currents (e.g., streams, rivers, and some marine systems), entrainable life stages residing in spawning and/or nursery areas located downstream of the intake would have minimal potential for entrainment. However, on the upstream side, passive transport by currents can bring entrainable organisms into the vicinity of the intake. In contrast, distance to the primary spawning or nursery areas must be considered in all relevant directions in source waterbodies with bi- or multi-directional currents. In a lake or reservoir with little active water movement, entrained organisms would be expected to come from the immediate vicinity of the intake, rather than from multiple areas within the waterbody.

In addition to the hydrologic factors discussed above, several biological factors also interact with distance to the principal spawning or nursery areas to affect potential entrainment susceptibility. For example, differences in vertical distribution can interact with the hydrology (i.e., currents) to affect the rate of transport of individuals into the intake vicinity. Many currents are not uniform in depth, and may even flow in an opposite direction at the bottom, as compared to the surface. Thus, the distance from which individuals are transported to the intake also can be a function of the vertical distribution within the water column relative to the vertical distribution of water currents. The importance of such vertical distribution patterns is discussed in more detail in a subsequent section.

The spawning characteristics and larval behavior of individual species can also interact with hydrologic conditions and distance to the principal spawning or nursery areas to affect the potential for entrainment. For example, species with characteristics or behaviors that minimize their exposure to water currents will have little opportunity for transport over long distances. Nest building species (e.g., sunfishes, catfishes), species with strongly bottom-oriented early life stages (e.g., sturgeons, some flatfishes), and species for which wetlands or vegetation beds are the primary spawning or larval habitat (e.g., pikes, killifishes, perches) are examples of species with inherently low susceptibility to entrainment. For these species, potentially entrained individuals typically are those residing within the immediate vicinity of the intake. On the other hand, species with pelagic life stages (i.e., found up in the water column) can be subject to significant transport by water currents and, consequently, entrained individuals may be drawn from areas some distance from the intake. This factor is discussed in more detail in a subsequent section.

Seasonal Occurrence

This factor refers to any seasonal pattern in the occurrence of entrainable life stages in the cooling water withdrawn from the source waterbody. For most species, spawning and the early larval period occur during specific seasons of the year. For these species, entrainment ulnerability is typically limited to a few months of the year. While the timing of the seasonal occurrence pattern for any species or life stage does not directly affect the potential for entrainment, this factor can alter the potential for AEI from entrainment by interacting with several other intake and biological factors. These potential interactions are discussed below.

Many power plants (i.e., non-baseload plants) vary electrical generation in order to meet seasonal patterns of demand. Demand may be higher during summer and lower during cooler months of the year, or the converse may be true. Typically, demand is intermediate in spring and fall. This is illustrated in Figure 2.1.2. Some plant operators reduce the number of cooling water intake pumps operating during periods of prolonged low demand, resulting in seasonal reductions in cooling water flow. The potential for seasonal patterns in cooling water flow are discussed in more detail in Section 2.1.2. As a result of these varying cooling water flows, the interaction between any seasonal pattern in relative abundance of each species and life stage and any seasonal pattern in cooling water withdrawals has the potential to substantially alter the fraction of the population entrained for that species and life stage. For example, if any species and/or life stage is present in the vicinity of the intake primarily during periods of lower cooling flow, then the potential for entrainment is reduced. This may be the case for winter- or early spring-spawning species (e.g., yellow perch, rainbow smelt, Atlantic herring, turbot, winter flounder) (Figure 2.1.2). On the other hand, higher entrainment could occur if the period of higher cooling water flow coincides with periods of higher entrainment abundance, as might be the case for summer-spawning species (e.g., minnows, redhorse, anchovies) (Figure 2.1.2).

In addition to potential seasonal patterns in cooling water flow, seasonal changes in electrical production produce changes in the amount of heat that must be removed by the cooling water system. As a result, the temperature increase through the cooling water system (delta-T) varies almost directly with electrical production. Since the magnitude of this temperature increase can directly affect the potential for entrainment survival (see Section 2.2), entrainment mortality can increase during periods of higher electrical demand. Thus, the fraction of those individuals entrained that do not survive can vary seasonally and result in substantial differences in the fraction of the entire population cropped as a result of entrainment, depending on the seasonal occurrence pattern for any individual species and life stage.

Further, any seasonal pattern in the occurrence of individual species and life stages can affect the potential for AEI from entrainment through an interaction with the ambient temperatures naturally occurring at the time of potential entrainment. This interaction can occur through one of four processes. First, growth and development rates of aquatic organisms are temperature dependent (Moyle and Cech 1996). Growth rates typically increase (and life stage durations decrease) at higher temperatures. At lower temperatures, the converse is true. As susceptibility of individuals to entrainment is typically a function of size and life stage, higher growth rates and reduced life stage durations for organisms occurring in the vicinity of any intake will reduce the overall probability of entrainment. Thus, the overall potential for AEI from entrainment could be lower for organisms occurring principally at higher relative ambient temperatures. This process is discussed in more detail later in this section. Second, natural survival rates for many small aquatic organisms often vary with temperature. Typically, there is an optimal temperature range for natural survival that is less than the total range of temperatures over which a particular species and life stage can be found. As a result, entrainment losses occurring principally outside this optimal temperature range could result in less potential for AEI since these organisms would have reduced potential to survive naturally. Third, potential for entrainment survival is a function of many factors, including acclimation temperature when thermal stress is sufficient to be lethal. Individuals acclimated to higher temperatures (up to a point) are often better able to survive exposures to elevated temperatures than individuals acclimated to lower temperatures. Thus, ambient temperatures at the time of entrainment can affect the likelihood of entrainment survival. Finally, there are upper temperature limits above which complete mortality occurs in aquatic organisms regardless of any other factors. These upper temperature limits are species and life-stage specific. Thus, when ambient temperatures at the time of entrainment are sufficiently high such that thermal additions within the cooling water system result in exceedances of these upper temperature limits, entrainment mortality may be complete. whereas at lower ambient temperatures, survival could be high, lowering the potential for AEI.

Spawning Characteristics and Larval Behavior

Several species-specific behavioral and life history characteristics among the egg and larval stages affect their susceptibility to transport with water currents. To be entrained, organisms must be transported through the cooling water system along with the cooling water flow. For this reason, species that are generally most susceptible to entrainment are those with pelagic egg and/or larval stages. Thus, any life stages or species not susceptible to transport by water currents have limited susceptibility to entrainment.

Fish exhibit a wide variety of reproductive characteristics (Moyle and Cech 1996, Wootton 1990) many of which can affect susceptibility to entrainment. For example, many species of fish have adhesive eggs that are attached to substrate until hatching. Common examples of such species include white perch, sturgeons, and some minnows. This spawning characteristic is a specific adaptation to avoid movement by water current and to maintain the eggs within an environment optimal for development and hatching success. As a result, the eggs of these species generally have negligible potential for entrainment. However, eggs of these species may occasionally be entrained as a result of wave action or extreme currents that dislodge attached eggs. As they are no longer in optimal conditions, these unattached eggs are likely to have reduced survival compared to those remaining attached, and therefore any entrainment of the unattached eggs is of reduced significance to the population.

In addition, many fish species provide significant parental protection to their eggs and larvae in order to maximize potential for survival. Often this parental care provides additional reduction in the potential for entrainment. For example, some species (e.g., salmon and trout) build redds in which the eggs are buried under sediments or gravel until they hatch. Except under unusual circumstances, these eggs would not be susceptible to entrainment. Other species build nests (e.g., sunfishes, catfishes) that are often protected by adults during the egg and early larval stages. The eggs and early larvae remain within these nests and larvae only leave once they are actively swimming and feeding. Since these nests afford some protection from normal currents, the eggs and early larval stages of these nest-building species generally have minimal susceptibility to entrainment.

In addition to the various reproductive characteristics described above, the preferred locations for spawning and/or larval development can significantly alter susceptibility to entrainment. For example, many species of fish spawn in relatively protected areas, such as shallow waters and weed beds, and the newly hatched larvae remain in these areas until they are actively feeding and swimming. Often these areas are little affected by currents and. thus, organisms in such areas would have little susceptibility to entrainment. Also, older larvae can actively seek preferred habitats that would affect their susceptibility to entrainment. For example, larvae of benthic species, such as sturgeon and catfish, actively seek out and hide under available cover along the bottom and, consequently, reduce their potential for entrainment. On the other hand, older larvae of some species, such as certain species associated with reefs and kelp beds (e.g.. rockfishes. blennies, wrasses), actively swim up into the water column from more protected spawning and early larval nursery areas. Such behavior exposes these larvae to transport by water currents and serves as an important mechanism for larval dispersal. These active movements and subsequent transport would tend to increase the potential for entrainment of these life stages.

The potential for spawning characteristics and larval behavior to affect the susceptibility of any aquatic species to entrainment, however, must be considered in light of other factors related to the design, location and operation of each individual intake. For example, intakes that draw much of their water from shallow areas might entrain a relatively greater proportion of species that use shallow waters or vegetated areas as spawning and/or nursery areas. Similarly, intakes that selectively withdraw waters from along the bottom would tend to entrain a greater proportion of species and life stages that actively seek out cover along the bottom.

Vertical Distribution/Movements

The active movement or passive transport of entrainable organisms among depths within the water column can alter the susceptibility of those organisms to entrainment. Aquatic organisms most susceptible to entrainment are those that are largely planktonic and unable to overcome either natural currents or man-made currents associated with cooling water withdrawals. However, many of the aquatic organisms of greatest concern are not randomly distributed throughout the entire water column. Consequently, these individuals could be at greater or lesser risk of involvement with the intake depending on their vertical distribution relative to the vertical zones of withdrawal for any particular intake.

Non-random distribution within the water column can result from a variety of factors, including water density differences, habitat preferences and active vertical migrations. Most aquatic organisms have a slightly higher density than the surrounding water, resulting in a natural tendency to sink. Owing to their limited swimming ability, the earliest life stages of many of these species depend upon water currents to keep them up in the water column and off of the bottom. As a result, many of these organisms tend to be found at greatest densities near the bottom, unless currents keep them suspended up in the water column. Other species use physiological mechanisms, such as oil droplets, that result in early life stages that are less dense than water and, consequently, float (Alexander 1993, Bond 1996). These mechanisms are most common among pelagic marine species and serve to maximize their survival in these systems.

As these organisms develop, greater size and swimming capacity afford them the ability to actively move up and down in the water column towards preferred water depths. Reasons for such vertical migrations are many-fold, including dispersion, predator avoidance and increased food availability (Bertness 1999, Copeland et al. 1976, Lampert and Sommer 1997, Mullin 1986, Mullin 1993, Peterson 1986). For some species, such migratory behavior results in vertical distributions that remain constant for a life stage. Examples of such patterns include marine species, such as drums, croakers, and blue crabs. which selectively use depth-varying tidal currents to move from spawning areas towards larval nursery areas. For other species such as herrings, anchovies, striped bass, copepods, and opossum shrimp, vertical migrations move individuals up and down in the water column on a regular basis. Often individuals of these species move into deeper waters near the bottom during daylight hours to avoid predators and disperse up into the water column at night to feed. Such diel vertical migrations are common among many pelagic species of fish and macroinvertebrates.

The potential for vertical distributions and movement to affect the susceptibility of any aquatic species to entrainment must be considered in light of other factors related to the design, location and operation of each individual intake. For example, offshore intakes are often designed so that cooling water is withdrawn from a specific depth stratum within the water column. On the other hand, more traditional shoreline intakes often draw from a wide range of strata. The range of depths from which the intake withdraws relative to the depth of the source waterbody can influence entrainment involvement through interaction with the vertical distribution of organisms. An intake encompassing almost all of the depth of the source waterbody would tend to draw from all depths and reduce the importance of any non-random vertical distribution. Alternatively, the importance of non-random vertical distribution might be high for an intake drawing water from a relatively narrow depth stratum compared to the overall depth of the waterbody. Finally, active diel migrations in entrainable organisms have been demonstrated in numerous studies to result in wide variation in entrainment densities over a 24-hour period (Gammon 1976, Schneider et al. 1980). Consequently, variation in cooling water flow over this same period can result in significant differences in the fraction of the population entrained, even when all other factors remain the same. Data collected on the amphipod, Gammarus spp., collected from the Hudson River estuary (Figure 2.1.3), illustrates did migration. In this study, Gammarus spp. were found to be concentrated near the bottom during the day but uniformly distributed throughout the water column at night.

Cross-sectional Distribution

Non-random distribution patterns across the source waterbody also occur among some species and life stages potentially susceptible to entrainment. These cross-sectional distributional patterns can be species-specific or even vary across life stages within a species. Consequently, individuals could be at greater or lesser risk of entrainment depending on their distribution relative to the areas of withdrawal for any particular intake.

Most commonly, non-random distributions result from a preference for spawning and/or early larval development in onshore or offshore areas or directed movements of the more motile stages towards preferred habitat for growth and survival. For example, species spawning in relatively shallow shoreline areas (e.g., darters, minnows, gobies), would have relatively low susceptibility to entrainment as eggs or early larvae if the intake draws water primarily from offshore areas. Likewise, species whose spawning takes place in far offshore waters of large waterbodies (e.g., cods, grouper, lake trout) such as the Great Lakes or an ocean would have relatively low susceptibility to entrainment at intakes located along the shore. In addition, for some river species, researchers have demonstrated differential horizontal distribution related to bed morphology and hydrology (King 1978).

The later larval stages of some fish species make directed movements away from spawning areas for a variety of reasons. For example, some species, particularly inshore marine reef and kelp bed inhabitants (e.g., wrasses and sea bass), migrate as larvae from inshore spawning areas to offshore areas where currents provide for dispersal throughout their geographic range (Bertness 1999, Swearer et al. 1999). Thus, the susceptibility to entrainment will vary by life stage within these species depending on the area of cooling water withdrawal. Often, these species return to inshore waters as early juveniles and take up residence among reefs and kelp beds. In addition. some marine species (e.g., marine drums, bluefish, blue crab) spawn in offshore waters and then migrate as larvae towards shallow, inshore, larval and juvenile nursery areas (Boehiert and Mundy 1988, Miller 1988). For these species, entrainment susceptibility is limited to the later larval and early juvenile stages for intakes located in estuarine or inshore marine waters. Finally. many species with pelagic eggs and/or larvae (e.g., striped bass, white perch) migrate towards shallow water nursery areas along the shore as late larvae or early juveniles. Once in these shallow areas, the susceptibility of these life stages to entrainment is low and few are encountered in entrainment sampling.

As with all the other factors, the potential for cross-sectional distribution to affect the susceptibility of any aquatic species to entrainment must be considered in light of other factors related to the design and location of each individual intake. For example, offshore intakes are often designed so that cooling water is withdrawn from pelagic areas of the source waterbody. For these intakes, entrainment susceptibility would tend to be limited to species with pelagic life stages. On the other hand, intakes located along the shoreline of a waterbody would typically draw from a combination of inshore and offshore areas. For these intakes, both inshore and pelagic species might be susceptible to entrainment.

Swimming Ability

The ability of an organism to swim sufficiently well so as to avoid being transported into a plant's intake with the cooling water also influences entrainment. Individuals most susceptible to entrainment are those that are planktonic. This includes permanent members of the plankton community (phytoplankton and zooplankton), as well as seasonal members of this community such as the early life stages of many larger macroinvertebrates and fish. Many members of this later group develop increased swimming abilities as they grow and become less dependent on water movements for transport and dispersal. As this occurs, their ability to maintain themselves in preferred locations increases and their susceptibility to entrainment decreases.

Many species of larger macroinvertebrates (e.g., crabs, oysters, mussels) and fish have planktonic egg and larval stages. These planktonic stages are transported about by currents. Newly hatched larvae typically have limited swimming abilities and are transported passively by these currents. As the larvae develop, their swimming abilities (maximum swim speed and endurance) increase and they begin to move about in the water column. At first, active movements are short bursts associated with feeding and predator avoidance. Large-scale movements of these life stages are still largely passive, occurring primarily through current transport. During the later larval and early juvenile stages, many of the macroinvertebrates settle out of the water column, take on a benthic existence and are no longer as susceptible to entrainment. During these same stages, the swimming ability of many fish species reaches a point where active movements exceed passive transport as the primary means of movement, and individuals begin to have the ability to seek preferred habitats. Often during this period. schooling behavior, active vertical migrations, and movement towards preferred habitats near the bottom or in shallow waters also begin. With this increase in swimming ability comes a decrease in the susceptibility to entrainment as the older and larger larvae and early juveniles begin to achieve the ability to maintain position against water currents that could transport them into cooling water intakes.

The relationship between swimming ability and susceptibility to entrainment must be considered in light of several intake factors. For example, swimming ability must be analyzed in relation to the hydrology in the vicinity of the intake. In low current systems (e.g., lakes) larvae will have the ability to maintain their position at a much earlier age than will larvae living in higher current systems (e.g., rivers and estuaries). In addition, the approach velocity of the intake must also be considered. Once organisms in the vicinity detect the intake, larvae and early juveniles should have a greater ability to actively avoid entrainment at intakes with low approach velocities compared to similar intakes with higher velocity. Further, the design and location of the intake (offshore, shoreline, recessed) will also strongly influence the ability of larvae and early juveniles to actively detect and avoid entrainment. Finally, the swimming ability of many fish species is related to the size of the individual. Thus, factors that affect the rate of growth of these early life stages (e.g., temperature) will also affect the rate of increase in swimming ability, and thus the potential duration of their susceptibility to entrainment.

Growth Rates

The rate of growth of the early life stages also influences entrainment susceptibility. Many aquatic species are susceptible to entrainment only during a limited period of their life. This susceptibility is most common during the earliest life stages. Thus, the rate at which individuals pass through these most susceptible life stages can alter the total time of entrainment susceptibility and thus the potential for AEI.

While growth, in and of itself, does not directly affect entrainment, it has potentially important interactions with several other factors that can significantly affect the potential for AEI through entrainment. This occurs because the susceptibility of individuals to entrainment can be influenced by several size-related processes. First, size-related differences in distribution and preferred habitat can affect the fraction of the population potentially susceptible to entrainment at any particular intake.

Second, vertical distribution and migration patterns, which can influence entrainment susceptibility, are also often related to size of the individuals. Third, swimming ability typically is related to size, with larger individuals having greater swimming abilities. Fourth, the size of the individual can affect whether or not it will physically pass through the intake screens and become entrained. Once individuals reach a certain size, they can no longer pass through the intake screens and, instead, may become impinged on the screens. For three-eighths inch mesh, a mesh typical of many intake traveling screens, the transition from entrainment to impingement typically occurs when the organisms reach approximately one inch long. Thus, growth will necessarily affect the size-related interactions described above.

It is not always easy to determine exactly how changes in growth rates will affect entrainment susceptibility. For example, an increase in growth rates could either increase or decrease entrainment susceptibility based on the species' preferred habitat, vertical distribution, or migration in relation to the intake location. For these processes, the magnitude and direction of change in susceptibility would be dependent on site-specific conditions as well as the species and life stages involved. On the other hand, increases in growth rates will always decrease overall entrainment by reducing the amount of time individuals are susceptible to entrainment at any specific intake. Thus, since growth rates tend to increase with warmer temperatures and higher food availability, the overall period of entrainment susceptibility would be expected to be lower when such conditions exist. This interaction is illustrated in Figure 2.1.4. In this example. a larvae that hatches at 4 mm and has a maximum entrainable size of 25 mm would have a 10-day longer period of entrainment susceptibility with a 25 percent decrease in growth rates.

Species-Specific Morphometry

The general shape of individuals among species also affects the transition from an entrainable to an impingeable size. In general, this factor is of less significance than the others described in this section. However, this factor may be very significant when entrainment is predominated by late larval or early juvenile stages.

Not all species of fish are shaped the same. Examples of differences in larval morphometry are illustrated in Figure 2.1.5. These differences in shape can result in different outcomes when different species of the same length approach an intake screen. Some species, such as the herrings, anchovies, and eels, are relatively slender for their length. Species such as these can pass through intake screens and become entrained at lengths at which other, less slender species would become impinged. Thus, the length at transition between entrainment and impingement is species-specific and dependent upon overall morphometry. However, the exact point of transition from entrainable to impingeable size is dependent on the characteristics of the screen mesh and through-screen water velocities, as well as species-specific morphometry.

2.1.2. Factors Relating to CWIS Location and Type

While the primary factors influencing the potential for involvement of entrainable life stages with an intake are biological, certain intake structure factors, combined with hydrologic factors, interact with these biological factors to influence the potential for AEI. These factors are not related to the design and location of the intake structure per se, but rather the fact that the structure has been located in an area where biological and hydrologic factors influence the probability that organisms will encounter it.

At the outset, it is important to note that there are many practical reasons why CWISs are located where they are. While cost may be one factor, engineering considerations, such as the need to protect the structure from wave or ice action, or the need to withdraw cooler bottom water to improve turbine efficiency, often are crucial. In some cases, intakes have been located specifically to place the point of water withdrawal in areas of relatively low biological productivity, thereby addressing the potential for impact during the design stage. In any case, the focus of the following discussion is not on any specific intake location, orientation, or operation, but rather factors associated with location and orientation that influence the potential for AEI.

For species/life stages that reside (at least seasonally) in the open water environment, their potential for involvement with the CWIS is dependent on two factors:

-the influence of far-field hydrologic/hydraulic conditions which determine the probability that organisms will be transported into the near-field zone of an intake's hydraulic influence, and

-the location and type of intake as they relate to the vertical and horizontal distribution of each species and life stage.

Hydrology/Hydraulics

The natural hydrology of the waterbody, and its relationship to plant hydraulics, is generally an important factor in evaluation of the potential for AEI. For a pelagic organism to become entrained, it must occur in the area of hydraulic influence of an intake. The probability that an organism will enter this area is controlled by complex hydrologic processes that extend into the far-field and are influenced by a variety of other factors. Thus, while the proximity of a primary spawning and/or nursery area can be an important influence on the fraction of a population entrained for any individual species, other factors interact with this locational factor and together determine actual susceptibility to entrainment.

In all waterbody types, entrainment potential is related to the hydrologic conditions of far-field flow direction and magnitude and their interaction with near-field, plant-induced currents. Further, large-scale, far-field hydrologic conditions in many cases influence (or determine) the zone of influence of plant-induced currents. The importance of these hydrologic parameters and their interactions are presented below.

For the purpose of this discussion, the far-field is defined as the area of the waterbody in which an intake is located that is outside the intake's zone of hydraulic influence (the zone from which a passive particle in the waterbody will be drawn into the CWIS). The near-field is defined as that zone of influence. The direction of flow in a waterbody is an important factor in the potential for entrainment of planktonic life stages in several ways. In a waterbody that is unidirectional (e.g., a non-tidal river), a non-motile organism will pass an intake relatively quickly as it moves with the flow. Therefore, the time that the organism has to become involved with the intake is short. On the other hand, an organism in a bi-directional flow regime (e.g., tidal estuaries or rivers) may take longer to pass an intake and may be subjected to potential involvement over a longer period. In both cases, the potential for entrainment is related to the net positive displacement of the organism over time. This displacement is, in turn, determined by the relative magnitude of the waterbody flow (e.g., river discharge) compared to the multi-directional influences (e.g., tidal forces). For example, the net downstream displacement of an organism in a tidal river will be faster during periods of high river discharge under a given tidal flow regime resulting in a shorter exposure to involvement with the CWIS. On the other hand, in extreme low-flow conditions (e.g., droughts) on tidal rivers, the salt wedge can move further upstream carrying organisms that would not normally be exposed to the CWIS from downstream.

The magnitude of flow in a waterbody (all directional influences included) relative to the flow volume withdrawn into an intake is also a factor in determining the potential for organism involvement with an intake (Figure 2.1.6). For example, it can be expected that an intake that withdraws one percent of the total flow of a river will have less potential for entraining organisms than one that withdraws ten percent. However, the relative proportion of flows is only one factor in defining the near-field zone of influence of an intake. Therefore, percent withdrawal does not, in itself, define the potential for organism entrainment. Important interrelated factors are the absolute magnitude (volume and velocity) of the ambient (i.e., waterbody) flow, the morphology of the waterbody and the vertical and horizontal distribution of organisms.

The magnitude of the ambient flow and the morphology of the flow path are important factors in defining the spatial expanse (i.e., shape, width and depth) of the plant-induced zone of influence. For example, if an intake is located on the outside bend of a river and ambient velocities are high, the zone of influence of the intake will be contained relatively close to the shoreline. Conversely, if the CWIS is on the inside bend, the zone of influence will be larger, particularly under low-flow conditions.

In estuarine or tidal river locations, the zone of influence of an intake will vary over time as the magnitude and direction of ambient, tidally-influenced currents vary. Therefore, the potential for involvement of organisms with an intake in these locations will also vary over time.

Intake Location

The location of an intake is important mainly as it relates to the presence or absence of aquatic organisms. Shallow water intakes (e.g., shoreline intakes) will not entrain species and life stages that occur predominantly near the bottom in deeper waters. Similarly, submerged, offshore intakes will not entrain species and life stages that are surface-oriented. As a result, the distribution and behavior of each species and life stage, coupled with hydrologic factors, is an important determinant in whether these organisms are subject to entrainment into an intake at a given location.

Intake Design and Operation

A plant's design and operation will influence the entrainment of organisms. For example, if the design incorporates fine screening technology installed specifically to prevent organism passage, the potential for entrainment will be reduced. Currently, the two most common fine mesh technologies in use at power plants are cylindrical wedge-wire screens and fine mesh traveling screens. Both screen types can have openings as small as 0.5 mm and, therefore, have the potential for blocking the passage of all life stages. The wedge-wire design is intended to act passively in that larger, mobile life stages swim around the screen while smaller, non-motile life stages roll or slide over the screen surface and are carried downstream by an ambient current. Fine mesh traveling screens actively collect organisms in the water column and carry them to a surface spraywash system that gently washes them into an organism return trough. By design, these screens prevent entrainment but cause impingement. Thus, it is important in evaluating alternative technologies for a given site to determine whether organism survival will be higher following the impingement and removal process or following entrainment through the cooling water system.

A third technology that can be considered for reducing entrainment of ichthyoplankton is the skimmer wall. Skimmer walls (Figure 2.1.7) are typically used to selectively withdraw deeper water, to keep out floating debris and ice. and to prevent cold air from entering screenhouses. Results from studies conducted at two power plants in the southeastern United States showed a substantial reduction in larval densities between sampling locations upstream and downstream of the skimmer walls (Olmsted and Adair 1981). The authors attribute the reductions to the depth of the openings created by the walls. By withdrawing water from well below the thermocline of the stratified lakes on which the plants are situated, waters from the epilimnion. where most larval fish occur in southeastern reservoirs, were not entrained into the intakes.

In addition to these technologies, several other technologies (including Gunderbooms, a fabric mat with very small pores sizes and low velocities) may be effective, depending on individual site conditions in reducing entrainment. A review of all technologies available for protecting organisms at CWIS is presented in a recent report on fish protection technologies (EPRI 1999a).

The cooling water flow rate is important in a relative sense. The potential for organism entrainment is related primarily to the near-field area of intake influence relative to far-field hydrologic conditions. Due to biological factors that influence the distribution of organisms in a water column, one cannot assume that flow rate is directly related to numbers of organisms entrained. However, in the sense that the area of influence of an intake is indirectly related to flow rate, there is a relationship between flow rate and entrainment, even if it is not one-to-one. In evaluating the potential for organisms to be entrained into a CWIS, all of the biological, hydrologic and hydraulic factors that influence the potential for entrainment must be weighed collectively. Mathematical models are available that may be useful in defining the zone of hydraulic influence of a CWIS.

At plants that operate to meet demand (i.e., non-base load), the operational schedule may influence the potential for entrainment of organisms that pass into the CWIS near-field zone of influence. Plants that are non-operational during times of peak abundance will have less potential for entrainment than plants that operate during peak abundance periods. Scheduling plant outages during periods of peak organism abundance will also reduce entrainment potential.

[text continued in 316bEFR.041.302]

[see hard copy for appendices/figures]

Footnotes

2 In 1976, EPA finalized its original § 316(b) rules. 41 Fed. Reg. 17,387 (Apr. 26, 1976). Those rules, however, were vacated in Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977) and withdrawn by the Agency. 44 Fed. Reg. 32,956 (June 7, 1979).

EPA Response

EPA acknowledges receipt and has reviewed this submission. EPA agrees that there are many factors which can affect the number of organisms impinged and entrained by cooling water intake structures at a particular site. Under today's final rule, facilities are required to submit to the permit director a Comprehensive Demonstration Study, as defined in §125.95(3)(b) that fully characterizes impingement mortality and entrainment of the cooling water intake structure. Many of the issues raised by this comment can be addressed in this Study.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

[comment continued from 316bEFR.041.301]

2.2 FACTORS THAT AFFECT MORTALITY

Not all organisms that are entrained die. Quite to the contrary, studies have shown that entrainment survival can be high (EPRI 2000). Depending on the species and CWIS operating conditions, entrainment survival may range from 0 to as high as 100 percent in some cases. The mortality rate of entrained organisms is influenced by the specific physical, thermal, and chemical stresses to which they may be exposed during transit through the cooling water system, and by the tolerance of the organisms to those stresses. This section therefore discusses both CWIS factors and biological factors that interact to determine entrainment mortality. Because entrainment mortality varies widely based on site-specific and species-specific factors, whether a particular CWIS is causing or is likely to cause AEI may be greatly influenced by entrainment mortality.

2.2.1. Biological

A number of biological factors directly or indirectly influence an organism's likelihood of surviving transit through the CWIS. Entrained organisms are exposed to physical forces (such as changes in pressure and shear) and to rapid temperature elevations as they move through the CWIS. At power plants that must treat the cooling water flow to control biofouling. entrained organisms may also be exposed to toxic compounds (e.g.. chlorine or bromine). The tolerance of phytoplankton, invertebrate zooplankton, and the early life stages of fish to physical, thermal, and biocide exposures received during entrainment has been studied using both controlled laboratory experiments and entrainment survival sampling at operating power plants. These studies show that entrainment survival is influenced by the organisms' inherent sensitivity to entrainment stresses, by the ambient water temperature to which organisms are physiologically adapted (i.e., acclimation temperature) prior to entrainment, and for estuarine-sited power plants. by the ambient water salinity. Finally, in some situations where biofouling is especially prevalent, entrained organisms may be consumed by filter feeding organisms that grow within the CWIS.

At the outset, it is important to note that, for some species, entrainment mortality are irrelevant to the size and health of the population. For example, studies have shown that the potential for reduction in abundance or productivity of phytoplankton and microzooplankton as a result of entrainment at power plants is minimal (Tetra Tech 1978, Lankford 1990). Appreciable intake structure effects on these taxa, if any, are generally of short duration and confined to the immediate vicinity of the CWIS, due to a combination of factors such as relatively high natural abundance, rapid dispersal and mixing by water turbulence and currents, and short life-cycles, rapid generation times, and resultant high reproductive capacity (Tetra Tech 1978, Lankford 1990). Indeed, USEPA's Draft 316(b) Guidance suggested that phytoplankton and zooplankton species generally should not be selected for detailed assessment (USEPA 1977) and thus the focus of the majority of entrainment studies conducted since the early 1970s has been on macrozooplankton and fish. No more recent information has been generated that would contradict this presumption. EPA has implicitly endorsed this approach by proposing that § 316(b) monitoring requirements for new facilities should focus on nekton and the meroplankton of fish and shellfish. See 65 Fed. Reg. at 49,119, 49,121 (proposed 40 C.F.R. § 125.86, 125.87).

Organism Sensitivity to Physical Stresses

Organism sensitivity to physical stress refers to the inherent ability to withstand exposure to shear forces, pressure changes and mechanical contact with surfaces during transit through a cooling water system. Studies at a number of operating power plants employing single-pass cooling water systems during the 1970s and early 1980s measured entrainment survival of a variety of invertebrate and fish species, often encompassing several life stages and a range of sizes. These studies were performed by sampling at the intakes and discharges of the plants, in many cases using gear designed to minimize collection damage to the organisms. The proportion of each species and life stage collected alive at the discharge was compared to that at the intake to determine the effect of passage through the cooling water system. Studies often measured both the initial survival at the time of collection and subsequent survival up to 24-96 hours after collection, and analyzed both to determine the percentage of the species and life stage surviving entrainment. Samples collected at cooling water system discharge temperatures lower than the upper lethal temperature limit of the species were used to estimate survival from the physical (or mechanical) stresses of entrainment, independent of the effects of temperature.

The results of entrainment survival studies indicate that entrainment survival in the absence of thermal effects varies widely among species. For example, a review of ichthyoplankton entrainment survival estimates from 12 power plants sited on freshwater, estuarine, and marine systems indicates up to about a four-fold difference in survival rate among species entrained at each CWIS, and about an eight-fold difference among 21 taxa collected across all 12 sites (Jinks et al. 1981). Of the 13 families of fish represented in these studies, herrings, anchovies, silversides, and sand lances appeared relatively sensitive to physical effects of entrainment (survival of 23-48 percent), while the sensitivity of cods, gobies, and suckers appeared moderate (survival of 52-60 percent). Eels, carps and minnows, temperate basses, perch, drums and flounders appeared highly tolerant of entrainment, with survival in the range of 75-100 percent. A recent comprehensive review summarized entrainment survival estimates for approximately 50 different taxa, obtained from 35 study reports at 20 different power stations (EPRI 2000). Although the entrainment survival estimates were quite variable, patterns among taxa were evident (Figure 2.2.1). The mean of entrainment survival estimates for most taxa exceeded 50 percent. Mean entrainment survival values were highest (about 72-92 percent) for freshwater and estuarine macroinvertebrates, freshwater suckers, and spot. Striped bass, white perch, Atlantic tomcod, winter flounder, carps and minnows, and freshwater drum had mean moderate survival values (about 47-63 percent), while herrings and anchovies had the lowest survival, with mean values approaching 25 percent (Figure 2.2.1).

For a given species, survival from the physical effects of entrainment may also depend on the life stage or size of the entrained organisms, although data sufficient to quantify the relationship is limited to relatively few species. Where large data sets exist, such as for Hudson River striped bass and white perch, analyses indicate significant positive correlation between entrainment survival and life stage/size of the fish (EA 1989). For example, survival of entrained striped bass increased from 50 percent at about 5.5 mm total length to 90 percent at about 14.5 mm (Figure 2.2.2). In general, yolk-sac larvae had the lowest entrainment survival and early juveniles the highest.

However, experiments using pressure chambers and simulated condenser systems have shown that a wide variety of species can tolerate the large changes in pressure and shear forces that are found during normal open-cycle cooling water system operation. These studies indicate that pressure increases probably do not damage most entrained organisms and that substantial mortality (>25 percent) from pressure decreases is principally limited to exposure to subatmospheric pressures (NYU 1975, Coutant and Kedl 1975, NYU 1979). The range of variation in pressure exposures among different power plants is constrained by the need for efficient hydraulic performance. Transfer of species- and life stage-specific survival information among sites may therefore be feasible, but should consider the velocity and pressure characteristics of the cooling water system in context with those at power plants for which survival information is available.

Organism Sensitivity to Thermal Stresses

The inherent ability of entrained individuals to withstand temperature elevations during transit through the cooling water system varies from species to species. Temperature is a normal part of the habitat structure experienced by all aquatic organisms, and spatial and temporal variations in water temperature are a natural feature to which indigenous species have adapted. Aquatic organisms can survive within a range of temperatures specific to each species, called the "zone of thermal tolerance." Organisms can also adjust to the thermal environment physiologically, by shifting their tolerance range, but this acclimation has limits and ultimately a water temperature may be reached that would be lethal. The upper lethal limits of thermal tolerance for a species are typically determined by laboratory experiments and are defined as the temperature resulting in death of 5, 50, or 95 percent of the test organisms (TL5, TL50, TL95). Immobilization or death resulting from sudden increases in water temperature beyond an organism's upper tolerance limit is often referred to as "heat shock."

The tolerance of organisms to temperature elevations in the cooling water system is influenced by their genetic ability to adapt to thermal changes within their characteristic temperature range and the duration of exposure to the elevated or lowered temperature (Coutant 1972). Genetic ability to adapt to temperature changes differs among species and among life stages within a particular species (Hochachka and Somero 1971; EA 1989; Kellogg and Jinks 1985). For example, striped bass tolerate higher temperatures than salmon, and juvenile striped bass have higher tolerances than adult striped bass (EA 1978b; Coutant 1970). Therefore, entrainment survival is influenced by the thermal life histories of the relevant waterbody assemblages and the thermal tolerance limits of the species susceptible to entrainment. For example, the community in a waterbody having a narrow natural range of temperatures may have species assemblages with thermal tolerance zones that are relatively narrower than those in a waterbody with widely fluctuating natural temperatures. Conversely, species may migrate between waterbodies or between habitats within a waterbody to occupy thermal regimes suitable to their thermal tolerance range. In this latter sense, an organism's sensitivity to thermal stress also influences its spatial distribution and potential for involvement with a CWIS.

The duration of exposure is a crucial interacting factor in an organism's tolerance of temperature change (Coutant 1972). The tolerance of an organism to temperature changes is a direct function of exposure time. Organisms tolerate exposure to greater changes in temperature if the exposure is for a short period (Brett 1952; Kellogg et al. 1984). For example, striped bass acclimated to approximately 77°F survive an increase in temperature of 18°F (i.e., exposure temperature of 95° F) for 60 minutes, but tolerate an increase in temperature of 29°F (i.e., exposure temperature of 106°F) for 10 seconds

(EA 1979). This time-temperature aspect of thermal tolerance is crucial to an accurate and scientifically valid assessment of the potential for organisms to tolerate heat shock from potential exposure in a cooling water system. Therefore, species- and life stage-specific sensitivity to thermal stress must be considered in light of cooling water system design and operating factors, specifically delta-T and transit time (i.e., time for the water flow and entrained organisms to pass from the condensers back to the waterbody).

Acclimation Temperature

Acclimation temperature is the ambient water temperature to which an organism has become physiologically adapted prior to entrainment. True acclimation to changed temperature requires several days to more than a week (Brett 1941; Fry 1971; Hochachka and Somero 1971). Acclimation temperature affects aquatic organisms' upper temperature tolerance (Brett 1956; Coutant 1972; Lauer et al. 1974).

Tolerance to the short-term (seconds to hours) exposures to temperature changes that are characteristic of entrainment also depends on the organism's acclimation temperature (Lauer et al. 1974; IA 1978; Greges and Schubel 1979: Jinks et a!. 1981). Organisms acclimated to temperatures at the low end of their genetically determined range of tolerance typically can tolerate larger increases in temperature than the same organisms acclimated to temperatures near the high end of their genetically determined range of tolerance (Lauer et al. 1974). For example. striped bass post yolk-sac larvae acclimated to 68°F tolerated a 23.4°F temperature rise (i.e.. exposure temperature of 91.4°F) for five minutes, whereas when acclimated to 78.8°F. they tolerated only a 19.1°F rise (i.e., an exposure temperature of 97.9°F) for the same exposure time (EA 1978b). Nonetheless, organisms acclimated to warmer temperatures generally can tolerate higher maximum exposure temperatures than if they were acclimated to lower temperatures. For example, as illustrated above, the five-minute TL50 for striped bass post yolk-sac larvae acclimated to 68°F is 91.4°F, while the five-minute TL50 for the same species life stage acclimated to 78.8°F is 97.9°F. Another example of the relationship between acclimation temperatures and thermal tolerance (TL50) is provided by laboratory studies conducted on bluegill juveniles (Figure 2.2.3). In this study, at acclimation temperatures of 70°F, juvenile bluegill could withstand a temperature increase of approximately 30°F. At higher acclimation temperatures, individuals became less able to withstand temperature increases such that at an acclimation temperature of 92°F, bluegill juveniles were only able to withstand a 10°F temperature rise.

Therefore, evaluation of entrainment survival must consider the seasonal nature of involvement of organisms with the CWIS and the seasonal temperature regimes characteristic of the waterbody segment in which the intake is located. For example, in a warm-temperate meteorological climate, species with high tolerance of the physical stresses of entrainment may incur lower mortality if entrained during spring, when ambient temperatures are cool, than they would if entrained during summer, when ambient temperatures are much higher.

Salinity

Water salinity may be an important factor influencing entrainment survival at power plants located in the brackish water regions of estuaries, where salinity varies seasonally in response to changes in freshwater discharge and tidal height. Low to moderate levels of salinity reduce the energy input required for osmoregulation (physiological maintenance of internal water and salt balance), and thereby act as a general stress ameliorator. For example, the addition of salt has been shown to reduce mortality from physical stresses such as handling during fish rearing operations (Bowser and Buttner 1991; Kane et al. 1990; Palawski et al. 1985).

Entrainment survival studies in brackish water regions of the Hudson River suggest that the stress reducing effects of salt result in higher entrainment survival for a given species when brackish water is present than during freshwater periods (EA 1989).

Biofouling Predation

A variety of life forms are capable of colonizing the surfaces of cooling water systems, including bacteria and sessile invertebrates. Filter-feeding forms, such as barnacles, mussels, and hydroids, may prey on entrained organisms as they pass through the cooling water system, and extensive buildup of filter-feeding forms may substantially reduce entrainment survival through this predation mechanism (Kauffman et al. 1980: EA 1983). Such biofouling predation is generally limited to some sites located on high salinity waters along oceans. enclosed bays. or the lower reaches of estuaries.

Cooling water system susceptibility to biofouling (i.e., the buildup of biological growths on structures and equipment) varies widely depending on waterbody type and location. Biofouling is generally undesirable since it may reduce the efficiency of the cooling water system. Facilities may use biocides, heat treatments, or mechanical scraping to remove biological growths from the cooling water system when necessary to maintain efficient operation. However, the effect of such colonization on system performance depends on cooling water system design and on the portion of the cooling water system colonized. As a result, heavy biofouling predation may occur in portions of the cooling water system where they do not substantially impact plant performance, such as in long shallow discharge troughs or canals. When this occurs, the potential for significant predation by the biofouling organisms exists.

2.2.2. Factors Relating to the CWIS

The primary factors that influence the potential for AEI as a result of entrainment mortality include:

-the physical forces to which organisms are exposed as they pass through pumps, pipes, condensers and discharge structures;

-increased water temperature and the duration of exposure; and

-in some cases, the concentration and duration of exposure to chemical or thermal biofouling control agents.

The physical forces encountered by entrained organisms include pressure changes experienced as the organism moves along the hydraulic grade line (i.e., the line which defines the pressure head at any point within the system; Figure 2.2.4) from intake to discharge, shearing (the tearing action resulting from exposure to zones of rapid flow accelerations or decelerations, and direct (mechanical) contact with system components). The potential for organisms to be injured as a result of physical forces during passage through the cooling water system varies depending upon system design. For example, different pumps have different clearances and rotational speeds that can influence the potential for mechanical injury and shearing effects. Similarly, the velocity of flow into a condenser waterbox and turbulence in that flow as it approaches and exits the condenser tubes may influence the potential for mechanical injury.

In general, meaningful changes in water temperature occur twice during the trip from intake to discharge: during passage through the cooling water condenser (increase) and at the point of discharge into a mixing zone (decrease). The primary factor in determining temperature effects on organisms is the upper lethal temperature limit of the organism and the duration of exposure. Many aspects of cooling water system design influence temperature changes and length of exposure. In once-through systems, those with low delta-T's and short transit times are likely to cause the least entrainment mortality. In contrast, facilities with long discharge canals or tunnels increase transit time and may increase organism mortality, depending on species-specific factors. Closed-cycle cooling systems in which organisms entrained with the cooling water are repeatedly circulated through the plant's system generally result in 100 percent entrainment mortality.

Where a chemical agent (e.g., chlorine) is used to control biofouling in the cooling water system, the point of injection is typically immediately upstream or downstream of the circulating water pump. Due to the chemical concentration needed to effect biofouling control, 100 percent mortality of entrained organisms is assumed during the period of treatment. Where thermal backwashing is used (i.e., reversing flow in the intake and discharge systems), elevated temperatures are maintained for a period of time sufficient to kill shelled invertebrates such as barnacles and mussels. Therefore, total mortality of entrained organisms can again be assumed. Current state and federal regulations, however, restrict the frequency and duration of chemical or thermal treatment. Therefore, while complete entrainment mortality may occur during such treatments, it occurs for a short period of time and on an infrequent basis. For a given species and life stage, survival is influenced by the factors listed previously (primarily physical forces and thermal effects). The stresses imparted by these factors vary depending on the type of cooling water system used, the characteristics of specific system components, and the transit time through the system.

Cooling System Type

There are two basic types of cooling water systems used by power plants: open-cycle systems (Figure 2.2.4), in which cooling water passes directly through the system from the intake to the point of discharge, and closed-cycle systems, in which cooling water is recirculated within the system and is cooled via cooling towers, canals, or ponds (Figure 2.2.5). Closed-cycle plants typically withdraw a small percentage of the water that would be used in a open-cycle system at a plant of the same capacity. This so-called make-up water is used to replace water lost to evaporation in the cooling process and to maintain the chemical composition of the recycled cooling water within certain prescribed limits. While open- and closed-cycle system designs vary widely, for the purposes of addressing entrainment, these two categories are sufficient. In general, many organisms have a high potential for surviving passage through open-cycle systems, while mortality with closed-cycle systems is 100 percent.

The flow path that an organism follows in passing through an open-cycle system is as follows: entry into the intake (e.g., offshore intake connected to onshore screenwell via pipe, or shoreline intake with canal leading to screenwell); passage through trash racks (coarse openings) and traveling screens (smaller openings, typically 6 to 10 mm); passage through the circulating water pump; transit through pipes that convey the water to the condenser; passage through the condenser tubes (typically about 1-inch diameter pipes); transit through the pipe and/or other conduit that conveys the water to the point of discharge; and release into the receiving waterbody. It is within the condenser that the flow is used for cooling and the temperature of the cooling water increases. The degree of increase is determined by the design change in temperature, or "delta-T," of the plant. The delta-T is governed by overall plant design and performance requirements that are determined on a site-specific basis. The transit time through the system is determined by the velocity of flow in each system component and the length of the system from intake to discharge.

In a closed-cycle cooling system, make-up water is withdrawn through an intake structure similar in design and location to a once-through system that would be used at the same site. Since the water needed for make-up is substantially less than that needed for once-through cooling, the intake structures are proportionately smaller. However, the front and back ends of the closed-cycle system are similar to those in a once-through system: trash racks, screens, pumps and piping on the front and pipes or other conduits on the back to convey "blow-down" to the receiving waterbody. The difference between the two cooling systems is in the heat exchange unit (condenser). In a closed-cycle system, the cooling water passes through the condenser and then is transported, along with any entrained organisms, to a cooling tower, lake or pond. The water is allowed to cool prior to being recycled through the condenser. This cycle is continuously repeated providing no potential for entrained organisms to return to the natural waterbody except in the low-volume blow-down. Therefore, mortality in closed-cycle systems is complete.

CWIS Components

The primary components influencing the physical forces to which organisms are exposed as they pass through the cooling water system are the traveling water screens, pumps, piping and condensers. It should be noted that, while traveling water screens are the typical component used to handle debris in power plants and are the focus of the following discussion, some plants are equipped with fixed screens or bar racks.

Traveling Screens. In most power plants, traveling screens incorporate mesh sizes (e.g., 3/8-inch [9.5 mm] openings) through which eggs, larvae and some early juveniles (depending on species) pass with ease. In the last two decades, a small number of power plants (Brayton Point, Prairie Island, Big Bend, and Indian Point) have employed fine mesh (e.g., 0.5 to 1.0 mm) as a means of collecting early life stages and preventing entrainment through the cooling water system. Eggs and larvae collected on the screens are normally washed off the screens and deposited back in the source waterbody at a location away from the intake. In this case, survival following impingement, removal and transport of early life stages that would have been entrained through larger meshes must be weighed against the survival that would be expected if they had been entrained. For fragile species (e.g., clupeids, shad, alewife and anchovy), fine mesh screening may result in higher organism mortality than if entrainment through an open-cycle cooling water system had occurred (e.g., Bruggemeyer et a!. 1987).

Other than larger-mesh and fine mesh screens, there are a variety of screen meshes that incorporate combinations of sizes, geometries and special features that influence the manner in which they interact with organisms and debris. For example, a rectangular mesh that has been flattened on one side (referred to as "smooth-top") has shown superior debris-shedding and organism handling properties compared to conventional woven-wire, square meshes. With openings such as 1/8-inch (3.2-mm) wide by 1/2-inch (12.7-mm) high, these smooth-faced screens, in some environments, are less likely to entwine (or "pin") debris and are more likely to have debris and organisms slide freely into collection troughs. Naturally, the effectiveness of a particular screen size and geometry is influenced by the type of debris present. At the Salem Generating Station, l/8-by-1/2 inch smooth-top screens have been shown to somewhat alleviate historic debris problems while apparently contributing to the improved organism survival observed when the screens were retrofitted with other enhanced organism survival features (PSE&G 1999). Thus, different sizes and shapes of screen meshes may influence both debris loading and entrainment. However, the specific mesh used at a given site must be selected on the basis of the type and amount of debris present and the species and life stages to be protected. Additional research to further identify the relationships between mesh size and shape and impingement and entrainment, and how those relationships will vary depending upon site-specific factors may prove fruitful in this area.

Pumps and System Piping. Power plant circulating water pumps are typically low-head (i.e., provide the energy required to move the cooling water through the system), high-flow pumps that have large clearances between impellers and housings. Specific studies to identify injury and mortality as a result of passage of early life stages through the pumps have not been conducted. It is generally assumed that large pumps do not contribute substantially to overall system mortality.

Similarly, velocities in cooling water system transport piping that convey water to the condensers and from the condensers to the plant discharge outfall are relatively low and are not highly turbulent. Therefore, shear and impact forces in these locations are not considered an important factor in overall system mortality.

Condensers. Two factors influence the potential for organism stress and mortality in the condenser. The thermal factor has been previously addressed. The second factor relates to mechanical impact, pressure and shear experienced as organisms enter the condenser water box and pass into the relatively small condenser tubes. However, experiments using pressure chambers and simulated condenser systems have shown that response to pressure and shear forces is species and life-stage specific. Some species can tolerate the large changes in pressure and shear forces to which they are exposed during passage, while others cannot. (NYU 1975, Coutant and Kedi 1975, NYU 1979).

Biofouling Treatment

Some power plants add biocides, most typically chlorine or bromine, periodically to the cooling water flow to control the growth of organisms that can foul the cooling water system. Alternatively, some power plants clean the cooling water system condensers and discharge conduits by temporarily recirculating a portion of the cooling water, thereby raising the watet temperature in the cooling water system above upper temperature tolerance limits of the fouling organisms. To effectively control biofouling, the biocide concentrations and heat treatment temperatures within portions of the cooling water system must be raised to toxic levels that alsc cause mortality of entrained organisms.

The contribution of biofouling treatment to the overall mortality incurred by entrained species depends primarily on the frequency and duration of treatment, which varies widely depending on plant design and location. Biocide application is controlled by either technology-based or waterquality based federal/state pollution discharge permits, which generally also limit the frequency and duration of treatment. For example, EPA's technology-based limits for steam-electric power plants limit chlorine discharge to 0.200 mg/l for no more than a total of two hours per unit per day, unless the facility demonstrates the need for, and obtains, a variance. However, at many plants the duration and frequency of biofouling treatment required to maintain efficient plant operation is far less, and some plants do not have to treat at all. Therefore. the significance of cooling water system biofouling treatment as to entrainment survival and the potential for AEI varies.

3. FACTORS THAT AFFECT IMPINGEMENT LOSS

Organisms too large to pass through the screens that protect the cooling water systems at steam electric power plants may become entrapped against the intake screens by the flow of water. This process is known as impingement. The magnitude of impingement loss of any species to CWIS operation is a function of the involvement of the species with the intake (number or fraction impinged) and the subsequent mortality of those organisms (impingement mortality). This section discusses the primary factors influencing both impingement involvement and impingement mortality.

3.1 FACTORS THAT AFFECT INVOLVEMENT

The actual impingement of organisms by the cooling water flow involves two processes. First, the organisms must be in the area of the source waterbody from which cooling water flow is withdrawn. Second, the organisms must be entrapped against the intake by the cooling water flow. A variety of cooling system and biological factors affect these two processes, as discussed below.

3.1.1. Biological

This section discusses biological factors that generally affect potential impingement susceptibility of aquatic populations. These factors largely revolve around species and/or size considerations that can alter the susceptibility to entrapment against intake screens.

Location of Intake in Relation to Areas of Fish Concentration

The location of the specific intake at issue with respect to areas where species of concern might be concentrated in significant relative abundance is a key factor affecting potential impingement. The general presumption (which may or may not prove true, for any particular site) is that the closer these areas are to the point of water withdrawal for any species, the greater the likelihood that a high proportion of that species will be subject to impingement, assuming all other factors are constant. Conversely, the greater the distance between these areas and the intake, the lower the potential for impingement.

Concentration of individuals in the vicinity of an intake can occur for several reasons. First, the area could be a principal nursery area for juveniles. These young fish tend to be more susceptible to impingement than adults owing to their more limited swimming abilities. Second, the intake could be located near a migratory pathway. Migratory pathways have the potential to bring a significant proportion of the population to the vicinity of the intake during certain seasons of the year. For example, impingement rates for anadromous species such as river herring, American shad, salmon, and striped bass are often highest during periods of emigration as they pass through the vicinity of an intake. Third, many species of fish exhibit seasonal movement associated with spawning. These movements can bring individuals into the vicinity of a plant's intake if located near the species pathway. Finally, the intake could be near an overwintering area. In temperate areas of the country, many species of fish move to and remain in deeper areas of the waterbody during the winter. Intakes located near these areas may experience higher impingement rates during the coldest months of the year as a result of the organisms' natural cold-induced lethargy.

While distance to these areas of concentration can be an important influence on the fraction of population impinged for any individual species, other intake and biological factors interact with this factor to determine actual susceptibility to impingement. For example. as discussed in Section 3.1.2, the design and location of the intake substantially affects the actual rate of impingement for any species through such factors as approach and through-screen velocities, depth of water withdrawal, and avoidance potential. In addition, biological factors, such as the size of individuals in the vicinity of the intake, swimming ability, and depth distributions, all can alter the relative importance of the distance to areas of concentration such as principal nursery areas.

Seasonal Occurrence

This factor refers to any seasonal pattern in the occurrence of impingeable individuals in the cooling water withdrawn from the source waterbody. While the seasonal occurrence pattern for any species or life stage may not directly affect the potential for impingement, this factor can alter the potential for AEI from impingement by interacting with several other intake and biological factors. These potential interactions are discussed below.

As discussed earlier in Section 2.1.1, many power plants vary electrical generation in order to meet seasonal patterns of demand, and thus cooling water flow may be lower during periods of prolonged low demand. This is illustrated in Figure 3.1.1. In addition, the need for cooling water is reduced at some facilities owing to the greater heat transfer that can occur during the coolest months of the year. Finally, cooling water flows can vary seasonally as a result of discharge permit requirements. The potential for seasonal patterns in cooling water flow are discussed in more detail in Section 2.1.1. As a result of these varying cooling water flows, the interaction between any seasonal pattern in relative abundance of each species and age with any seasonal pattern in cooling water withdrawals has the potential to alter substantially the fraction of the population impinged for that species. For example, many species of fish exhibit spring and fall migrations (e.g., anadromous species). Such migrations could bring them into the vicinity of a cooling water intake during periods of the year when cooling water flows, and hence the potential for impingement, is reduced compared to warmer summer periods (Figure 3.1.1).

In addition to potential seasonal patterns in cooling water flow, seasonal patterns in the occurrence of individual species and ages can affect the potential for AEI from impingement through an interaction with the ambient temperatures naturally occurring at the time of potential impingement. This interaction can occur through either of two processes. First, impingement survival is a function of many factors, including acclimation temperature. Generally, impingement mortality increases at higher temperatures and, conversely, impingement survival tends to be higher when water temperatures are cooler. Thus, the ambient temperatures at the time of impingement can affect the likelihood of survival for impinged organisms. Second, aquatic organisms subject to impingement are virtually all poikilotherms (i.e., cold-blooded). Thus, their metabolic rates and activity levels vary directly with the temperature of the surrounding water. When water temperatures are well below the species' temperature range for optimum performance, these organisms can become lethargic and have limited ability to avoid impingement if they remain in the vicinity of the intake. Thus. their susceptibility to impingement can increase during the colder periods of the year. The magnitude of this increased susceptibility depends on differences between actual temperatures and those optimal for a particular species.

Vertical Distribution/Movements

The distribution and movement of impingeable organisms within the water column can alter the susceptibility of those organisms to entrapment against the intake screens. Many of the aquatic organisms of greatest concern for impingement are not randomly distributed throughout the entire water column. Consequently, these individuals experience greater or lesser risk of impingement depending on their vertical distribution relative to the vertical zones of withdrawal for any particular intake.

Non-random distribution within the water column generally results from specific habitat preferences of the individual species. For example, some species prefer to occupy areas near the bottom (benthic species) whereas others are found principally up in the water column (pelagic species). Often pelagic species exhibit strong schooling behaviors. For most intakes, pelagic species are typically more susceptible to impingement than are benthic inhabitants. These habitat preferences help to explain differences in impingement rates observed between species of similar abundance in the source waterbody.

In addition to these species-specific differences, depth distributions can vary seasonally and even within a day for some species. For example, in systems with strongly stratified thermal regimes (e.g., lakes and reservoirs), species will often seek specific preferred temperature ranges that correspond to specific depth intervals (Peterson 1986). Consequently, the depths at which these species are typically found can vary seasonally. However, in some thermally stratified systems, low dissolved oxygen values in deeper waters during the warmer months of the year can force individuals into areas of less than optimal temperatures, potentially leading to physiological stress. In addition, some systems can become strongly stratified with respect to salinity (e.g., some estuaries). In these systems, many species will inhabit preferred salinity ranges leading to vertically-stratified depth distributions. These salinity-induced distribution patterns can vary on both a short-term and seasonal basis as a result of changes in freshwater inflow. Finally, many pelagic species move up in the water column at night to feed, only to return to deeper waters during the day (Loesch 1987). These temporal differences in vertical distribution can substantially alter the susceptibility of individual populations to impingement through time. Such differences help to explain the strong temporal patterns in impingement observed for many species at many power plant intakes (e.g., Thomas and Miller 1976, Lifton and Storr 1978).

As for all other factors related to the potential for AEI, the potential for this factor to affect the susceptibility of aquatic organisms to impingement must be considered in light of the design, location, and operation of each individual intake. The range of depths from which the intake withdraws relative to the depth of the source waterbody can influence impingement involvement through interaction with the vertical distribution of organisms. For example, the importance of non-random vertical distribution might be high for an intake drawing water from a relatively narrow depth stratum compared to the overall depth of the water body. On the other hand, an intake encompassing almost all of the depth of the source waterbody would tend to draw from all depths and reduce the importance of non-random vertical distribution.

Cross-sectional Distribution

As discussed in greater detail in Section 2.1.1, non-random cross-sectional distribution patterns among the species and life stages are a factor in assessing the potential for AEI. These cross-sectional distributional patterns can be species-specific or even vary across time within a species. Consequently, individual populations could experience a greater or lesser risk of impingement depending on their distribution relative to the areas of withdrawal for any particular intake.

Most commonly, non-random distributions among species result from a preference for onshore or offshore habitats by individual species. For example, species found principally in near-shore areas would have relatively low susceptibility to impingement at an intake drawing water primarily from offshore areas (e.g., darters, minnows, gobies, silversides). Likewise, species found principally in far offshore waters in large bodies of water (e.g., lake trout, deepwater marine species), such as the Great Lakes or the oceans, would have relatively low susceptibility to impingement at intakes located along the shore. These species-specific habitat preferences can explain some of the differences in impingement rates observed between species at any individual intake.

In addition to differences in habitat preference between species, substantial changes in cross-sectional distribution may occur through time for the same species. These changes can occur on both a short-term and seasonal basis. For example, many species of fish move to inshore waters during the night to feed, only to return offshore during the day (e.g., black bass, summer flounder, striped bass). Such movements can lead to dial differences in susceptibility to impingement. In addition, predatory species move into inshore waters following schools of prey. During such times, both predators and prey can become more susceptible to impingement at shoreline intakes. On a longer time scale, many species make seasonal movements between inshore and offshore areas, particularly in temperate areas of the country (e.g., bluefish, pikes, carp, grunion). Often such movements bring the species into shallow waters during the warmer months of the year where active feeding takes place. As temperatures drop during fall and winter, many of these species migrate to deeper waters offshore for overwintering. Other species make seasonal movements between inshore and offshore areas for spawning purposes. These temporal changes in inshore and offshore distributions help to explain some of the variability in impingement susceptibility observed for many species.

Swimming Ability

An organism’s ability to swim obviously influences its potential for impingement. Individuals most susceptible to impingement tend to be younger individuals with limited swimming abilities, both in terms of maximum swim speed and endurance. As both components of an individual’s swimming ability tend to increase with size, overall susceptibility to impingement tends to decrease as the individuals become older and larger.

In general, most fish of impingeable size (typically 1 inch or longer) have a maximum swim speed greater than the approach velocity of most intakes. Consequently, these fish have the ability to swim away from the screens once they are encountered and, thus are not immediately impinged. These fish swim against the water approaching the intake in order to avoid contact with the screen. If these fish remain in front of the screens, then they continue to swim to the point of exhaustion at which point they become entrapped against the intake screen. Since the swimming endurance of fish tends to increase with size, larger individuals can swim against the approach velocity longer and have a greater likelihood of avoiding impingement altogether. Thus, smaller individuals of a species in the vicinity of the intake tend to become impinged. Thus, the size, and, consequently, the swimming ability, of individuals must be taken into account in assessing the overall susceptibility of individuals to impingement.

In addition to the influence of size, swimming ability is also affected by water temperature (Webb 1993). During colder times of the year fish metabolic processes slow down and, thus, swimming ability is reduced. Thus, susceptibility to impingement often increases as water temperatures decline in fall and winter. The effects of both water temperature and length of the fish on individual fish swimming ability is illustrated with swim speed data collected on white perch (Figure 3.1.2).

The importance of swimming ability to the potential for AEI should be evaluated in light of the approach velocity of the intake. In the absence of other intervening factors, individuals have a greater ability to actively avoid impingement at intakes with low approach velocities, as compared to a similar intake with higher velocity. Further, the design and location of the intake (offshore, shoreline, recessed) will also strongly influence the ability of individuals to actively avoid impingement. In particular, recessed intakes tend to limit the options for fish to move away from the intake. Thus, there is a greater tendency for individuals to remain in front of the screens and become impinged when encountering a recessed intake design, as compared to either shoreline or offshore intakes of similar capacity and approach velocities. These potential interactions are discussed in more detail in Section 3.1.2.

Physiological Stress

This factor refers to the stresses an aquatic organism might encounter that affect physiological processes to the point that susceptibility to impingement is increased. Such stresses are typically a result of extreme events that lead to exposure to non-routine environmental conditions. These exposures can result in stresses that adversely affect the ability of an organism to actively detect and avoid impingement.

Physiological stresses can arise from a variety of factors, including exposures to less than optimal environmental conditions. As already discussed, prolonged exposures to temperatures in excess of optimal temperatures can leave organisms in a weakened state and less able to avoid impingement, and sudden temperature drops or prolonged exposures to unusually cold temperatures can also incapacitate organisms to the point that they have difficulty avoiding impingement. Finally, exposures to low dissolved oxygen or salinities outside normal ranges can so stress individuals that their swimming capacity and ability to avoid impingement are impaired.

In addition to exposure to adverse environmental conditions, impingement susceptibility can also increase from other physiological stresses. For example, reproductive activities can stress individuals and reduce their ability to avoid impingement. Energy expended as a result of gamete production, nest or redd construction, or the actual spawning process can result in temporarily weakened individuals that are less able to avoid impingement. Further, diseases or physical damage can also weaken individuals and reduce impingement avoidance capabilities.

In general, periods of increased impingement susceptibility resulting from the physiological stresses described above are infrequent and of relatively short duration. Often, such periods of stress are somewhat predictable in their timing, as they are related to seasonal phenomena such as temperature patterns or spawning activity.

As with every other factor affecting the potential for AEI through impingement, physiological stress must be considered in light of other intervening factors. These factors, described in more detail in the previous sections, include approach velocity and intake location.

3.1.2. Factors Relating to the CWIS

Intake structural factors, as well as hydrological and chemical factors, are important in determining whether aquatic organisms become impinged. These structural factors include (1) the location and orientation of the intake structure vis a vis the shoreline and the bottom and surface of the waterbody; (2) the design features of the intake structure; (3) velocity and other hydraulic or hydrological factors; and (4) water quality factors. The following section discusses these factors in turn.

For purposes of this discussion, the “CWIS” includes both any initial inlet through which water is directed from waters of the United States (“WOUS”) to the facility (which may include jetties, breakwaters, or other structures extending into the WOUS), and inter-connected onshore structures that serve as the initial portal through which water enters the facility.

Such portals often include some type of fixed or rotating (also called “traveling”) screening system to screen out debris that could cause blockage of the condenser tubes within the cooling system and reduce condenser efficiency. Such screening systems generally are located in an onshore screenwell that also may contain a bar rack to prevent large debris from impacting the screens.

Intake Location/Orientation

The location of an intake relative to the shoreline and its orientation to the surface and bottom of the waterbody are important factors in determining which species and life stages are most likely to interact with the structure. In this regard, there are three basic configurations: (1) offshore, submerged, <FN 3> (2) shoreline, submerged, or (3) shoreline, surface (Figure 3.1.3). By virtue of its location, the offshore, submerged intake withdraws water selectively from deeper offshore areas. Therefore, the species and life stages most likely to encounter such an intake are those that inhabit or tend to pass through such areas. Shoreline intakes typically are located in shallower water. Often, skimmer walls are incorporated into CWISs in colder climates to prevent ice passage in winter. Such walls are also used to draw cooler water from greater depths. In any case, the inclusion of skimmer walls results in selective withdrawal and such shoreline intakes can be considered to be submerged. As such, surface-oriented species are less likely to encounter these intakes if the skimmer walls are of sufficient depth. On the other hand, shoreline intakes that are essentially open and pass water through the entire intake depth will not physically exclude such fish. With shoreline intakes in general (i.e.. submerged and open). the fish most likely to encounter the intake are pelagic species that inhabit shallow, near-shore areas.

The potential for involvement of fish with CWISs of a specific type in a specific location relates to how that intake is perceived by fish that might encounter it and how they react to it. The mere presence of an intake structure does not determine the potential for involvement. The location and orientation of a CWIS is more important from the standpoint of what that intake represents to fish approaching it. While intake structures are man-made and generally are considered to be “artificial,” they often have features that mimic naturally occurring structures. Such is the principle behind the highly successful use of man-made structures to create artificial habitat for fish (e.g., sunken ships, abandoned oil rigs and used cars). The behavioral response of fish to an intake is mostly related to the intake’s physical structure in conjunction with the hydraulic environment established by the interaction of the structure with ambient currents, as discussed below in Section 3.2.2.

Design Features

Various design features of intakes can be factors in determining whether fish will become involved with the CWIS and be subjected to potential impingement. The most important factors are the structural features of the CWIS. Again, these factors relate to how fish perceive and react to an intake structure. The following discusses the most important design features and the principle types of CWISs, including:

-CWISs that include offshore inlets incorporating jetties, embayments, or breakwaters and a shoreline intake portal;

-CWISs with shoreline intake inlets followed by canals leading to the intake portal;

-CWISs having both inlet and screenwells flush with the shoreline; and offshore intakes, both with and without velocity caps.

Shoreline intakes often incorporate canals, jetties <FN 4> (parallel walls, typically constructed of rock that project from the shoreline and direct flow to the screenwell), breakwaters (rock walls located offshore from the screenwell that project the CWIS from waves and ice) and embayments that are composed of natural and/or man-made materials located in WOUS, and direct water to an onshore screenwell. The tendency of fish to be attracted to, or repelled by, such features is largely a function of whether the materials and hydraulic conditions appear natural or whether some aspect of the structure signifies danger and triggers an avoidance response.

Fish moving along the shore in shallow water have been observed to be attracted to jetties and breakwaters. It is for this reason that such structures are popular with anglers. These structures serve as cover from predators and severe weather conditions, and may harbor abundant food resources. The attractiveness of jetties and breakwaters is independent of whether or not an intake structure is associated with them. There is no evidence to indicate that the impingement potential of jetty intakes is higher or lower than any other intake types. Provided that fish inhabiting jetty areas have the swimming capacity to move about at will, there is no reason to consider the structure as anything more than an extension of their natural environment.

Unlike jetty intakes that protrude into a waterbody, intake canals typically have shoreline inlets that convey water to an in-land portal (typically a screenwell). The canal sides and bottom may be natural (e.g., earth or sand) or man-made (e.g., rip rap or sheet pile). As with jetties and breakwaters, the conditions that exist in canals can be attractive to fish and invertebrates. That is, fish may choose to reside in canals for periods of time. Again, it is often assumed that the mere presence of fish in a canal makes them more vulnerable to potential impingement. If these fish have selected the canal as preferred habitat and have the swimming ability to move freely. however, there is no reason to consider them to be more at risk than at other intake types. An example of long-term residence in a CWIS comes from a study conducted at a power plant on Lake Erie. Fish enter a shoreline forebay via an offshore, submerged intake. In 1998, a mark/recapture study was conducted with smallmouth bass in the forebay. A total of 967 fish were marked and released into the forebay periodically between May and August. None of these fish were recovered from the traveling screens during this period. Fish recaptured by angling in the forebay were found to be healthy and actively feeding on other fish residing in the forebay (Cooke et al. 2001).

At some power plants, the CWIS is constructed in such a manner that it is reasonably “flush” with the shoreline. The intent of this structural configuration is to minimize potential entrapment areas and permit freer movement of fish. It is often assumed that the flush-mounted design has less potential for impinging fish than a jetty or canal intake because it minimizes entrapment areas in which fish may not be able to, or may not desire to, leave. With any intake type, if fish have the swimming capability to move about freely in the intake, the potential for impingement is related to whether they encounter conditions that stimulate a response to leave the intake. Such stimuli apparently are absent at some CWISs, given that fish can be observed swimming in front of the traveling screens in CWISs for prolonged periods even though adequate passage routes permitting escape exist. Thus, fish that ultimately impinge on screens in any intake type may not necessarily be “entrapped” but rather have not been subjected to stimuli that would encourage them to leave. The importance of such a stimulus as a factor influencing the potential for fish involvement with an intake is discussed below in Section 3.2.2.

As discussed previously, some shoreline intakes are designed to withdraw deeper water and are, therefore, considered to be submerged. The use of skimmer walls to achieve this end can result in the creation of a barner to fish that enter the intake and then seek a route of return to open water. For example, at PEPCO’s Morgantown Station, fish were observed to be entrapped behind a skimmer wall in water with low dissolved oxygen levels. When portals were cut into the sheetpile walls allowing fresh water to enter, the fish were able to find their way out of the intake.

Like the structural features of shoreline CWISs, offshore CWISs may have features that can make them more or less attractive to fish and influence the potential for involvement. Offshore intakes typically are submerged and located relatively close to the bottom. They may be open-ended pipes oriented vertically or horizontally in relation to the bottom, and they often have coarse racks to block the passage of large debris. Offshore, submerged intakes are connected to onshore screening systems via tunnels or pipes. Once fish enter these closed conduits, their fate is to arrive at the screenwell and eventually impinge. Therefore, the “point of no return” is at the offshore intake opening. Many offshore, submerged CWIS incorporate a velocity cap, which is a flat structure that sits horizontally over the intake opening. The velocity cap creates a horizontal, “net-like” flow pattern. While it has been shown that fish generally respond more actively to horizontal flow accelerations than vertical flow accelerations (USEPA 1976), there have been no quantitative studies of velocity cap versus open-pipe intakes.

In conclusion, while intake location and design influence the species and life stages of fish that are most likely to encounter an intake, other factors are dominant in determining the potential for impingement.

[text continued in 316bEFR.041.303]

[see hard copy for appendices/figures]

Footnotes

3 "Submerged" typically means that the structure is located substantially below the water surface -- e.g., a velocity cap is submerged.

4 In freshwater systems, shoreline intakes incorporating canals or jetties are not a typical design.

EPA Response

Please see response to comment 316bEFR.041.301. Today's final rule allows facilities to adjust for impingement survival in their impingement numbers. Please see the response to comment 316bEFR.305.001 for the discussion regarding entrainment-based performance standards. Please see response to comment 316bEFR.002.015 for the discussion regarding the inclusion of entrainment survival estimates in site-specific benefit analyses. Also, please see the chapter, Entrainment Survival, in the Regional Studies for Final Section 316(b) Phase II Existing Facilities Rule for more information.

[comment continued from 316bEFR.041.302]

Velocity and Related Hydraulic Phenomena

As previously noted, the structural features of an intake, coupled with ambient hydrologic conditions (i.e., tidal, river, or wind-driven velocity magnitude and direction, and turbulence levels) and hydraulic conditions established by the withdrawal of cooling water flow, are important factors in determining the potential for involvement of impingeable organisms with the CWIS.

For a fish to avoid an intake, it must receive some type of stimulus, or cue, to trigger an avoidance response. Within the range of velocities and other hydraulic phenomena occurring at most CWISs, such cues appear to be largely lacking. This is not surprising given that the hydraulic conditions which fish experience at intakes are not substantially different from those they experience in their everyday existence. In most environments, fish are subjected to velocities in the range of those found at or within CWISs (on the order of about 0.1 to 3.0 ft/sec). Further, turbulence is common in most environments, particularly in waters where instream velocities are naturally high, such as tidal estuaries and rivers. Thus, fish will tend to respond to hydraulic conditions at a CWIS in a manner similar to which they respond to any object in open water.

Flow velocity and direction at an offshore, velocity cap intake will vary mainly with ambient long-shore currents (mainly tidal and wind-driven) and intake flow rate. Hydraulic conditions (i.e., velocity magnitude and direction) will be more uniform and will vary over a much longer time scale. The velocity cap concept arose from research conducted in 1956 which indicated that fish cannot sense a vertical displacement of flow to any substantial degree. Up to that time, offshore intakes were generally open pipes built up from the ocean or lake bottom, possibly with a large-spaced trash rack over the opening. With the understanding that fish are better able to perceive velocity gradients in a horizontal direction than in a vertical direction, the velocity cap design was conceived (Figure 3.1.4). The retrofit of a velocity cap intake at the El Segundo Steam Station in California was reported to reduce impingement by 95 percent relative to the uncapped intake (Weight 1958). Based on these results, a velocity cap was designed to reduce fish entrainment at an intake for California Edison's Huntington Beach Steam Station. Prior to final design, a scale model of the proposed design was constructed to develop optimum hydraulic performance. During these tests, live fish were exposed to the capped and uncapped model intakes. The investigators noted that, without a velocity cap, small fish were entrained rapidly into the intake pipe. However, it was almost impossible to draw any fish into the pipe when the velocity cap was being used (Weight, 1958).

It is significant to note that the El Segundo Station incorporates an entrance velocity of 3.5 ft/s while the Huntington Beach intake was designed for a 2.0 ft/s entrance velocity. In fact, Weight (1958) reports: "It is the opinion of the engineers concerned that the entrance velocity is not highly critical for this type of installation as long as it is greater than a fish normally experiences. A range of 1 to 3 feet per second is recommended as acceptable for design."

This opinion is substantiated by two laboratory studies that addressed the relationship between velocity and entrapment of alewives (SWEC 1976; 1978). In these studies, two identical offshore intake structures (opening size of 5 ft wide by 2 ft high in a water depth of 6 ft) were operated at different velocities over a range from 0.5 to 2.0 ft/s. In the first study, an inverse relationship was found between inlet velocity and entrapment (Figure 3.1.6; SWEC 1976). In the second study, no correlation was found between velocity and entrapment of alewives (SWEC 1978).

A variety of studies at CWIS indicate either a lack of correlation between velocity and impingement or identification of other factors that significantly influence the number of fish impinged. For the reasons discussed above, the absolute value of the velocity approaching and entering the CWIS is not a determining factor in impingement. Rather. it is the change in velocity, if of sufficient magnitude, and the subsequent change in hydraulic conditions (e.g.. rapid flow accelerations and turbulence) that could provide the cues to fish that elicit positive rheotaxis.

This conclusion is supported by the results of a study by Loar et al. (1978), which examined impingement data for 24 power plants for which a year's worth of data were available. Velocities were calculated by dividing the plant design flow by the traveling screen area. While there were some limitations in the data relating to knowledge of how many pumps were operating during sample collections, the strong lack of correlation between velocity and the number of clupeids impinged per l06m3 (Figure 3.1.5) indicates that, over the range of velocities evaluated [6 - 88 cm/s (0.02 - 2.89 ft/s)], other factors were more influential in explaining impingement numbers. The authors report that the level of impingement varied between the units of a given power plant as well as between screens of a given unit and speculate that localized hydraulic conditions may account for these differences. By way of example, Loar et al. (1978) present data on the impingement of clupeids at the Marshall Steam Station on Lake Norman, NC. As shown on Figure 3.1.7, impingement numbers varied widely between identical units. The authors point to the presence of a large eddy adjacent to Unit 4 and again suggest that site-specific hydraulic conditions may explain the observed differences in impingement.

These data point out the potential shortcomings of using existing impingement data in determining the potential for AEI as a result of impingement losses. Unless reported data represent samples from all screens and units at a power plant, the numbers could be over- or under-estimates and may yield inaccurate estimates if used to extrapolate to non-sampled units to develop total impingement numbers. The data also demonstrate the site-specificity of impingement data — i.e., intakes of similar type, design and location may experience large differences in the numbers and species of fish impinged. Similar conclusions were reached in a study by Page et al. (1978) which presents results of a comparative assessment of impingement at two similar cooling water intakes located on the same shore of the Columbia River approximately 276m (905 ft) apart. The 100-N station intake has a total capacity of 26.4 m3/s (936 cfs), while the upstream Hanford Generating Project has a total capacity of 35.6 m3/s (1257 cfs). Flow velocities through the traveling water screens at both sites are similar, on the order of 0.7 m/s (2.3 ft/s). Therefore, it might be reasonably assumed that impingement rates would be similar. On the contrary, despite the similarity and close proximity of the two intakes, twice as many yellow perch and 30 times as many chinook salmon fry were impinged at Hanford (Figure 3.1.8).

The authors offer several possible explanations for these unexpected results. One explanation was that the Hanford intake removes more vulnerable fish from the river upstream of the 100-N intake; this was discounted since most fish impinged at Hanford are returned alive to the river and are then fully susceptible to passage to the 100-N intake. A second explanation was that fish may have been less likely to encounter the 100-N intake because it is located further from the river in a more pronounced forebay; this was discounted since removal of berms at Hanford which had previously created a similar embayment had no effect on impingement. A third possibility was that curtain walls near the upstream face of the two intakes are in slightly different locations. Experimental releases of live and dead fry in front of both intakes showed that Hanford impinged six times more fish than 100-N: however about 1.3 times more dead fish were impinged at 100-N. Impingement of more dead fish and fewer live fish at 100-N suggests that, although velocities are somewhat higher, some environmental stimulus induces fish to avoid the screens. A final explanation was that more fish pass around or through the screens at 100-N. However, diver observations and sampling downstream of the screens indicated that this was not a large problem. The authors suggest that subtle differences in velocity, circulation patterns and design and operation of the intakes may provide behavioral stimuli and induce avoidance of the screens by fish at 100-N (Page et al. 1978). In analyzing possible relationships between velocity and impingement, caution is advised in using existing velocity data due to inconsistencies in the methods used to derive and report these data. This caution stems from the fact that intake structures create complex hydraulic environments that cannot be adequately described from the standpoint of potential impingement by maximum, minimum, or mean values. Hydraulic conditions vary by intake type and design, and are influenced by plant operational and ambient hydraulic factors. For example, flow velocity and direction approaching and within a shoreline intake structure in a tidal river will vary with the orientation of the structure in the river, the presence of curtain or skimmer walls (common in northern climates), the number of pumps operating, and tidal stage (ebb, flood or slack). The hydraulic conditions in the intake will be complex and will vary continuously. Further, if the plant has a shoreline discharge. there is the potential for recirculation of warm water under certain tidal conditions. Such recirculation is not only undesirable from an operations (energy) viewpoint, but it also has been correlated to impingement potential.

As with velocity, the correlation between rate of flow (e.g., gallons per minute) into an intake and the potential for impingement has not been demonstrated. EPRI is currently developing a database of entrainment and impingement which will be used to examine relationships with flow, velocity and other factors. Results of these analyses are scheduled to be completed in the fall of 2001.

In at least some cases, it would appear that biological factors play a greater role in determining whether fish are susceptible to impingement than flow. For motile organisms, flow rate is important primarily as it relates to near-field hydraulic conditions (flow direction and magnitude) at the intake, as discussed above. While flow rate affects the area of influence of a power plant, the measurable velocity effects that have been associated with impingement potential extend a very short distance from the point of water withdrawal.

Data presented by Benda and Houtcooper (1976) on the impingement experience at sixteen power plants located on Lake Michigan and its tributaries provide an example of the lack of correlation between flow rate and impingement. While it was not the intent of the authors to correlate the numbers of fish impinged at these plants to any particular plant design or operating feature, they did supply total numbers by species and flow rates. This information is plotted on Figure 3.1.9. While the authors indicate that, within a given CWIS, there were more fish impinged on screens with larger circulating water pumps, there was little correlation between flow and numbers impinged across all sixteen plants. This lack of correlation could be attributable to other factors (e.g., relative fish abundance in the vicinity of each power plant intake). However, this example points to the difficulty of flow alone to predict impingement levels at a specific site.

Water Quality

Closely coupled to hydraulic conditions are a number of water quality parameters that influence impingement potential. Water quality appears to be a confounding factor influencing the nature and extent of impingement. The biological aspects of water quality and impingement interactions are presented in more detail in the next section of this report. The following discussion provides specific examples of how plant design and operational factors interact with water quality parameters to influence the number of fish impinged.

Temperature is one of the most important factors influencing fish impingement. This is particularly true of schooling species in inland waters, such as threadfin shad (Dorosoma petenense) and alewives that live at latitudes where temperatures approach their lower lethal Limit. A number of studies have been conducted which provide insight into other factors that might influence the nature and extent of impingement effects. As noted above, Loar et al. (1978) attempted to identify factors influencing impingement of fish at inland power plants in the southeastern United States. The authors examined impingement data from 24 power plants at which data were available for an entire year. Approximately 98 percent of the fish impinged at these plants were members of the family Clupeidae, with the major species being threadfin shad. As observed with shad at power plants in other regions, temperature was the factor most highly associated with impingement. Maximum impingement rates occurred during the winter when intake temperature dropped below 10° C. At low temperatures, threadfin shad are susceptible to stress that affects their swimming ability. The peak in impingement in the colder winter months at the plants examined indicates that temperature is the overriding parameter influencing shad impingement in this region of the country.

Other authors have reported similar results. Lifton and Storr (1978) present impingement data for the C. R. Huntley Plant on the Niagara River near Buffalo, NY (Figure 3.1.10). A significant inverse correlation was found between temperature and the number of alewives, gizzard shad, and smelt impinged at this shoreline intake; however, other factors also were found to be correlated to numbers of fish impinged. Sky cover was found to be inversely correlated with impingement at a statistically significant level. The authors concluded that, with increased cloud cover, there is less activity of daylight-active fish, and that lack of a proper twilight level fails to trigger normal activity patterns for nighttime-active fish. Wind direction and intensity also were correlated with impingement at statistically significant levels at the Huntley Plant. Storm activity and strong north or northwest winds resulted in increased impingement while east and south winds resulted in lower impingement levels (Lifton and Storr 1978). The authors found similar relationships at the R. E. Ginna Power Plant which has a submerged velocity cap intake located offshore at a depth of 9.1 m (30 ft). In addition, wave height was found to be correlated with impingement, and the authors suggest that wave-induced turbulence and possibly increased turbidity interfere with the fish's normal ability to detect the intake and avoid it (Lifton and Storr 1978).

At the Monroe Power Plant on Lake Erie, Eisele and Malaric (1978) examined the relationship between gizzard shad impingement and a variety of operational and environmental factors. This plant withdraws cooling water from the lake via a river and intake canal. Large episodes of shad were noted during the 1973-1977 period. Stepwise multiple regression of 612 observations of impingement indicated that intake water temperature was the only variable that contributed significantly to the variation in shad density. As temperature decreased, impingement increased. Such observations have been made with gizzard shad at other power plants. The authors noted, however, that most shad runs at Monroe occurred during intentional warm-water recirculation or wind-driven recirculation of the thermal plume to the intake and suggest that increased numbers were related to an attraction to this warm water. Further analysis of selected data from periods of peak shad abundance showed that water transparency significantly contributed to variations in shad density. They suggest that reduced transparency causes a lack of visual orientation that leads to higher impingement (Eisele and Malaric 1978).

Other environmental parameters have been associated with impingement levels. For example, Cannon and Lauer (1976) found impingement of fish to be closely related to salinity at the Indian Point Power Plant on the Hudson River in New York. They note that over wintering fish. Particularly white perch, prefer the freshwater/saltwater interface of the salt front that moves up and down the river past the plant’s intakes in response to tides and river flows. When the salt front is in the vicinity of the plant, higher impingement rates usually result (Figure 3.1.11). This is a case where habitat preference has a strong influence on susceptibility to impingement.

3.2 FACTORS THAT AFFECT MORTALITY

The proportion of organisms that survive impingement and are returned to the source water body alive is an obviously important factor influencing the potential for AEI. The survival of impinged organisms depends on intake screen design and operation, and on the tolerance of the organisms to impingement stresses. This section therefore discusses CWIS factors and biological factors that interact to determine impingement survival.

3.2.1. Biological

The impingement process exposes organisms to the risk of injury and death from suffocation, mechanical abrasion and generalized physiological stress, including exhaustion. Studies at operating power plants have shown that impingement survival is influenced by the organisms’ inherent sensitivity to impingement stresses, by seasonal factors presumably influencing the condition of fish prior to impingement, and, for estuarine-sited power plants, by the ambient water salinity.

Species Sensitivity

Survival of impinged fish and macro invertebrates varies widely among species and, therefore, the influence of impingement on AEI must be considered on a species-specific basis. In general, organisms that have traditionally been found to be hardy in terms of their resistance to collection and handling stress (e.g., blue crab, hogchoker, catfish) are also tolerant of impingement stresses, while those that have traditionally been difficult to collect and keep alive (e.g., Atlantic menhaden, bay anchovy, threadfin shad) are sensitive to impingement.

Studies that have been conducted at operating power plants indicate that the rate of organisms surviving impingement generally varies at least several-fold among species at a given site, with a maximum reported range of 0 percent to 100 percent survival. An example of the range in impingement survival across species at one power plant is provided in Figure 3.2.1. For a given species, survival from the physical effects of impingement may also depend on the size or age of the impinged organisms.

The actual impingement survival realized by each species and life stage is greatly influenced by intake screen design and operating conditions that affect the physical stresses present during impingement (See Section 3.2.2). For example, for vertical traveling screens there is generally a substantial increase in organism survival associated with decreased time between screenwashes. continuous screen rotation providing the highest survival (Chase 1975: King et al. 1978: Tatham et al. 1978). When screens are stationary for long periods of time, impinged organisms may become moribund in repeated attempts to free themselves and may suffocate against the screen. Conventional vertical traveling screens at existing power plants typically are engineered for intermittent washes, often automatically triggered by hydraulic head differential as debris builds up at the face of the screens. Continuous operation of these screens is possible. but they generally require upgrading of mechanical components, or complete replacement to assure reliable operation in a continuous mode.

Survival is also improved by incorporating stress reduction features such as lifting buckets and low-pressure screenwash systems that separate fish from debris (see Section 3.2.2). Conversely, some power plants have no provision in the intake design for returning organisms to the source waterbody, and therefore none survive impingement. In addition, the proximity of cooling water intake and discharge, together with the hydrodynamics of the waterbody in the vicinity of the station, influences the extent to which organisms are reimpinged after return to the waterbody. Multiple impingement exposures tend to reduce survival as a result of cumulative stress and injury.

Salinity

As for entrainment, water salinity may be an important factor influencing impingement survival in the brackish water regions of estuaries, where salinity varies seasonally in response to changes in freshwater discharge and tidal height. Low to moderate levels of salinity reduce the energy input required for osmoregulation, and thereby act as a general stress ameliorator. The addition of salt has been shown to reduce mortality from physical stresses (Bowser and Buttner 1991; Kane et al. 1990; Palawski et al. 1985).

Impingement survival studies in brackish water regions of the Hudson River suggest that the stress reducing effects of salt result in higher impingement survival of some species when brackish water is present than during freshwater periods (ORU 1977). For example, white perch impingement survival was found to be positively correlated with water salinity at the time of impingement. Survival 96 hours after impingement ranged from 7 to 42 percent when the intake water was less than about 0.1 parts per thousand (ppt) mean salinity (essentially freshwater) and was generally greater than 60 percent when salinity exceeded about 0.3 ppt.

Other Factors

Impingement survival of individual species has been observed to vary widely at different times of year. Several potential sources of the variation have been suggested in the literature, although studies to verify the causes of seasonal variations have generally not been conducted. One important factor is the intake screen loadings of debris and organisms with hard exoskeletons (e.g., crabs) which appear to cause an increase in injury and death, reducing survival of other impinged species (Landry and Strawn 1974). Occurrence of debris and its blockage of intake screens is a highly site-specific factor.

The physiological state of organisms at the time of impingement may also affect their survival. In particular, seasonal water temperatures near the upper or lower temperature tolerance limit of the species may increase their sensitivity to the subsequent stress of impingement, thereby lowering impingement survival relative to that observed at other times of the year. In temperate zones, many species are unable to fully adapt physiologically to the wide changes in water temperature which occur seasonally. Although many of these species adapt behaviorally by seasonal migration to habitats with more favorable temperatures, some portion of their populations often reside in waters quite close to the limits of heir thermal tolerance. As a result, these organisms are susceptible to natural seasonal mortality, especially in particularly cold winters or hot summers, and may therefore die whether or not they are impinged. For example, Lankford (1997) has shown that Atlantic croaker, which use bays and estuaries during summer and fall months, can become highly stressed and more susceptible to impingement when water temperatures are lowest.

[text continued in 316bEFR.041.304]

[see hard copy for appendices/figures]

Footnotes

3

EPA Response

Please see response to comment 316bEFR.041.301 and 316bEFR.041.302.

Comment ID 316bEFR.041.304

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 18.01.01
UWAG definition of "adverse environmental impact"

[comment continued from 316bEFR.041.303]

3.2.2. Factors Relating to the CWIS

As discussed in Section 3.1.2, fish that cannot leave an intake, or that are not provided with the stimuli to induce them to leave, ultimately will impinge on a screening device. Most Swiss contain traveling water screens that are designed to screen out debris that can cause blockage of the condenser tubes and reduce condenser efficiency. A typical through-flow screen design is shown on Figure 2.1.7. The CWIS factors that influence the potential for impingement mortality are addressed individually in the following discussion.

Fish Species and Life Stage

The survival of fish impinged on traveling screens varies widely by species and life stage. Some species have been shown to be relatively fragile and suffer high mortality regardless of screen design and operation. For example, mortality of juvenile herring (Genus Alosa; e.g., blueback herring and alewives) has been high at many CWISs over a wide geographic range. On the other hand, some species have demonstrated high impingement survival, such as flounders, sunfishes and catfishes. In addition, macroinvertebrates, which represent a major proportion of total organisms impinged at some CWISs, display survival rates approaching 100 percent (e.g., blue crabs). (Thomas and Miller 1976; Murray and Jinnette 1978; LMS 1991). Thus, it is not possible to predict mortality based solely on CWIS design and operation. Rather, each species and life stage must be evaluated relative to its inherent potential for injury and stress in combination with design and operational factors at a given CWIS.

Fish Behavior In Relation to the Intake

Behavioral characteristics vary widely by species and life stage. Behavior not only influences how quickly a fish might impinge, but also the degree to which injury may occur that will influence survival. Actively-migrating anadromous species, such as juvenile river herring, prior to impinging (Cooke et al. 2001). Such prolonged swimming may have a negative physiological impact on fish that eventually leads to reduced swimming capability and impingement. Such stress might also be expected to influence survival potential. The relationship between exercise and fatigue resulting from physiological stress in fish has been extensively studied in laboratory experiments over many decades. However, the relationship between swimming duration and time to impingement and survival potential in power plant screenwells has not be defined. Fish behavior also influences survival potential once a fish is impinged. Regardless of the design screen approach velocity in most screenwells, the force of the water flowing through the screen generally is powerful enough to prevent escape once a fish is impinged on the screen mesh. However, depending on fish species and size, many fish actively respond to becoming impinged by trying to free themselves. The resulting oscillatory motion of the fish does not allow it to free itself from the forces of the flow holding it on the mesh. However, due to local variations in flow direction and magnitude, the struggling behavior of the fish can result in lateral movement along the screen face. The result of such movement can produce both negative and positive results. On the negative side, movement of fish over a screen mesh can result in de-scaling and possible injury to the eye, fins and other soft tissue that can, in turn, reduce survival potential. The classification of species as “fragile” results from the fact that such species are particularly susceptible to scale loss that negatively impacts their ability to osmoregulate and exposes them to infection.

On the positive side, Fletcher (1990) showed in laboratory studies that, in selected species, struggling behavior resulted in a downward movement along the screen mesh that directed them to the fish lifting bucket attached to each of his experimental screen panels. By redesigning the bucket to create a calm zone, fish were found to seek shelter and remain in the bucket as the screen’s rotation carried them upward to the water surface and spraywash fish removal system. Thus, the natural behavior of fish should be evaluated in optimizing the design features of traveling screens. It should be noted that Fletcher’s work is one of the few attempts that have been made to observe and understand how fish interact with screens and how these observed behaviors might lead to design improvements. Additional work of this type is warranted.

Screen Type and Operation

The traveling screens in use at most CWISs in the United States are through-flow or dual-flow design. In the through-flow screen design, the screen is set perpendicular to the approach flow and fish are collected on the upstream, ascending screen face. With dual-flow screens, the screen is oriented horizontal to the approach flow. Water passes through both ascending and descending screen faces and exits the screen through a single discharge port. The screens are rotated periodically for cleaning (e.g., once per shift) or are designed to rotate when debris blockage results in a preset differential headloss (i.e., the drop in water elevation from the upstream to the downstream side of the screen) across the screen. As such, fish that collect on the screens may remain impinged for long periods of time. Most species cannot respire effectively under such conditions and experience mortality due to suffocation.

During periodic screen washing, the screen panels move to the water surface and then through a high-pressure (e.g., 100 psi) spraywash system which removes debris and fish to a trough for transport to a trash basket. Fish that are alive at this point can be injured or killed by this spraywash procedure. Further, as the screen panels clear the water surface. impinged fish can fall back into the water and be re-impinged. Those fish that enter the debris trough are sluiced back to the receiving water at a location away from the intake. In some cases, the fish are collected in a trash basket where they typically suffer total mortality if the basket is emptied only occasionally.

A variety of screen modifications, and the associated development of effective fish transport systems, has led to improvements in screening technology that can result in high organism survival rates. These improvements include:

-Alternative screen mesh designs that minimize abrasion and enhance fish removal:

-continuous screen operation to minimize impingement duration;

-the addition of fish lifting buckets to each screen panel to contain fish in water as they are carried to the removal system, as described above;

-the incorporation of low-pressure (e.g., 10-15 psi) fish removal spraywash systems to minimize injury to fish; and

-the addition of fish transport pipes or troughs which convey recovered fish to a safe release location.

Research is ongoing in this area, and continued improvements in survival are expected. Therefore, while the screening system remains a contributing factor in organism survival at CWISs, new designs are available that can greatly reduce the potential for AEI resulting from these systems.

Screen Mesh Type and Size/Debris

In the past, screen meshes at CWISs consisted of woven wire with square openings on the order of 6 to 13 mm. Given concern over the potential for AEI as a result of fish impingement losses, researchers over the past three decades have investigated changes in mesh size and type to improve organism survival. Fine mesh screens (e.g., 0.5 to 2.0 mm) have been employed to protect early life stages of fish and invertebrates.

The type of mesh used affects the survival potential of fish in several ways. First, coarse mesh woven wire tends to be abrasive by design. Second, with their large wire spacings, the impingement forces on fish are distributed across relatively few screen elements resulting in the characteristic “grill marks” that are observed on fish subjected to prolonged impingement. Finally, the debris handling characteristics of screen meshes vary widely. Coarse, square mesh designs tend to result in the “pinning” of debris more than finer, square or oblong mesh designs. Pinned debris can reduce the effectiveness of low-pressure spray wash systems causing fish to carry over to the high-pressure spray wash. The use of mesh designs that minimize pinning and readily shed debris (e.g., fine or oblong mesh) can result in the sloughing of debris into the fish collection trough. On the other hand, these meshes tend to be less injurious to impinged organisms. Therefore, the selection of mesh type and size at a given site must balance fish protection and debris handling needs and take into consideration the type and amount of debris present and the species and life stages to be protected.

It is important to point out that fine mesh screens designed to protect early life stages result in the impingement of these smaller organisms that are entrained through coarser meshes. Therefore, fine mesh screens are only of biological benefit if the impingement survival of the affected species and life stages exceeds that which would result if they were allowed to pass through the circulating water system.

Fish Return Systems

As stated previously, modified traveling screens installed to protect fish must have an adequate organism return system that will convey collected fish to a safe release location. The conveyance is typically a smooth-surfaced trough or pipe that transports organisms in water for release at a distance from the CWIS that will minimize recirculation. Therefore, near-field hydraulic conditions must be understood when siting a discharge point. It is useful to return fish into moving water that will disperse them quickly and reduce the potential for predation by other fish and birds.

Other Fish Protection Technologies

A wide variety of fish protection technologies have been developed for possible use in reducing impingement losses and thereby preventing the potential for AEI at CWISs (EPRI 1999a). In addition to the fish collection screening systems described above, these technologies include diversions systems that actively guide fish to bypasses (e.g., angled screens and louvers), physical barriers that passively prevent fish passage (e.g., wedge-wire screens, submerged weirs and barrier nets), and behavioral barriers that take advantage of natural behavioral patterns in fish to cause repulsion or attraction (e.g., sound and strobe lights). These technologies have been installed at a relatively small number of power plants, as presented below. Biological effectiveness has been found to be site- and species/life stage-specific as presented in the following discussion.

Angled Fish Diversion Screens. A variety of species have been shown to guide effectively on angled screens given suitable hydraulic conditions. Angled screen systems have been installed and biologically evaluated at a number of cooling water intakes on a prototype and full-scale basis. Full-scale angled screens are in use at Oswego Steam Station — Unit 6 (LMS 1992) and at Brayton Point Station (Davis et al. 1988). Angled screen diversion efficiency and survival at these sites varies by species but has, been generally relatively high for the many species evaluated. Survival following diversion and pumping (as required to return fish to their natural environment) has been more variable. Overall survival rates of relatively fragile species following diversion has been low. Hardier species exhibit higher survival rates resulting in overall system efficiency values (diversion and survival) ranging from 50 to nearly 100%.

Physical Barrier Nets. Under the proper hydraulic conditions and without heavy debris loading. barrier nets have been effective in blocking fish passage into water intakes. At the Ludington Pumped Storage Plant on Lake Michigan, a 2.5-mile long barrier net, set in open water around the intake jetties, has been successful in reducing entrainment of all fish species that occur in the vicinity of the intake (Reider et al. 1997). The net was first deployed in 1989. Modifications to the design in subsequent years led to a net effectiveness for target species (five salmonid species. yellow perch, rainbow smelt, alewife and chub) of over 80% since 1991, with an effectiveness of 96% in 1995 and 1996.

At the Chalk Point Station, a double net system was installed to reduce impingement of fish and crabs. Losses were estimated by assigning a dollar value to each organism by species according to Maryland's regulations (Loos 1986). All fish species impinged and 15 percent of blue crabs impinged were assumed killed. River trawl data (relative abundance) was used to create a relationship between impingement of blue crabs on the traveling screens and their abundance in the river. This relationship was used to compute the expected impingement based on the abundance of crabs in the river for that year. The expected impingement after modifications were made to the barrier net system was 919,000 crabs, while the actual number of crabs impinged was 142,000. This represented an 84 percent reduction in expected crab impingement after the second barrier net was deployed.

Sound Behavioral Barrier. Recent fish protection studies involving underwater sound technologies have focused on the use of new types of low- and high-frequency acoustic systems that have not previously been available for commercial use. High-frequency (120kHz) sound has been shown to effectively and repeatedly repel members of the Genus Alosa (American shad, alewife and blueback herring) at sites throughout the United States (Nestler et al. 1992; Dunning 1997; Con Edison 1994).

Other studies have not shown sound to be consistently effective in repelling species such as largemouth bass, smallmouth bass, yellow perch, walleye, rainbow trout (EPRI 1998), gizzard shad, Atlantic herring, and bay anchovy (Con Edison 1994). Given the species-specific responses to different frequencies that have been evaluated and the variable results that often have been produced, additional research is warranted at any sites where there is little or no data to indicate that the species of concern may respond to sound.

Therefore, when reviewing potential for AEI at a given plant, consideration must be given to the effectiveness of existing technologies that have been installed to increase survival.

4. FACTORS THAT AFFECT POPULATION RESPONSE

The response of a population to the loss of individual organisms is a function both of the characteristics of the individual fish and of the population as a whole. In terms of population dynamics, the ultimate measure of the value of an organism is its potential contribution to future generations. The higher that contribution, the more important the population-level effect of harming that organism. Conversely, the lower the contribution of the organism to potential future generations, the smaller the effect. All other factors being equal, populations with very short generation times recover more rapidly from reductions in abundance than do populations with long generation times, and populations with high capacities to compensate for unpredictable

This section identifies the major biological factors that can be expected to influence the responses of populations to entrainment and impingement loss. Although several methods for assessing the impacts of power plants on fish populations are introduced to illustrate the influences of these factors, the section does not include a compendium of all possible assessment approaches. Readers interested in such a compendium should consult EPRI's Catalog of Assessment Methods for Evaluating the Effects of Power Plant Operations on Aquatic Communities (EPRI 1999b).

4.1 LIFE STAGE OR AGE OF ORGANISM

The effect on a population of the death of an individual organism is strongly dependent on the• life stage or age of that organism at the time of its death. Eggs and larvae of fishes typically suffer extremely high mortality rates. More than 99.9 percent of the young spawned by a typical female fish can be expected to die prior to adulthood. The effect on a population resulting from the death of a single egg or larva is, therefore, low. The effect resulting from the death of a fish increases with the age of that fish. The simplest way to illustrate this concept is to consider the expected future egg production of an individual female fish at age x:

Equation 1
[see hard copy for equation]

The influence of age on future egg production can be easily illustrated using the values provided in Table 4-1 that summarizes the life history of a hypothetical fish species in which all females become sexually mature at one year of age. The probability of survival from the egg stage (age 0) to an age of one year is only one in a thousand, but the probability of survival thereafter is 0.5 per year until the fish reach five years of age. All fish that reach age 5 die without further reproduction. Between ages 1 and 5, the fecundity of each fish increases with age.

In this example, a one-year-old female will produce 2,000 eggs. If she lives to age 2 she will produce 2,400 more eggs, but her probability of surviving another year is only 0.5. if she lives to age 3 she will produce another 2,800 eggs, but her probability of surviving for two years is only 0.25 (i.e., 0.5 x 0.5). Her total expected egg production is calculated by multiplying her expected fecundity at each future age by the probability that she will survive to reach that age:

E1 =2,000+(0.5x2,400)+(0.5x0.5x2,800)+(0.5x0.5xo.5x3,200)+(0.5x0.5x0.5x05x0)—4,300

The death of a one-year-old fish, therefore, deprives future generations of more than 4,000 eggs on average. A newly spawned egg has a far lower potential lifetime egg production. If she survives to age 1, her potential egg production will be equal to that of a fish that is already one year old, but her probability of surviving to age 1 is very low. The lifetime reproductive potential of a newly spawned female egg is much lower, because only one out of every thousand eggs will survive to age 1. The lifetime reproductive potential of an egg. using equation (I). is:

E0 = (0.0001x 2,000) +(0.0001x 0.5 x 2,400)+(0.0001x 0.5 x 0.5 x 2.800)+(0.0001x 0.5 x 0.5 x 0.5 x 3.200)+(0.0001x0.5x0.5x0.5x0.5x0)=E1 x0.0001=4.3

Hence, in this hypothetical, the death of an egg deprives future generations of just over four eggs on average. Once a fish reaches age 5 reproduction ceases and, therefore,

E5 =0

The death of a fish older than the maximum reproductive age has no effect at all on future generations.

Although this example has been simplified for illustrative purposes, the general principle applies equally to actual fish populations: the death of a very young fish has a much smaller effect on the population than does the death of a sexually mature fish. Within the first year of life, the value of each fish to the population increases with each successive life stage, because the probability that it will survive to reproduce increases with age. For life stages vulnerable to entrainment, the effect of entrainment on the population is least on eggs and greatest on entrainable juveniles. Fish vulnerable to impingement are larger and older than entrainable life stages, and the potential population effect of impinging a given fish is substantially larger than the effect of entraining it at an earlier age. The species that are most vulnerable to population- level effects from impingement are those for which fish are vulnerable to impingement throughout their entire lifespan. Forage fish such as bay anchovy and threadfin shad, or small predators such as white perch, are examples of such species.

Estimated effects of entrainment and impingement on Hudson River fish populations provide excellent examples of the importance of life stage and age in determining the population-level consequences of entrainment and impingement. Densities of white perch eggs and larvae in the Hudson River are much higher than densities of juveniles (Klauda et al. 1988), and large numbers of white perch larvae are entrained at Hudson River power plants. Given the relative densities of the different life stages in the river, the number of white perch that are impinged must be substantially smaller than the number entrained. However, because these fish have survived the early life stages of high mortality, their value to the population is higher and the population effect of impingement — measured as the conditional mortality rate (fraction of the annual production removed, see Section

4.6) — is at least as high and perhaps higher than the population effect of entrainment (Barnthouse a al. 1984).

In determining the ultimate importance of this factor to the potential for AEI, this factor must be considered in light of several other biological factors. For example, compensatory processes (see below) vary with life stage, and are often especially important in early life stages of fish. In addition, the susceptibility of fish to entrainment compared to impingement varies with life stage. Eggs and larvae are normally vulnerable to entrainment, but not to impingement. Exceptions may occur with certain intake technologies (e.g., fine-mesh screens) in which the mesh size of traveling screens is small enough to impinge larvae. Small juvenile fish (~20-40 mm in length, depending on mesh size and body shape) may also be susceptible to entrainment, while larger juveniles and adults are primarily impinged rather than entrained.

4.2 LIFE HISTORY STRATEGY

The term “life history” refers to the suite of characteristics of species that determine their long-term rates of population growth or decline. Among these are longevity, age-specific rates of survival and reproduction, seasonal patterns of reproduction, and sex ratios. Evolutionary biologists have long known that these characteristics are subject to natural selection. and that when life history traits of many organisms are compared, they tend to fall into a small number of distinct groups (Cole 1954). The most familiar grouping of life history patterns is the “r-K continuum” pattern described by Pianka (1970). According to Pianka, most species can be described as falling somewhere between two opposite life history types or strategies: ‘K-strategists” are characterized by short life span, early sexual maturity, large clutch or brood sizes, and high annual reproductive effort. Examples would include many weeds, most insects, and some species of fish. Examples of fish that could be described as r-strategists would include bay anchovy, threadfin shad, and many fish that inhabit small, ephemeral streams. Such species are able to rapidly colonize new environments and are able to rebound quickly after disturbances that kill many or most individual organisms. Their population sizes are usually highly variable in space and time. “K-strategists” are characterized by long life span, delayed sexual maturity, small clutches or broods, and low annual reproductive effort. Familiar examples include trees, condors, and elephants. Such species are slow to colonize new or variable environments, but can attain large population sizes in stable environments. Adults of K-strategist species tend to be large in size and to have relatively low rates of natural mortality. Fish, because of their relatively high fecundities compared to terrestrial vertebrates, have been difficult to place in the r-K continuum. Large, long-lived fishes such as sturgeons and paddlefish share many characteristics of K-strategists, but produce too many eggs to fit the pattern perfectly.

Winemiller and Rose (1992) proposed a “triangular continuum” to describe life history patterns in North American fish species. In comparing life history characteristics of 200 species of freshwater, estuarine, and marine fishes, the authors found three general types of species: “opportunistic,” “equilibrium,” and “periodic.” The opportunistic strategy involves early maturation, frequent reproduction over an extended spawning season, and rapid larval growth. Adults are small in size, generally have short life spans, and suffer high levels of mortality due to predation. Anchovies, killifishes, and mosquitofishes represent extreme examples of this strategy. The equilibrium strategy involves low fecundity, high juvenile survivorship, and parental care. Extreme equilibrium strategists among fishes are relatively small and inhabit very stable environments, such as caves and coral reefs. Species such as largemouth bass and channel catfish, as well as other members of the families

Centrarchidae and Ictaluridae, are less extreme examples. In these species, male fish build and guard nests; these behaviors greatly reduce the vulnerability of eggs and larvae to predators. The opportunistic and equilibrium strategies are similar to the r and K strategies described by Pianka (1970). The periodic strategy involves delayed maturation, large body size, and high fecundity. The individual eggs are usually small and mortality in early life stages of these species is usually high and highly variable between years. Adults have very long life spans and low natural mortality rates; populations are sustained by "dominant year classes" that occur infrequently when environmental conditions are favorable. Striped bass is an extreme example of this strategy, however, many anadromous and coastal species (e.g., weakfish, American shad, and winter flounder) possess some or most of the characteristics of periodic strategists.

The triangular continuum is more easily applicable to fish than the traditional r-K continuum because it readily accommodates many fish species — specifically, the "periodic" strategists - that do not fit neatly into the traditional theory. It has recently been extended to amphibians and used to assess the relative vulnerability of different types of oviparous (egg-laying) vertebrates to adverse effects of toxic chemicals (Rose et al. 1999).

The potential responses of fish populations to entrainment and impingement mortality are, in part, related to life history strategy. Both opportunistic and periodic strategists possess adaptations that enable them to exploit spatially and temporally varying environments and to persist in spite of high levels of natural mortality. Small-bodied, opportunistic species, such as bay anchovy, sustain high natural mortality rates at all ages. Populations of these species may be relatively insensitive to entrainment and impingement mortality, provided that these rates are much lower than natural mortality rates. Large-bodied, periodic species, such as striped bass and many other anadromous species, sustain high natural mortality rates at early life stages and may be relatively insensitive to additional mortality imposed on those life stages. Equilibrium strategists would be expected to have greater potential for population effect from mortality imposed on early life stages, because this strategy involves maximizing early life stage survival.

Periodic and opportunistic strategists are often among the most abundant species in entrainment and impingement collections at power plants and are commonly selected for inclusions in assessments of the potential for AEI. For example, of the species included in the Hudson River studies (Barnthouse et a!. l988b), striped bass, American shad; alewife, and blueback herring are periodic strategists. The bay anchovy and Atlantic tomcod are opportunistic strategists. The white perch is intermediate between opportunistic and periodic species. Among other commonly entrained or impinged species, the Atlantic silversides, Atlantic menhaden, threadfin shad, and other small forage species would all be classified as opportunistic species according to Winemiller and Rose (1992).

Equilibrium strategists such as salmonids, centrarchids, and ictalurids, which have relatively low fecundity and provide parental care to eggs and larvae, are often found in the vicinities of power plants sited on lakes, rivers, or reservoirs.

The importance of this factor to the potential for AEI requires consideration of other, potentially interacting, biological factors. For example, many periodic and opportunistic species produce large numbers of small eggs and larvae. These life stages are highly susceptible to entrainment, especially if they inhabit the pelagic zone. On the other hand, larvae of nest-building species (e.g., salmonids, centrarchids, and ictalurids) are much less susceptible to entrainment. Smallbodied opportunistic species that inhabit the pelagic zone can be highly susceptible to impingement.

In addition, several lines of evidence suggest that the compensatory capabilities of fishes are related to life history. The periodic life history strategy appears to be especially common among fish species that sustain high rates of commercial exploitation (Mertz and Myers 1998). In some cases, species have sustained rates of fishing mortality that are several times higher than their rates of natural mortality (Mertz and Myers 1998). Some opportunistic species. e.g., herrings and anchovies, also have sustained high rates of natural mortality. Exploitation at these rates would not be possible if these species did not possess significant compensatory capabilities. Research on compensatory mechanisms in fish representative of the periodic and opportunistic life history types has shown that relatively small changes in the survival rates of early life stages of these species can offset relatively large changes in mortality imposed on other life stages (Cowan et al. 1993, Cowan et al. 1999).

4.3 MEAN GENERATION TIME

Generation time is defined by Andrewartha and Birch (1954) as ". . .the mean period elapsing from the birth of the parents to the birth of the offspring." In terms of birth and survival rates,

Equation 2
[see hard copy for equation]

In other words, the mean generation time is determined by the time required for the average female to reach sexual maturity, the average number of offspring born at each reproductive age, and the probability that a female will survive to reach that age.

The rate of recovery of a population from a disturbance that greatly reduces its abundance, or from a reduction in fishing effort intended to promote an increase in abundance, is related to generation time. Species with short generation times recover much more rapidly than species with long generation times. Species with short generation times can, for example, be expected to recover more rapidly from episodes of high entrainment or impingement mortality than would species with long generation times. Bay anchovy, threadfin shad, and other small fishes have mean generation times of approximately one year or even less under favorable conditions. Recovery of these populations from either natural disasters or episodes of entrainment or impingement would be expected to be rapid. Striped bass, although living for up to 30 years, become sexually mature in 5 to 7 years and so have an intermediate generation time. The Atlantic Coast striped bass population was observed to recover fully from severe depletion within approximately two generations following the imposition of strict fishing regulations in the mid-1980s (Atlantic States Marine Fisheries Commission 1994). The Atlantic sturgeon, which requires 10-20 years to reach sexual maturity (Boreman 1997a), has a correspondingly long generation time. This species is rarely impinged or entrained. However, overfishing has severely depleted most East Coast populations. Although fisheries managers have imposed a harvest ban, several decades will probably be required for these populations to recover.

This factor has important interactions with other biological factors. For example. generation time is related to life history type. Opportunistic species. by definition, have very short generation times. Generation times in periodic species are highly variable, however, ranging from 2-3 years for more rapidly-maturing species, such as weakfish, to more than 10 years for slow-maturing species, such as paddlefish, Atlantic sturgeon and white sturgeon.

[text continued in 316bEFR.041.305]

[see hard copy for appendices/figures]

Footnotes

4

EPA Response

Please see response to comment 316bEFR.041.301 and 316bEFR.041.302. With regard to the portion of this comment regarding population response, please see response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.041.305

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

[comment continued from 316bEFR.041.304]

4.4 COMPENSATORY RESERVE

Any biological population that persists despite natural fluctuations in the environment must exhibit some degree of increase or decrease in survival or reproduction in response to increases or decreases in population density. The density-dependence of survival and reproduction. also known as "biological compensation," is fundamental to the understanding and management of biological populations. It is compensation that permits fish populations to sustain themselves in spite of intensive harvesting by man. The study of compensation has a very long history in fisheries science; the most commonly used approaches to quantifying compensation were developed more than 50 years ago (Ricker 1954, Beverton and Holt 1957).

The term "compensatory reserve," as defined by Christensen and Goodyear (1988), refers to the excess reproductive capacity of the average female fish, above and beyond the minimum capacity required to replace herself. When environmental conditions are ideal, the average fish can produce far more offspring than are needed to replace her. If the size of the population is lower than the size that can be supported by the environment (i.e., the "carrying capacity" of the environment), the population will grow. If the population is already as large as can be supported, density-dependent reductions in the fecundity of the adults or increases in the mortality rates of the offspring reduce the numbers of surviving young produced by each female. Additional mortality caused by fishing or power plants acts to reduce the size of a population, resulting in compensatory increases in survival and reproduction that offset the additional mortality. As long as the compensatory reserve of the average fish is not depleted, the population will persist. if, however, high levels of additional mortality deplete the compensatory reserve, density-dependent processes will not be able to offset this mortality and the population will decline toward extinction. Such declines have frequently been observed in populations that have been subjected to severe overfishing.

Density-dependent processes act to offset the influences of mortality, e.g., entrainment, impingement, or fishing, on the abundance of populations. The amount of the offset is difficult to predict quantitatively, but qualitatively it is related to the magnitude of the compensatory reserve present in a population and to the relationship between the life stages affected by the additional mortality and the life stages within which compensatory processes are occurring. McFadden (1977) reviewed 17 published studies documenting density-dependent responses of fish populations to fishing and to experimentally-induced variations in population abundance. In recent years, a number of investigators have used "individual-based" population models to synthesize information concerning compensatory mechanisms at the level of the individual fish and to explore the population-level consequences of these mechanisms. Species studied have included smallmouth bass (DeAngelis et al. 1991), striped bass (Cowan et al. 1993). bay anchovy (Cowan et al. 1999), and yellow perch (Rose et al. 1999).

The applicability of compensation to assessments of effects of power plants on fish populations was first discussed by McFadden (1977) and Goodyear (1977). Models that directly incorporate compensation have been used to assess impacts of entrainment and impingement on the Niantic River winter flounder population (NUSCO 1992) and on the Hudson River striped bass population (Lawler 1988, Savidge et al. 1988). At the time these models were developed, however, the available data concerning the life history and stock characteristics of most coastal fish stocks were sparse and unreliable. In the case of striped bass, models in which compensation was assumed to be very strong (implying low potential for impacts related to power plants) and models in which compensation was assumed to be very weak (implying high potential for impacts related to power plants) provided equally good fits to the available data (Christensen and Goodyear 1988). Because of the infeasibility of directly quantifying compensation from the data available for typical fish populations, Goodyear (1977) proposed an approach, which he termed the "compensation ratio" approach, for indirectly estimating the impact of a power plant (or any other source of mortality) on the compensatory reserve of a fish species. An essentially identical approach, termed the "spawning stock biomass per recruit" (SSBPR) approach (Goodyear 1993, Mace and Sissenwine 1993), is commonly used today. The SSBPR approach is widely used as an indirect method of estimating the impact of fishing on the compensatory reserves of species for which the available data will not support a fully quantitative assessment (National Research Council 1998). This approach can be applied to any species for which basic life history information is available. Although it cannot be used to predict reductions in abundance due to fishing or operation of power plants, it can be used to assess whether existing rates of additional mortality due to fishing or power plants are high enough to threaten the long-term sustainability of populations.

Since the 1970s, major advances have occurred both in understanding the mechanisms responsible for compensation, and in incorporating compensation in quantitative models used in fisheries management. Myers and Cadigan (1993), for example, showed that density-dependent mortality in the juvenile stages is crucial for population regulation in some marine demersal (bottom-dwelling) fish. DeAngelis et al. (1979) and MacCall (1981) demonstrated the importance of cannibalism as a compensatory mechanism in other fish populations. Rose et al. (1999) showed that density-dependent processes acting throughout the life cycle of yellow perch — including density-dependent predation by walleye — act together to regulate the abundance of perch. Myers et a!. (1999) developed estimates of compensatory reserve for 246 different fish populations. Pace et al (1993) found evidence for strong density-dependence in the post yolk-sac larval stage of striped bass in the Hudson River.

A variety of methods are now available for developing fish population models that incorporate compensation (Hilborn and Walters 1992). The most widely used approach for directly quantifying the compensatory reserve of a fish population is the "spawner-recruit" approach (Ricker 1954, Beverton and Holt 1957). The spawner-recruit approach relates the abundance of adult fish (the spawners) to the abundance of their offspring (the recruits). Application of this approach requires a series of observations of spawner abundance and resulting recruit abundance from a population. These observations are fitted to a mathematical model and then used to predict the effects of changes in mortality rates on the future abundance of spawners and recruits.

The Atlantic States Marine Fisheries Commission now uses a spawner-recruit model to establish permissible fishing mortality rates for striped bass (Stock Assessment Review Committee 1998). Similar models have been developed for American shad (Crecco and Savoy 1987) and weakfish (Stock Assessment Review Committee 1998).

In practice, high natural variability in recruit abundance, independent of density-dependent effects, often prevents useful predictions from being derived from the stock-recruitment approach. Recently, Myers and Mertz (1998) described the use of a statistical technique known as “meta-analysis” to estimate the compensatory reserve present in poorly-studied species from spawner-recruit data for related but better-studied species. This approach has not, to date, been used by fisheries managers but it is potentially applicable both to fisheries management and to the assessment of power plant effects.

Theoretically, regardless of the magnitude of compensatory reserve present in a population. compensatory processes are more effective in offsetting additional mortality if that mortality is imposed prior to the life stages in which compensatory processes are occurring. For example. mortality due to entrainment of eggs and early larvae may be readily offset by density-dependent increases in the growth rate and survivorship of older larvae (due to reduced competition between larvae) and juveniles. If early juvenile fish are entrained or impinged, compensation occurring in the earlier larval stages cannot act to offset this mortality. Compensation can still occur due to density-dependent growth of the surviving juveniles, but the effectiveness of this compensation will be lessened compared to the compensation possible if the entrainment had occurred prior to this stage.

Compensatory processes interact with many other biological factors to affect the potential for AEI. For example, the specific compensatory mechanisms operating within fish populations vary with life history strategy and trophic position. In species representative of periodic or opportunistic life history strategies, in which there is little or no parental investment in offspring survival, density-dependent mortality can be especially important in early life stages. In nest-building species such as smallmouth bass and other members of the Centrarchidae (largemouth bass, bluegill, sunfishes), nest abandonment is a more important cause of early life-stage mortality than is density-dependent growth or predation. Nest abandonment is influenced by the health of the male fish that guard the nests and by the quality of the nest site; both of these factors represent compensatory mechanisms operating in the adult fish. Cannibalism can be an important compensatory mechanism in predatory fish such as largemouth bass and walleye.

The magnitude of the compensatory reserve of a population, as distinct from the specific mechanisms that operate in the population, is strongly influenced by the presence of other stresses acting on the population. The most important of these stresses is usually fishing, but contaminants that reduce the survival or fecundity of fish can also reduce the compensatory reserve (Barnthouse et al. 1987). This topic is further discussed in Section 4.6 below.

4.5 GEOGRAPHIC POPULATION STRUCTURE

Geographic population structure refers to the large-scale geographic distribution of the organisms that comprise a self-reproducing population. Some aquatic populations are confined to specific waterbodies (e.g., lakes or reservoirs) and, except for emigration and immigration of small numbers of individuals, are isolated from other populations of the same species. In other populations, individuals may be distributed over very large regions during most of the year, congregating in specific locations only for spawning. The degree of geographic concentration or dispersal of organisms within a population affects the fraction of the population that is susceptible to entrainment and impingement.

Populations that are widely dispersed are less susceptible to population-level impacts of entrainment and impingement than are populations that are concentrated within the waterbody from which cooling water is withdrawn. In many species, the degree of geographic dispersal of individuals varies seasonally. Fish may aggregate in specific areas for spawning, or may use specific migration corridors. Water withdrawals from areas in which a population is concentrated in the vicinity of the intake can have a comparatively large effect on populations. Water withdrawals from areas used by widely dispersed populations, in contrast, may have comparatively small effects on populations, even if large numbers of organisms are entrained or impinged.

For example, in anadromous fish species such as striped bass, American shad, and the various species of Atlantic and Pacific salmon, adult fish return to the river or estuary in which they were spawned. Each such river or estuary supports a discrete spawning population that only infrequently exchanges individuals with neighboring populations. Depending on the distribution of early life stages relative to cooling-water intake structures, most or all of the population may be susceptible to entrainment or impingement. In other species that use estuaries, such as Atlantic menhaden, weakfish, spot, and croaker, spawning occurs in coastal waters and the young fish that enter estuaries do not represent discrete populations. In these species, all of the fish present in Atlantic coastal waters are, effectively, a single population. Only a fraction of the population is present in any given estuary, greatly reducing the overall susceptibility of the population to any given power plant. In many fish species that use intertidal and subtidal zones along the Pacific coast (e.g., rock bass), larvae are transported long distances by currents before settling out in favorable habitats. The reproducing population of these species may also be characterized as geographically dispersed, rather than localized.

In freshwater, populations are more likely to be localized in discrete waterbodies. In nonmigratory species (e.g., largemouth bass and other centrarchids), the population present in any lake, pond, or river can be considered to be a discrete population. In large rivers that have been dammed for navigational purposes, the population within each navigational pool may be considered to be a localized spawning population. Population structures of migratory freshwater species, such as sturgeons and paddlefish, have been less-well characterized.

4.6 OTHER STRESSES

The sustainability of a population is influenced by all of the stresses imposed on it by natural conditions (e.g., floods, drought) and man's activities. The response of a population to additional mortality caused by entrainment and impingement is affected by the existence and magnitude of other stresses. By stress, we mean any other influence that reduces the capacity of the population to replace itself. Effects that reduce the replacement capacity of organisms include increases in mortality and reductions in fecundity. Reductions in growth can indirectly affect both survival and fecundity. Sources of stress that commonly affect fish populations include harvesting, environmental contamination, habitat alteration, and introductions of non-native species.

Goodyear (1977) showed that both effects of exploitation of adult fish and of entrainment/impingement of early life stages decrease the lifetime reproductive potential of female fish. He demonstrated a method for combining the effects of these two sources of stress and calculating the tradeoffs required to maintain a given "safe" level of reproductive potential. Barnthouse et al. (1987, 1988a) extended Goodyear's method to include effects of toxic chemicals that reduce survival or fecundity. Boreman (l997b) reviewed several related methods for combining effects of fishing with effects of pollutants. Schaaf et al. (1993) assessed the effects of pollutant-related habitat destruction on several Atlantic coastal fish stocks with different life history characteristics.

Any stressor that affects the survival, growth, or reproduction of the members of a population reduces the capacity of that population to cope with normal environmental variability or to new stresses. Within the conceptual framework of population dynamics, these types of stresses reduce the compensatory reserve of populations. Stresses that have small effects compared to the pre-existing compensatory reserve may reduce the ability of the population to cope with future stresses, but they will not cause irreversible population decline. If, however, the total burden of stresses exceeds the compensatory reserve, decline will occur. The potential lifetime egg production of an individual one-year-old fish, as described in Section 4.1, provides a convenient means of illustrating the effects of combined stressors on the sustainability of a population. Stresses such as fishing, power plants, and environmental contaminants reduce the potential lifetime egg production of a fish by reducing its probability of survival, reducing the number of viable eggs produced at any given age, or reducing the probability that a spawned egg will survive to adulthood.

As noted by Goodyear (1993), the Spawning Stock Biomass per Recruit (SSBPR) index used in fisheries management can be expressed in terms of either biomass or egg production. Expressed as egg production, SSBPR is the same as the expected lifetime egg production of a one-year-old fish, as described in Section 4.1. Analyses of data for a variety of harvested fish populations (Clark 1991, Mace and Sissenwine 1993) indicate that SSBPR can be used to define conservative, “default” biological reference points for regulating fishing mortality. The maximum sustained yield in many fish populations occurs at rates of fishing mortality that reduce SSBPR to about 35 percent to 40 percent of the level characteristic of an unfished population. In other words, if the fish population described in Table 4-1 were a harvested species, maximum sustained yield would be expected to occur at a rate of fishing mortality that would reduce the lifetime egg production of a one-year-old fish to about 35 percent of the unfished value, or from 4,300 to 1,505. Many fish populations can sustain levels of fishing mortality that reduce SSBPR to as low as 20 percent of the level characteristic of an unfished population (Mace and Sissenwine 1993). This level is referred to as a “recruitment overfishing reference point.” As long as SSBPR remains above this level, compensatory increases rates of survival and reproduction are expected to permit the average female fish to replace herself. If SSBPR falls below that level, there is a risk that the compensatory reserve of the population will be exceeded, the average female will not be able to replace herself, and the population will become depleted. If the population described in Table 4-1 were a “typical” fish, lifetime egg production per one-year-old fish could be reduced to 860 without completely depleting the compensatory reserve of the population. The number of young fish recruited into the population each year would not significantly decrease, and the population would persist. If. however, egg production fell below that level, recruitment might begin to decline, and the continued persistence of the population might be threatened.

Power plant effects are often expressed in terms of a “conditional mortality rate” (CMR) that combines effects of entrainment and impingement. As explained by Barnthouse et al. (1984), the CMR is a measure of the mortality caused by entrainment and impingement. independent of all other sources of mortality affecting a population. If only young-of-the-year fish are vulnerable to entrainment and impingement, then the CMR is a measure of the fractional reduction in abundance of 1-year-old fish due to entrainment and impingement. In other words. a CMR of 0.1 indicates that for every 1,000 one-year-old fish expected to be produced in the absence of power plant operations, 100 fish will be lost due to entrainment and impingement. Removing 10 percent of the young produced by a fish before they become one-year-olds is equivalent to removing 10 percent of the eggs produced by that fish that spawned them. If, in the absence of power plant operations, 1,000,000 eggs would have been required to produce 1,000 one-year-old fish, then reducing the number of survivors by 10% (from 1000 to 900) is equivalent to reducing egg production by 10%, from 1,000,000 to 900,000. This means that a CMR of 0.1 is also equivalent to a 10 percent reduction in SSBPR. A CMR of 0.1 would reduce SSBPR (expressed as lifetime egg production) for the population in Table 4-1 by 10 percent, from 4,300 to 3,870. It should be noted that none of these calculations include adjustments to account for density-dependent mortality. Density-dependent mortality occurring prior to the time during which entrainment and impingement occur would have no effect on the results. However, if mortality during or subsequent to the period during which entrainment and impingement occur is density-dependent, then the loss of some individuals due to station-related mortality will result in increased survival of those organisms that are not entrained or impinged. In this case the CMR, as usually calculated, would overestimate the actual impact of station losses on the abundance of one-year-old fish. The timing of station losses relative to periods in which compensatory mechanisms are operating is an important issue in applying spawner-recruit models in power-plant impact assessments. However, the timing of compensation has no effect on the application or interpretation of the SSBPR approach.

A 10 percent reduction in the SSBPR of an unharvested or unstressed population would, according to current understanding of fish population dynamics, have a negligible effect on the compensatory reserve of that population. If imposed on a population that is already under stress due to overfishing or environmental contaminants, however, the additional mortality caused by entrainment and impingement could be important. Figure 4.1 shows the relationship between SSBPR and fishing mortality (1) for a population that is harvested but is unaffected by other stresses, (2) a population that is harvested and exposed to toxic chemicals that reduce the fecundity of each fish by 20 percent, and (3) a population that is harvested, exposed to chemicals, and subjected to a 0.1 CMR due to entrainment and impingement. Fishing mortality is expressed, in standard fisheries terminology, as "F," the instantaneous rate of fishing mortality (Ricker, 1975). All fish that are one year old or older are assumed to be equally vulnerable to fishing.

As shown in Figure 4.1, SSBPR declines continuously with increasing F. For any given value of F, the added effects of contaminants and fishing reduce SSBPR below the level that would exist if harvesting were the only stress imposed on the population. When F is low, the remaining SSBPR is well above the recruitment overfishing reference point (SSBPR = 20 percent of the unfished value). Even if the population were being harvested at a rate intended to produce maximum sustained yield (SSBPR = 35 percent of the unfished value), the added effects of contaminants and power plants would still not cause the remaining SSBPR to fall below the reference point. However, if the population were over harvested (F = 0.8 or higher). fishing alone could nearly deplete the compensatory reserve of the population and the additional effects of other stresses could reduce SSBPR to the point where the spawning population could no longer replace itself and the population would decline.

The purpose of the above hypothetical example is to illustrate the concept that multiple stresses can combine to cause serious adverse effects on populations, even when the individual stresses evaluated in isolation may appear inconsequential. In particular, fish populations that are already in jeopardy because of overfishing are more vulnerable to additional effects of other stresses such as power plants, toxic chemicals, introduced species, and habitat degradation. The more of these stresses affecting a population, the more likely it is that any additional stresses (or increases in the intensity of existing stresses) will cause the population to decline.

Many, if not most, exploited fish populations are subject to multiple stresses. The major estuaries of the Atlantic, Gulf, and Pacific coasts all provide spawning and nursery habitat for important fish species, and almost all have been adversely affected by impaired water quality related to urban development. The Great Lakes have been similarly affected. The catastrophic decline in the native fisheries of the Great Lakes — including the extinction of some formerly abundant species — has been attributed to a combination of overfishing, toxic chemicals, and introductions of non-native species. (Holling 1973). Multiple stresses have probably contributed to historic declines in abundance of many estuarmne-dependent species, although the relative importance of the different stressors is usually unknown. The recent recovery of the Delaware River striped bass population, which was nearly extirpated in the 1960s, has been attributed to a combination of improvements in water quality and reductions in fishing mortality (Weisberg and Burton 1993, Weisberg et al. 1996).

Consideration of multiple stressors is important both for evaluating effects of entrainment and impingement on populations and for evaluating the susceptibility of individual fish to entrainment and impingement. In the population context, the compensatory reserve of a population is affected by all of the stressors that affect survival and reproduction. The stressors can affect different life stages. In the context of individual susceptibility, stresses that affect the health or mobility of an organism can increase its susceptibility to entrainment or impingement. The susceptibility of the organism to the intake structure itself can be increased, and the survival of entrained or impinged organisms can be decreased.

The above discussion does not imply that all populations subjected to multiple stresses are at a high risk if exposed to additional mortality due to entrainment and impingement. A large fraction of target species in 316(b) studies support intensive commercial or recreational fisheries, moreover, because many power plants are sited in industrialized regions, a large fraction are also exposed to stresses related to water quality and habitat modification. The continued growth of the Atlantic coastal striped bass population (ASMFC 1999) and the recent growth of the Atlantic coastal weakfish population (ASMFC 2000) are excellent examples. Both species use heavily industrialized estuaries for parts of their life cycles and both are exposed to entrainment and impingement at power plants. Yet both species recovered rapidly following reductions in fishing effort that were imposed because of previous overfishing.

[see hard copy for table]
TABLE 4.1. MORTALITY AND REPRODUCTION PARAMETERS FOR A HYPOTHETICAL FISH SPECIES

5. FACTORS THAT AFFECT SOCIETAL VALUATION

As part of an assessment of the potential for AEI, a determination must be made as to whether or not population-level effects resulting from entrainment and impingement losses are sufficiently large so as to be considered adverse. EPA has defined adverse effects as effects that are of concern because of the amount of risk that they pose to valued structural or functional characteristics of ecological systems (USEPA 1998). However, whether or not population effects are large enough to be of concern can only be determined through decision making that takes place in the context of human values. Consequently, determination of adversity ultimately involves societal judgments about the acceptability of population responses, or effects, on valued biological resources and community characteristics. Therefore, the nature and magnitude of population responses that are considered undesirable may depend in part on the relative value, or societal valuation, placed on individual species or habitats.

Societal valuations involve economic, legal, and quality of life issues that can best be thought of as management factors influencing the threshold of acceptability. Among the more important of such factors for evaluating AEI are a species' commercial value, recreational value, and ecological role (i.e., for the structure and functioning of the community). Species rarity and the uniqueness of the source waterbody habitat near the intake can also be important influencing factors.

5.1 COMMERCIAL VALUE

Species that are harvested for sale as food, bait, or use in other products are commonly viewed as having special importance in AEI assessment due to their obvious economic value. For this reason, EPA's draft § 316(b) guidance (USEPA 1977) recommends that commercially or recreationally important species be among those species selected for the assessment of AEI.

Specific consideration of commercial species is also justified because they are subjected to the combined stresses of fishing and CWIS mortality (Section 4.6). In this sense. CWIS mortality and fishing mortality compete for the available compensatory reserve of the population. Thus, populations of commercially harvested species can be more sensitive to entrainment and impingement effects (other biological factors being equal) because a portion of their compensatory reserve (see Section 4.4) is used in the commercial harvest. Where fisheries heavily exploit populations of commercially important species, compensatory reserves available to offset mortality from other uses may be limited. In such cases. resource allocation and balancing of beneficial uses are important resource management considerations that, as yet, have been largely unaddressed.

The economic value of commercially important species is generally based on landings and market value (i.e., dollars/lb). Species with high commercial value tend to be principally found in coastal marine and estuarine systems and very large freshwater bodies such as the Great Lakes. Commercially important species occupy a wide variety of feeding niches and trophic positions in the aquatic community. For example, Atlantic menhaden are primarily plantivores feeding on a mixture of phytoplankton and planktonic invertebrates, whereas flounder species are primarily top-level predators which feed on crustaceans, mollusks, and fish.

5.2 RECREATIONAL/CULTURAL VALUE

Species sought by anglers frequently are an important consideration in AEI assessments. This is due in part to the direct economic value of the sport fishing industry, but also to the broader quality of life value that society places on recreational enjoyment. Therefore, the value per fish that some segments of society ascribe to recreationally important species is relatively high. In addition, some recreationally important species, such as striped bass, American shad, and channel catfish are also harvested commercially. As a reflection of this societal emphasis, EPA's draft § 316(b) guidance (USEPA 1977) recommends that, of the species potentially involved with the intake structure, commercially or recreationally important species be among those species selected for the assessment of AEI.

As for commercially important species, specific consideration of recreational species is also justified because they are subjected to the combined stresses of fishing and CWIS mortality, and a portion of their compensatory reserve (see Section 4.4) is used in the recreational harvest. Where combined sport and commercial fisheries heavily exploit populations of recreationally important species, compensatory reserves available to offset mortality from other uses may be limited.

The economic value of recreationally important species is generally based on an assessment of replacement value, or the amount of money that anglers judge would be required to dissuade them from fishing (dollars/day). Species with high recreational value inhabit all types and sizes of waterbodies. The most important of the sport fish species tend to be top-level predators in the aquatic community. Examples include weakfish, walleye, largemouth bass, and striped bass. Because of their position at the top of the food chain, recreational species are generally considered good indicators of adverse effects potentially caused by CWIS operation on lower trophic levels. That is, if adverse effects were occurring on primary producers (e.g., phytoplankton, kelp, submerged vascular plants) or on plant eaters, detritus eaters, or lower level predators, those effects would also be observed in the top-level predators. for which the lower trophic levels provide food and shelter.

Some species (e.g., catfish, salmon) may also be the target of subsistence fishing by indigenous peoples or other special population segments that traditionally rely on fishing. and as a result be ascribed substantial cultural value. In these cases, resource valuation may become intertwined with human rights issues and result in either an increase or decrease in the level of protection afforded to the species.

5.3 IMPORTANCE OF ECOLOGICAL ROLE

Societal valuation generally increases directly with the level of biological organization potentially effected. Effects that are imposed on higher levels of biological organization are generally perceived as more undesirable than those imposed at lower organizational levels. For example, organism mortality is more undesirable than sublethal effects, population effects more undesirable than organism mortality, and effects on the community as a whole more undesirable than effects on an individual population.

As a result of this distinction among biotic scales, higher value may be placed on species that play a pivotal role in the structure or functioning of the community, and they may receive more protective treatment in AEI assessment. As a reflection of this societal emphasis, EPA’s draft 316(b) guidance recommends that, of species involved with the intake structure, species critical to the structure and function of the ecological system be among those species selected for detailed assessment of AEI (USEPA 1977).

Ecologists have described the community as a complex assembly of component guilds, or roles, whose interactions with one another determine each community’s organizational characteristics. Guilds are defined based on food-web relationships, and consist of groups of species exploiting a common resource base in a similar fashion (Krebs 1994). Species within each guild can sometimes be viewed as interchangeable members, or functional equivalents, in terms of their relationship and effect on the rest of the community. Thus where guilds consist of many species, ecological redundancy is high, and CWIS effects on any one species population would be expected to have little effect on the community as a whole. Conversely, where a guild is occupied by a single species and that role is critical to the community, effects on that species population may cause substantial changes in the community. Such important species are called “keystone species” because their activities control community composition (Lampert and Sommer 1997). Such species typically would receive greater protective treatment in AEI assessment because of the ecological importance of their role. The composition of species guilds and the importance of keystone species varies among biological communities and therefore influence on AEI determinations is quite site specific.

5.4 PRESENCE OF THREATENED OR ENDANGERED SPECIES

As a result of concerns that man’s activities are leading to the unwanted extinction of species, Congress passed the Endangered Species Act in 1973 (ESA). This Act defined two categories of species, those that are “endangered” and those that are “threatened.” Endangered species were defined as ". . .any species [including subspecies or qualifying distinct population segment] that is in danger of extinction throughout all or a significant portion of its range.” ESA §3(6). Threatened species were defined as “... any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” ESA §3(20). These two classes of species, threatened and endangered, are afforded special protection in an effort to prevent extinction and to allow for their recovery.

Since passage of the ESA, considerable effort has been expended to provide for the protection of any qualifying species and the public has become acutely aware of the need to protect species that are threatened or endangered. Thus, in considering the potential for AEI resulting from entrainment and impingement, threatened and endangered species typically receive special consideration. It is for this reason that these species were identified as a specific category for selection of species for the assessment under EPA’s draft 316(b) guidance (USEPA 1977). For this single category, the potential for AEI is typically defined at the individual level as opposed to the population level. Because of the potential risk of extinction, the loss of even a single individual is considered unacceptable unless such a loss is specifically permitted and will not jeopardize the continued recovery of the species.

5.5 LOCATION OF SPECIAL STATUS HABITAT

This factor refers to the distance from the intake to any habitats or areas of the source waterbody that are specifically designated by an agency as having a special status or importance in supporting aquatic life. Many state natural resource agencies assign waterbodies or segments of waterbodies to a special status based on the quality of the habitat or the natural resources they contain. Examples of such special status waters include Significant Habitat Units, Trophy Fishing Waters, Blue Ribbon Trout Streams, and Marine Sanctuaries. Typically, these special status waters are afforded additional protection under state law.

As a result of this special status designation and the additional efforts expended for their protection, these areas commonly receive special consideration in the assessment of AEI resulting from entrainment and impingement. While the population-level consequences of entrainment and impingement will remain the same, a special status designation means that regulatory agencies, and typically the public at large, place a greater value on the resources in these areas. Hence, an equivalent level of loss from entrainment or impingement in these special status areas would have a greater likelihood of being considered adverse than if it had occurred elsewhere.

[see hard copy for appendices/figures]

Footnotes

5

EPA Response

This comment is a continuation of Comment 316bEFR.041.304. Please see EPA's response to that comment.

Regarding compensation and compensatory reserve in the context of EPA's benefits analysis for the 316b Phase 2 rule, please see response to Comment 316bEFR.025.015. Regarding fish population modeling, please see response to Comment 316bEFR.005.009.

EPA disagrees that widely dispersed populations are necessarily less susceptible to population-level impacts of I&E. Frequently, regional stocks are vulnerable to multiple CWIS, which can lead to significant cumulative effects. In fact, the Atlantic States Marine Fisheries Commission (ASMFC) has concern about this issue and is currently evaluating the potential cumulative impacts of multiple CWIS on the Atlantic Coast stock of Atlantic menhaden (Lisa Kline, Director of Research and Statistics, ASMFC, personal communication).

EPA agrees with the commenter that "Any stressor that affects the survival, growth, or reproduction of the members of a population reduces the capacity of that population to cope with normal environmental variability and new stresses." This is one of EPA's main concerns about the impingement and entrainment of large numbers of aquatic organisms. As to what the effects of I&E may be at the population-level, EPA agrees that it will depend on many factors, including any potential compensatory response, current population size, and the interacting effects of other stressors. Thus, a conditional mortality rate of 0.1 may be unimportant for one population or highly significant for another, depending on a host of factors. Therefore, generalizations about the importance of any given magnitude of effect are not possible, but will depend on the particular circumstances.

For EPA’s response to comments on societal judgment regarding acceptability of individual species mortality versus population effects, please see response to comment 316bEFR.306.302. See also the June 2, 2003 memorandum to L. Tudor “Description of Natural Resource Damage Assessment Studies that Present Willingness to Pay Estimates for Preventing Species Mortality” (DCN #6-2502).

Information on the methods EPA used to estimate commercial value, recreational, and ecological value of species affected by I&E is provided in the Regional Analysis Document prepared for the final Phase II rule (DCN #6-0003). See Chapter A10: Commercial Fishing Benefits; See Chapter A11: Estimating Benefits with a Random Utility Model (RUM); See Chapter A9: Economic Benefits Categories and Valuation Methods; Chapter A12: Non-use Meta-Analysis Methodology; See Chapter A 13: Threatened and Endangered Species Analysis Methods.

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Author Name Hunton & Williams

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Cooling system costs (e.g., dry, wet, recirculating)

ENGINEERING COST ESTIMATE FOR RETROFITTING CLOSED-CYCLE COOLING SYSTEMS AT EXISTING FACILITIES

Shaw, Stone & Webster, Inc.

8/5/02

1 EXECUTIVE SUMMARY

This report presents a summary of project costs associated with retrofitting closed-cycle cooling towers to existing power generation facilities. This information is intended to assist UWAG/EPRI and utility companies assess the economic impact of retrofitting cooling towers to U.S. generating units with existing once-through cooling systems.

The cost estimates utilize a number of cooling tower retrofit case studies developed for existing generating units. The cost figures compiled in this report attempts to represent conservative costs for cooling retrofit projects, not bounding site-specific costs. In particular, the units addressed in the case studies have sufficient land available in close proximity to the condenser/circulating water system, no plume abatement is required, and the existing circulating piping can be used in the closed cycle system without reinforcement. Site-specific factors that can have a significant effect, such as local plume abatement requirements and physical cooling tower location constraints, are discussed in Section 3.

Over 1,000 plants were included in this study and the total cooling tower retrofit costs for this population is approximately $25 to $28 billion in 2002 dollars. Sections 3 and 8 identify a number of site-specific issues that can result in significantly increased implementation costs. Attachment 3 is a survey of utilities where potential site-specific issues have been identified, which further supports the treatment of the costs reported in this study (Attachment 2) as low-end estimates assuming minimum site-specific conditions that are known to escalate cost.

Table 8-1 provides at range of O&M costs (including energy penalty costs) in the range of $5 to $12 million 2002 dollars per year. These estimates are from utility experience at several nuclear plants, however, the actual costs for individual plants may vary based upon size, water source, electricity prices, and design.

2 INTRODUCTION

This report presents a summary of project costs associated with retrofitting closed-cycle cooling towers to existing power generation facilities. This information is intended to assist UWAG/EPRI and the utility owner/operators assess the economic impact of retrofitting cooling towers to U.S. generating units with existing once-through cooling systems. It should be noted that the EPA's Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II

Existing Facilities, do not propose options that require retrofitting of cooling towers, but such alternative options are addressed in EPA's Phase II Economics and Benefits Analysis Document EPA-812-R-02-001.

The cost information summarized in this report and detailed in Attachment 2 will assist UWAG/EPRI and the utility owner/operators in developing a response to the proposed rule regarding the overall project cost associated with the retrofit of closed cycle cooling. The cost estimates utilize a number of cooling tower retrofit case studies developed for existing generating units. The cost figures compiled in this report represent conservative costs for cooling retrofit projects, not bounding site-specific costs. In particular, the units addressed in the case studies have sufficient land available in close proximity to the condenser/circulating water system, no plume abatement is required, and the existing circulating piping can be used in the closed cycle system without reinforcement. Site-specific factors that can have a significant effect, such as local plume abatement requirements and physical cooling tower location constraints, are discussed in Section 3. Based on one detailed site-specific cost study performed in the early 90's (and reconfirmed in the late 90's), site-specific factors, as discussed above, can easily result in site-specific costs double the baseline costs presented. Most site-specific conditions would tend to increase retrofit costs, over those developed in the case studies.

The UDI database was used to identify all existing U.S. generating units with once through cooling systems, which could potentially require a cooling tower retrofit. However, the information from the UDI database was updated based on current information on generating units. For example, some nuclear units included in the UDI database, have been decommissioned and are therefore excluded from Attachment 2. Six cooling tower retrofit case studies covering a range of unit sizes (detailed in Attachment 1), provide the cost basis for the Attachment 2 cooling tower retrofit cost estimates for potentially impacted US plants. Current capital costs developed in these studies are scaled based on condenser flowrate to estimate the retrofit cost for each once through unit in the database. The case study closest in condenser flowrate is selected for each database unit. An additional factor to adjust for regional labor rates is applied to the estimated labor costs. In one case, where a more detailed retrofit study was performed by Stone & Webster (Salem Units 1 & 2) it was demonstrated that these factors could more than double the cost estimate (See Attachment 2). Refer to Attachment I for additional information on costing methodology.

Section 7 includes representative schedules describing the major interfaces; engineering and construction activities, and plant outage requirements to implement a typical cooling tower retrofit projects.

3 SITE SPECIFIC ISSUES FOR RETROFITING CLOSED CYCLE COOLING

The retrofit installation of either natural or mechanical cooling towers entails an extraordinary engineering and construction effort requiring construction of new facilities and extensive demolition of existing Circulating Water (CW) System components and piping. A cooling tower retrofit will be costly and require a lengthy permitting, engineering, procurement and construction time period. Although in some cases Natural Draft Cooling Towers would be the design of choice, the cost of retrofitting Mechanical Draft Cooling Towers is used throughout this study. Although Natural Draft Cooling Towers would typically result in higher capital costs, longer construction periods, and more significant performance impacts than Mechanical Draft Cooling Towers; their reliability and long term maintenance and operation cost saving make them a more attractive choice for large "baseload" operated plants in northern locations. The following sections provide a brief summary of some of the major considerations and impacts associated with retrofitting closed cycle cooling at operating facilities.

Attachment 3 provides the results of a Utility Survey of the approach used in this report that identifies a number of potential site-specific issues that could result in higher costs than that presented in Attachment 2 due to one or more of the below implementation issues.

3.1 Cooling Tower Design

The difference between the temperature of the cooled water discharged from a cooling tower and the ambient air wet bulb temperature is called the cooling tower “approach” temperature. The approach temperature that is actually attainable at a particular installation depends on the type and size of the cooling tower, the quantity of water flow to be cooled and the change in water temperature to be achieved through cooling, and the local wet bulb temperature. The wet bulb temperature is the lowest temperature at which evaporation can occur for the specific conditions of the atmosphere. All of the approach factors, except those related to climate (i.e., local wet bulb temperature), are essentially fixed.

Since climatic factors are outside an operator’s control, an approach temperature can only be used by engineers as a design criterion, and cannot be applied as an operating requirement.

Natural draft towers induce an ambient air flow by virtue of a chimney effect i.e., the draft produced by the combined height of the shell and the difference in mixture density between the warm, wet exhaust from the tower’s fill section and the outside ambient air. Those effects are limited and, in turn, limit the air flow attainable by natural draft towers compared to mechanical draft towers. The current state of the art design for a natural draft tower is an approach temperature of 14°F.

Mechanical draft towers can attain a slightly lower approach temperature than a natural draft tower because of its greater ability to develop higher cooling air flows through use of huge mechanical fans. Even so, the actual attainable design approach temperature of a mechanical draft tower is limited to approximately 7°F. The approach temperature desired has a significant affect on cooling tower cost as indicated in the following figure. Figure 1 illustrates the theoretical impact of design approach on costs for both natural and mechanical draft towers. In this figure, the base (100%) cooling tower costs are based on a 7 F approach temperature for mechanical draft cooling towers and approximately 14 F approach temperature for the natural draft towers at design operating conditions.

FIGURE 1 APPROACH EFFECTS ON COOLING TOWER COSTS
[see hard copy for figure]

Whether natural or mechanical draft, the cooling effect of wet cooling towers is mainly due to evaporation, so the coolest temperature that the circulating water theoretically can reach is the wet bulb temperature. In real practice, however, the resulting cooled water temperature of a large tower can only “approach” the local wet bulb temperature (i.e. the wet bulb temperature can not be reached). The approach temperature that can be achieved is influenced by several major engineering and construction considerations including:

-quantity and quality of the water to be cooled,
-physical size of the structure,
-amount of fresh air that can be practically induced to flow through the tower,
-degree to which the water can be initially dispersed,
-degree and extent of the warm water’s contact with the cooling ai,r
-residence time of air/water contact,
-relative direction of the air and water, and
-amount of moisture the air can hold at 100% relative humidity.

3.2 System and Equipment Design

Retrofitting an existing facility for closed-cycle cooling does not simply mean the addition of cooling towers; rather, several other conditions must be considered. In contrast to a once-through (or open-cycle) cooling system design, the cooling tower designer usually reduces the circulated water quantity in order for the cooling towers to be efficient, economic, and cost-effective. Currently operating open cycle cooling units were designed for relatively high circulating water flow rates and low system pressures; the closed-cycle system, however, would be need to be designed for approximately two to four times higher pressure, regardless of whether the flow is reduced or not.

Additional site-specific factors are listed below to illustrate why retrofitting cooling towers to an existing facility is both technically difficult and costly.

-Condensers are comprised of thousands of small diameter tubes (equivalent to hundreds of miles per plant). A typical condenser shell for a large plant is approximately 20 ft high, 30 ft wide, and 65 ft long and there can be as many as 6 shells per unit. Each condenser shell can weigh as much as 160 tons and may require wholesale change-out with a new design to accommodate two-passes and a considerably higher tube side pressure. This may require extensive renovations even to gain access to the condenser shell, including temporary bracing and demolition of piping and components associated with the existing condensers.

-Existing circulating water systems are permanently installed without consideration for major piping design changes or replacement. Most of the piping and components are concrete and are supported on (if not embedded in) reinforced concrete foundations. Removal of existing plant equipment would likely be required to gain access for demolition of existing piping and major thrust blocks (concrete pipe supports), so as to facilitate installation of new circulating water system piping to/from the cooling towers. At one facility these thrust blocks are approximately 14 feet high, 10 feet wide, and 140 feet long. Preliminary engineering evaluations for two conventional natural draft towers at one facility suggest the retrofit would require excavating more than 250,000 cubic yards of soil and installing more than four miles of 7-foot diameter pipe as just one phase of a project of this magnitude.

-Cooling tower construction is regulated, monitored and controlled by many permitting agencies. Regulatory constraints (e.g., air quality permit approvals) could delay the start/completion of any project, even assuming that permits can be obtained, which is by no means certain. At nuclear power plants, the retrofit would also be monitored by the Nuclear Regulatory Commission. Documentation, review requirements and procedures are very extensive and stringent.

-Continuous chlorination of the circulating water would be required, most likely requiring a new chlorination system and a new dechlorination system on the tower blowdown.

-Another major consequence of the retrofit is that the circulating water could be at a significantly higher hydraulic pressure. The higher operating pressure is needed to overcome the friction loss of approximately 4,000-ft of additional piping (going back and forth to the cooling tower), and the static energy to overcome the height to the hot water distribution headers of the tower, and in some cases the added condenser tubing pressure loss where it is necessary to convert the condenser from a single pass to a two pass configuration to improve efficiency or because of plant configuration constraints.

3.3 Circulating Water System

In an electric generating station the main cooling water system is one of the first systems to be designed and installed. Careful consideration is given to the availability of a reliable source of cooling water to be used to condense the exhaust steam from the steam turbine(s) and remove heat from other equipment. The designs of many of the station's major capital cost components are inter-related to the cooling water supply system's capability. Therefore, any subsequent change to the cooling water system can have a significant impact on the plant's ability to perform at expected design conditions. Even minor changes to the cooling water supply (for example a temperature increase a few degrees above design or a reduction in flow) can result in a large decrease in the plant's ability to achieve its rated capacity. Because cooling water systems are one of the first systems to be installed during plant construction, many other plant systems, structures and components are built around and over the system making retrofitting to closed-cycle cooling complicated and expensive.

3.4 Condenser Modifications

A single pass condenser has cooling water entering one end of the condenser and passing through all tubes of the condenser in a single direction. The heated water exits at the opposite end of the condenser. A two pass condenser has cooling water entering the condenser and passing through one half of the condenser tubes in one direction and then reversing direction in the "reverse" water box and passing back through the other half of the condenser tubes in the opposite direction. The heated water exits the condenser through discharge nozzles located at the same end as the inlet nozzles.

Under certain retrofits scenarios it may be necessary to convert the existing single pass condenser to a two-pass configuration for efficiency reasons or condenser thermal design limitations. If conversion to two-pass configuration is necessary, extensive cooling water piping modifications may be required.

The two-pass arrangement would require CW system isolation valves to be moved to the inlet side of the water boxes to enable tube bundle isolation for periodic maintenance. Since the inlet and outlet nozzles are on the same end of the condenser, extensive circulating water pipe modifications within the turbine building would be required as part of the conversion.

3.5 Construction Issues

A closed-cycle cooling system retrofit could require extensive excavation and subsurface construction. Due to the depths of the subsurface construction activity (about 16 feet), groundwater would continuously infiltrate the excavations and groundwater would have to be continuously pumped out of the excavated areas during construction.

Site geological conditions have a major impact on construction costs. Rock excavation and the requirement for pile foundations are two examples.

Large amounts of excavation and construction will be required in a highly congested area with a need to assure safety if in the vicinity of high voltage transmission lines. Many underground facilities (piping, electrical ducts, etc.) may need to be avoided or rerouted. The majority of construction work is outdoors, and, therefore, the schedules and estimates are at risk for weather impacts that are difficult to accurately account for.

3.6 Additional Considerations

If mechanical draft towers were installed, a separate electrical/power system, powered from the existing switchyard, may be required because of the electrical power requirements and remote location of the pumps and fans relative to the existing distribution system.

The use of saltwater or brackish water in a cooling water system requires special corrosion-resistant materials. Continuous chemical treatment of the recirculating brackish cooling water would be required during Station operation to inhibit the corrosion that would otherwise occur. The allowable concentration factor in a salt water cooling tower is 1.5, as compared with 8 for a freshwater tower. Salt water towers, therefore, require significantly higher capacity makeup and blowdown systems.

4 UNCERTAINTIES AND RISKS

The scale of the required cooling system is a major factor in the projected difficulty. This scale is reflected in the quantity and size of piping, the depth and size (length and width) of the pipe trenches, number and length of supporting piles, the size and number of cooling towers, and the amount of reinforced concrete required. Another important factor that significantly exacerbates the complexity is the inherent permanence and site-specific design of the original cooling system.

Labor and equipment shortages pose a significant source of uncertainty. This source of uncertainty has not been included in the schedules. This may also impact the cost estimates, due to the necessity to pay premium rates for labor and equipment during delays not accounted for in the cost estimates.

Due to the large quantity of material and equipment needed to install cooling towers, there exists a source of uncertainty with respect to being able to obtain all materials and equipment in a timely manner in order to meet schedule requirements. Procurement problems may also cause impacts on the cost estimates due to the necessity to pay higher rates for expedited deliveries or make substitutions in favor of more expensive items to meet schedule requirements (taking into due consideration the goal to keep total project costs to a minimum).

5 LICENSING / PERMITTING

Major environmental factors that would influence the permitting cycle and approvals required to convert to closed-cycle cooling are:

-The height and visual obtrusion of the towers

-The impacts of the make-up and blowdown systems on marine biota and populations
-Tower plume effects due to size, frequency, or trajectory
-Salt drift from the towers on the nearby surroundings in case of salt or brackish water lowers.
-Noise impacts on neighbors
-Impact of particulate emissions on the air quality

Licensing the station with cooling towers requires a number of local, state and federal approvals. A period of two years or more could be required to obtain the necessary permits.

Licensing and permitting requirements pose a major source of uncertainty. It is assumed that the designs used as a basis for the cost estimates and schedules will be approved by the regulatory authorities. If not, there will be an unanticipated cost impact. In addition, depending upon the particular permit and schedule, there is the potential for very significant schedule impacts due to delays in obtaining permits.

6 STATION CAPACITY DERATING AND ENERGY LOSS

Retrofitting a closed-cycle cooling system will reduce energy output. This is the result of increased back pressure on the turbine exhaust due to the increasing of the cooling water temperature and increased electrical loads associated with the operation of the closed-cycle cooling system. This is the case because the low pressure turbine-blade path is not optimized for the exhaust conditions that will be associated with a cooling tower.

A site-specific case study shows that capacity penalties will fluctuate during the year between I and 3 %, for both natural and mechanical draft tower configurations, as indicated in Tables 1 and 2. The added (auxiliary) power required to operate the circulating water pumps and (in the case of installed mechanical draft towers) fans will also result in a decrease in plant generation output capability. Further details regarding capacity losses and auxiliary power penalties for the case study plant are provided in Table 3.

[see hard copy for tables 1-3]

7 PROJECT SCHEDULES

Based upon experience from a number of construction jobs, and with consideration of potential site-specific factors, the following discussion provides an overview of a representative project schedule and related logic for a cooling tower retrofit project at a large steam electric generating station.

REPRESENTATIVE COOLING TOWER RETROFIT PROJECT KEY SCHEDULE DATES
[see hard copy for table]

Schedule Considerations

The schedule duration for the on-line engineering, procurement, and construction activities, including new circulating water pipe installation from the cooling tower to the tie in location (with the existing pipe), and any pumphouse structural work were estimated based on a past plant-specific case study.

The cooling tower pumps have a long lead time (approximately one year) for vendor engineering and fabrication. The start of outage is driven by long duration construction and procurement activities.

The tie-in outage is scheduled sufficiently long after the final construction, environmental, and/or NRC permits have been obtained to complete all engineering and on-line construction activities including tower erection and major pipe runs. Tie-in outage activities may include: CW system tie-in, CWS pipe reinforcement, and condenser modifications. The tie-in outage duration is estimated to be approximately two to nine months, including one to two months for testing and start-up once the actual construction activities are completed.

To ensure that all of the necessary work needed to be completed during the CW system/condenser modification tie-in outage, it may be prudent to perform selected construction and modification activities during an earlier scheduled maintenance outage.

Schedule risk is high on such a project due to the magnitude and nature of the activities. Examples of uncertainty that could affect schedule include:

-Installation of up to 4 miles of new large diameter CWS piping
-Reinforcement and reconfiguration of CWS piping in the turbine building, if necessary.
-De-watering
-Weather delays
-The potential for other building and component interference's could cause construction delays and affect the overall schedule. Although site walkdowns and drawing reviews during the engineering phase might eliminate some of the potential problems, experience indicates that unforeseen interferences and below grade utilities that may need to be relocated are a very real threat to the schedule.

8 COST ISSUES

8.1 General

Attachment 2 provides a summary table of projected "baseline" costs for retrofitting closed cycle cooling towers to generating plants in the US. The approach used ensures that the labor, material, and equipment costs associated with a closed cycle retrofit are representative of that to be expected if such a retrofit were required. This section, in conjunction with Attachment 1, provides the basis for the cost estimates used in this study.

The retrofit of mechanical draft cooling towers to a generating unit with an existing once through cooling water system presents several major considerations; the following assumptions were used to develop the costs presented in Attachment 2:

-In so far as possible, the conceptual arrangements assumed as a basis for this study utilize existing piping and components under and within the confines of the turbine buildings.

-A gravity flow design from an elevated cooling tower basin, through the condenser to a new pump station located downstream of the condenser is assumed in order not to exceed the design pressure of condenser water boxes and existing circulating water conduits located under and within the turbine building.

-The CW system conceptual design uses a single set of pumps located in a new pump structure. The single set of pumps will deliver CW from the condenser discharge up to the tower fill distribution system.

-Cooling tower efficiency normally dictates higher condenser CW return temperatures than available from a single CW pass of the condenser (typical of open cycle cooling systems). Conversion of an existing single pass condenser to a two pass arrangement would be required in most cases to achieve this higher CW return temperature. Such a conversion would normally require extensive modifications if not replacement of the existing condenser. However for this study it has been assumed that the existing water piping systems including single pass condenser tube bundles will not be replaced.

-Existing circulating water piping not used in the closed loop system is assumed to be abandoned

-New circulating water piping is assumed to be fiberglass, buried in sheet pile trenches with concrete slabs for support and ballast.

-All major structures including the cooling tower basins are supported on pile foundations.

-Space for the cooling towers is available on station property within 2000 ft. of the station. Costs do not include purchase of land for the cooling towers and associated equipment.

-All costs are in 2002 dollars

8.2 Capital Costs

Although in some cases Natural Draft Cooling Towers would be the design of choice (because of reduced O&M costs) the cost of retrofitting Mechanical Draft Cooling Towers has been used throughout.

Estimated costs for cooling towers are based on vendor quotes for non-plume abated mechanical draft cooling towers constructed of fiberglass. Plume abatement technology could potentially double the cost of the cooling towers.

New circulating water piping will be required to/from the cooling tower pump house. Tower auxiliary systems, such as cooling tower blow-down and make-up and chemical treatment, were incorporated into the study.

8.3 Implementation Costs

Retrofitting a once-through cooling water system for closed-cycle cooling requires the construction of cooling towers, supporting systems and structures such as pump houses, and sufficient circulating water piping to form a closed loop system. Below is a list of implementation items that could affect the cost estimate.

The retrofit requires extensive excavation and subsurface construction. In low lying areas, groundwater intrusion would have to be pumped out.

Implementation is performed in two phases -- a new construction phase and a demolition and reconstruction phase.

The retrofit project requires the installation of thousands of feet of large diameter circulating water piping to connect the cooling towers to the existing cooling water system.

Electric substation, and substantial electrical cabling would also need to be installed to provide support for the closed-cycle cooling system operation. Portions of existing circulating water piping may need to be reinforced by welding corrosion-resistant steel plates inside the pipe.

Condenser modifications may be required.

Replacement power costs would also be incurred during the extended outage associated with demolition, reconstruction and tie-in.

Attachment 3 provides data from a recent Utility Survey performed as part of this study that identifies a number of potential site-specific issues that could result in higher costs due to one or more of the above implementation issues.

8.4 Operating and Maintenance

This section identifies and discusses the major categories of recurring annual operating and maintenance costs associated with both natural and mechanical draft tower designs. Estimates are based on input from several different operating plants. Table 8-1 summarizes typical cooling tower O&M costs.

Table 8-1. Cooling Tower Operating and Maintenance Costs
[see hard copy for table]

The operating costs estimated in Table 8-1 are associated with:

-Frequent detailed inspections of the internals, externals and air moving equipment (applicable to mechanical draft tower design only); and

-Continuous chemical treatment of recirculating brackish water

-The operation, sampling, testing and cost of chemicals that provide continuous chemical control of the water circulated through the station towers each day.

-Maintenance costs are appreciable because of the large quantity of materials and equipment associated with what would be an immense installation of cooling equipment. These costs are expended in upkeep, repairs and modifications to the structure, fill section, lighting, chemical control systems, hot water spray distribution system, fans, motors, switchgear, drift eliminators and basin. Make-up and blowdown system components which serve the tower complex also require periodic upkeep and repair.

9 CONCLUSION

Conservative capital costs to retrofit plant once-through cooling systems to closed cycle cooling tower is provided in Attachment 2. Over 1,000 plants were included in this study and the total cooling tower retrofit costs for this population is approximately $25 to $28 billion 2002 dollars. The 3 billion dollar range accounts for the fact that plants listed in the UDI database as having a “combined” or “mixed” type of cooling system may already have cooling tower technology that can either fully or partially accommodate closed cycle operation. As noted in Section 3 and 8 above, a number of site specific issues can result in significantly increased implementation costs, and therefore the costs estimated in Attachment 2 are considered conservative estimates. Attachment 3 is a survey of utilities where potential site-specific issues have been identified, which further supports the treatment of Attachment 2 costs as low-end estimates assuming minimum site-specific conditions that are known to escalate cost.

Table 8-1 provides at range of O&M costs (including energy penalty costs) in the range of $5 to $12 million 2002 dollars per year. These estimates are from utility experience at several nuclear plants, and the actual costs for individual plants may vary based upon size, water source, electricity prices, and design.

EPA Response

See response to comment 316b.EFR.208.002.

Attachment 1

Cooling Tower Retrofit Comparison Plant Cost Basis

Cost data from six comparison projects formed the empirical cost basis for the retrofit capital cost estimates provided in Attachment 2. The methodology for estimating capital costs and the cost breakdowns for each of the comparison plants are provided in this attachment. Comparison Plants Xl, X2 and X3 are different capacity fossil units located on estuaries. Comparison plants X4 and X5 are ocean site nuclear facilities, and finally X6 is a helper tower design proposed for a river site.

Methodology for Estimating Capital Costs

Estimated capital costs for retrofitting cooling towers for U.S. plants are provided in Attachment 2. Starting with the UDI database, in-scope plants for the purposes of this study were selected if they met the following criterion:

-Not already a closed cycle plant, and
-Capacity Factor >15%, and
-CW Intake Flowrate greater than 50 MGD.

Overall capital cost estimates for each in-scope plant was made by selecting the best comparison plant (case study plant with closest matching condenser flowrate) and adjusting the estimated retrofit for the comparison plant by applying a "cost scale factor" equal to the ratio of the condenser flowrates.

Labor cost adjustment factors for regions of the United States, based on RS Mean Labor Rates for the Construction Industry: 2001, are used to make regional adjustments to the estimated labor costs as follows:

Region	Labor Cost Adjustment Factor
Northeast (NE)	1.0
Southeast (SE)	0.6
North Central (NC)	0.9
South Central (SC)	0.65
Northwest (NW)	0.8
Southwest (SW)	0.9
California	1.1

Although in some cases, natural draft cooling towers would be the design of choice, the cost of retrofitting mechanical draft cooling towers has been used throughout. Stone & Webster has recently investigated the retrofitting of mechanical draft and natural draft cooling towers at several nuclear and fossil generating facilities located in the Northeast (NE) Region and South Central (SC) Region of the United States. Only the mechanical draft retrofit case studies have been used in this report. In each of these cases, preliminary designs were developed in sufficient detail to allow major equipment sizing and quantity estimates, which were used to develop order of magnitude cost estimates for retrofits. These costs have a 20% adder for contingency and indeterminates. For all case study facilities, the retrofit designs utilized all existing circulating water conduits in and under the turbine building and no major modifications to the condenser were included. This was achieved by elevating the cooling towers such that the systems utilized gravity flow from the cooling tower basin through the condenser. It was also assumed that no modifications of the turbine would be required. The following sections discuss the design features of the comparison plant retrofit designs utilized as a cost basis for this study.

Design Features for Cooling Tower Retrofit at Comparison Plants Xl. X2, and X3

These units are part of a large fossil generating facility located in the northeast region of the US. The existing units have once through circulating water systems with single pass condensers. Cooling water is salt water. The proposed cooling towers will be salt water towers. The existing circulating water conduits are reinforced concrete. A major design objective for the retrofit design was to utilize the existing single pass condenser and the portions of the existing circulating water conduits located under and within the confines of the turbine building. The low design pressures for the existing circulating water piping and condenser water boxes dictated that a gravity flow system from the cooling tower basins be used in order to not exceed the existing system design pressures. An existing elevated fill area is available on the site property approximately 1000 ft. from the station on which to locate the cooling towers.

New cooling tower pump stations utilizing dry pit pumps are constructed adjacent to the turbine buildings to pump the heated discharge from the condensers up to the cooling tower fill.

New circulating water piping is assumed to be fiberglass, buried in sheet pile trenches with concrete slabs for support and ballast.

All major structures including the cooling tower basins are supported on pile foundations.

The cooling towers are non-plume abated rectangular wet mechanical draft cooling towers arranged in two back-to-back rows in a common basin.

Specific unit parameters are as follows:

Station/Unit	Condenser Flow (cfs)	Distance to Cooling Tower
X1	390	1000ft
X2	624	1000 ft
X3	580	1000 ft

Design Features for Cooling Tower Retrofit at Comparison Plants X4 and X5

These units are nuclear generating units, which are part of a three unit nuclear generating facility located in the northeast region of the US. The existing units have once through circulating water systems with single pass condensers. Cooling water is salt water. The proposed retrofitted cooling towers would be salt water towers. A major design objective for the retrofit design was to utilize the existing single pass condensers and the portions of the existing circulating water conduits located under and within the confines of the turbine building. Differences in design pressures for existing circulating water conduit and condenser water boxes and other features required a significantly different design concept for the retrofitted cooling tower systems. The station site has an adequate area for the cooling towers about 2000 ft. from the station.

In plant X5 the condenser water passages and the existing circulating water conduits have sufficient design pressure margin to allow for the significantly higher pressures in the retrofit closed loop system. Existing valving and cross connects at the condenser allowed for conversion to two pass with no equipment changes. These features allow for a standard cooling tower loop with a single new pump station located at the cooling tower basin. The condenser would be converted to two pass operation in the retrofitted closed loop system.

In plant X4 the design pressures for the condenser water boxes and existing circulating water conduit are not adequate for the higher pressures for a standard closed loop arrangement. Plant X4 would require two new pump stations; one at the cooling tower and one at the discharge to pump heated water back to the cooling tower in push-pull arrangement. The condenser would continue to operate single pass in the retrofit cooling tower system.

The site is under laid with rock so extensive amounts of rock excavation are assumed.

The cooling towers are non-plume abated rectangular wet mechanical draft cooling towers arranged in two back-to-back rows in a common basin.

Specific unit parameters are as follows:

Station/Unit	Condenser Flow (cfs)	Distance to Cooling Tower
X4	1274	2000 ft.
X5	2000	2000 ft.

Design Features for Cooling Tower Retrofit at Comparison Plantss X6

Comparison Unit X6 is a three-cell helper tower system, which cools a portion of the heated discharge from the condenser and reintroduces the cooled water back into the discharge stream. The station is a nuclear generating facility located in the mid-western United States. The site has adequate area for the cooling tower adjacent to the station. All equipment and piping for the proposed retrofit, except for the connections in and out of the existing discharge tunnel are external to existing facilities.

The retrofit helper tower system consists of the three cell non-plume abated mechanical draft cooling tower, a new pumping facility, interconnecting piping and new electrical and control equipment for cooling tower fan and pump motors. The design system flow is 80 cfs and the cooling tower is located approximately 300 ft. from the station.

[see hard copy for cost tables]

EPA Response

See response to comment 316b.EFR.208.002.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Attachment 2

Cooling Tower Retrofit Cost Estimates

Attachment 3

Utility Survey: Potential Site Specific Limitations

Attachment 4

Example Case Study Project Schedules

[see hard copy for tables]

EPA Response

See response to comment 316b.EFR.208.002.

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Review of EPA's Methods for Extrapolating Baseline Loss Estimates at Case Study Facilities to National Baseline Loss Estimates

Prepared for Utility Water Act Group

Prepared by D.G. Heimbuch, Ph.D., PBS&J, Beltsville, MD

5 August 2002

I. Introduction

This report presents a review of EPA's methodology for extrapolating estimates of baseline economic losses at case study facilities to estimates of national baseline economic losses due to impingement and entrainment ("I&E"). The objective of the review is to assess the validity of EPA's extrapolation methodology, and to determine the effect of any identified errors on EPA's estimates of national baseline economic losses.

The primary documents examined as part of the review were Chapter C3 (National Extrapolations of Baseline Economic Losses) and Chapter C2 (Summary of Case Study Results) of EPA's Economic and Benefits Analysis ("EBA") <FN 1>, and Chapters B3, C3 and D3 (Evaluation of I&E Data for the Delaware Estuary, Ohio River and Tampa Bay Case Study Facilities) of EPA's Case Study Analysis ("CSA") <FN 2>.

This review does not include 1) an assessment of the validity of the entrainment and impingement data EPA used, 2) an assessment of EPA's estimates of age-i equivalents, pounds lost to the fishery, and production foregone, or 3) an assessment of benefit transfer techniques applied by EPA. Assessments of the validity of EPA's assumptions regarding entrainment survival rate estimates, and the validity of EPA's random utility model estimates, habitat replacement cost estimates, and societal revealed preference estimates (which factor into EPA's national baseline estimates) are also beyond the scope of this review. Other reviewers of EPA's CSA and EBA reports are addressing the validity of these estimates, methods and assumptions.

The remainder of this report is organized into three main parts. Section II provides an overview of EPA's methodology for (1) extrapolating from baseline loss estimates for individual facilities and, in one case, from multiple facilities on a given waterbody, and (2) extrapolating from those to develop national baseline economic loss estimates. Section II also contains a discussion of terminology and definitions used in this report. Section III contains a discussion of EPA's method for computing national baseline estimates, a discussion of the validity of EPA's extrapolation methodology, and a list of concerns regarding EPA's methodology. The effects of identified concerns on EPA's national baseline loss estimates are presented in Section IV.

II. Review of EPA's Methodology for Estimating the Value of National Baseline Losses

A. Overview of EPA's Overall Methodology

EPA computed estimates of the dollar value of national baseline losses due to I&E through what appears to have been the use of a multi-step methodology. Following is a description of each step, as this reviewer understands it. <FN 3>

-Step 1: EPA compiled historical data on entrainment and impingement at 18 case study facilities (Table 1) that are presented as being representative of 539 facilities in five waterbody types (Estuary — Non Gulf, Estuary - Gulf Coast, Freshwater, Great Lakes, and Ocean). Although EPA provided a brief, general discussion of its rationale for selecting case study facilities (EBA Chapter C1), EPA did not explain in any detail how or why it chose those sites, nor does it explain why it compiled data from some facilities within a watershed and not for others for which data are available (e.g., see Conectiv, 2002).

-Step 2: EPA generated estimates of baseline annual biological losses due to entrainment and impingement for each case study facility.

-Step 3: EPA estimated a range for the economic value of the baseline biological losses at each facility through the use of benefit transfer techniques.

-Step 4: EPA adjusted its initial estimates of dollar value of biological losses through the use of alternative valuation techniques and assumptions.

-Step 5: For two waterbody types (Estuary — Gulf Coast and Freshwater), EPA estimated the baseline annual biological losses for all in-scope facilities within the case study waterbody, based on data from the case study facilities. EPA then estimated the dollar value of those biological losses.

-Step 6: EPA extrapolated from the estimates of dollar value of baseline biological losses at the case study facilities (or in the case of the Estuary — Gulf Coast and Freshwater waterbody types from the estimate of dollar value of baseline biological losses at all in-scope facilities within the case study waterbodies) to all in-scope facilities within each waterbody type.

-Step 7: For each waterbody type EPA selected specific values from within the range of estimated baseline economic losses (the selected values were referred to as "best" estimates). EPA then summed the waterbody type "best" estimates to produce its national baseline "best" estimate.

This report addresses the fifth step (excluding the assignment of dollar value to the extrapolated biological losses) and the sixth and seventh steps of EPA's methodology, i.e., EPA's extrapolation methods used to compute national "best" estimates of baseline economic losses based on estimates from the case study facilities. It should be noted that because this review focuses on EPA's extrapolation methods (and not on EPA's methods for estimating biological losses and economic losses), EPA's estimates of those losses are used in some analyses presented in this report. However, this use of EPA's estimates in this report is not an endorsement of those estimates.

As noted in reviews by Barnthouse (2002) and Heimbuch (2002), EPA's estimates of biological losses are seriously flawed and biased. EPA's estimates incorrectly ignore entrainment survival and density dependent compensation (Barnthouse, 2002), two omissions which cause its estimates to be biased high. Furthermore, EPA's estimates of harvest foregone, production foregone and equivalent age-l fish were computed using inappropriate equations and input values (Barnthouse, 2002, and Heimbuch, 2002).

EPA's methods for estimating the economic value of biological losses also are seriously flawed and biased. EPA's habitat replacement cost method, its method for estimating the economic value of commercial catch, and its method for determining non-use value are fatally flawed (Stavins, 2002; Desvousges, 2002; and Harrison et. al., 2002). EPA's methods for determining the economic value of forage fish and its basic benefits transfer methods have also been seriously criticized (Harrison et. al., 2002; Strand, 2002; Stavins, 2002; and Desvousges, 2002).

B. Terminology and Defintions

The term "losses" was used by EPA to refer to both biological losses (e.g., "Each case study section reports EPA's estimate of the number of age 1 equivalent fish that are lost to I&E at the case study facilities and the economic value of these losses." EBA page C2-l), and economic losses (e.g., "Best Estimate Baseline Losses (in thousands, $2001)" EBA, Table C3-6). To avoid confusion in this report, the term "losses" is always qualified as being either biological losses (i.e., referring to estimated numbers or pounds of fish) or economic losses (i.e., referring to the estimated dollar value of the fish).

This reviewer was unable to find a succinct definition of "baseline losses" in the chapters of the EPA reports he reviewed. However, EPA's description of its intended use of the national baseline loss estimates (EBA Chapter C4 page C4-1) provides an indication of what the "baseline losses" were meant to represent:

Using the national baseline loss estimates reported in Chapter C3: National Extrapolation of Baseline Losses, EPA estimated the potential national benefits of each regulatory option by applying a set of estimated percent reductions to baseline losses.

The percent reduction in baseline losses for each facility reflects EPA's assessment of (1) regulatory baseline conditions at the facility (i.e., current practices and technologies in place), and (2) the percent reduction in impingement and entrainment that EPA estimated would be achieved at each facility that the Agency believes would be adopted under each regulatory option.

Based on this narrative it appears that the term "baseline losses" was meant to refer to estimated economic losses due to I&E given current facility practices and technologies.

The term "in-scope facility" refers to the any of the "539 utility and non-utility steam electric power generating facilities identified in EPA's 2000 Section 316(b) Industry Survey as being potentially covered by this proposed rule." (EBA Chapter A1, page A1-1). All other CWIS facilities (e.g., manufacturing facilities and electric generating facilities with design intake flows less than 50 MGD) are referred to as "out of scope facilities".

EPA used the term "case study facility" to refer to all CWIS facilities within a case study waterbody (e.g., CSA Chapter B1, Figure B1-2) and also to refer to only those facilities with I&E data that EPA used in its analyses (e.g., CSA Chapter C1). To avoid confusion in this report, the term “case study facility” is used only to refer to in-scope facilities with I&E data that EPA used in its analyses.

The term “reference facility” is used in this report to refer to a facility with I&E data upon which EPA based its extrapolation of economic losses to other in-scope facilities (that were not case study facilities). Only a subset of case study facilities are reference facilities. The I&E data from some case study facilities (i.e., Seabrook, Brayton Point, Contra Costa and Pittsburg) were used to produce baseline economic loss estimates for those facilities only, and were not used to extrapolate economic losses to other in-scope facilities.

C. EPA’s Methods of Extrapolation from Case Study Facilities

For each of the five waterbody types, EPA computed a separate estimate of baseline economic losses by summing estimates for individual facilities and groups of facilities within the waterbody type. EPA used three somewhat different methods for computing the waterbody-specific estimates (see Table 2). All three methods involved extrapolating the economic loss estimates from one or more reference facilities (selected from the case study facilities) to the economic losses at other in-scope facilities within the waterbody type (it is not clear from EPA’s Case Study Analysis and Economic Benefits Analysis reports why EPA used different approaches for different waterbody types).

The method of estimation for the Estuary — Non Gulf, Great Lakes and Ocean waterbody types was to base the extrapolation on the estimated economic losses at a single reference facility. For the Estuary — Non Gulf waterbody type, the extrapolation was based on estimated economic losses at the Salem facility. For the Great Lakes waterbody type the extrapolation was based on estimates of economic losses at the Whiting facility. For the Ocean waterbody type the extrapolation was based on estimates of economic losses at the Pilgrim facility.

The method of estimation for the Estuary — Gulf Coast waterbody type was to base the extrapolation on the combined estimated economic losses for all in-scope facilities within the case study waterbody (i.e., Tampa Bay). EPA’s combined estimate of the baseline economic losses for the in-scope Tampa Bay facilities was computed by extrapolating the biological loss estimates from only one case study facility (Big Bend) to all four in-scope Tampa Bay facilities, i.e., Big Bend, Bartow, Gannon and Hooker’s Point (see Table 3). The extrapolated biological losses for the four in-scope facilities then were translated into estimated economic losses for the four in-scope facilities.

The method of estimation for the Freshwater waterbody type was to base the extrapolation on the combined estimated economic losses for all in-scope facilities within the case study waterbody (i.e., Ohio River). In contrast to EPA’s method for extrapolating economic losses in Tampa Bay, EPA’s combined estimate of the baseline economic losses for the in-scope Ohio River facilities was computed by extrapolating the biological loss estimates from all nine case study facilities (i.e., Cardinal, Clifty Creek, Kammer, Kyger, Miami Fort, Philip Spom, Tanners Creek, W.C. Beckjord and Sammis) to the 29 in-scope facilities (see Table 4). The extrapolated biological losses for the 29 in-scope facilities then were translated into estimated economic losses for the 29 in-scope facilities.

III. Review of EPA’s Extrapolation Methods and Choice of “Best” National Estimates

This section contains a more in-depth review of EPA’s extrapolation methods. Section III begins with a review of EPA's methods for extrapolating from biological losses at the individual case study facilities to combined biological losses (on which the national extrapolations were based) for Tampa Bay and for the Ohio River. Section III.B contains a discussion of EPA's method for extrapolating from the estimated economic losses at the reference facility (or group of facilities, as was the case for the Estuary —Gulf and Freshwater waterbody types) to the national baseline economic loss estimates. Section III.C contains a discussion of EPA's methods for choosing "best" estimates, and Section III.D is a summary of identified concerns.

A. Extrapolations of Biological Losses from Single Case Study Facilities to Grouped Reference Facilities (On Which Extrapolations to Waterbody Types Were Based)

1. Tampa Bay

This section contains a summary of concerns regarding EPA's extrapolation method for Tampa Bay facilities (Section III.A.1.a). Because the documentation of EPA's extrapolation method (CSA, Chapter D3) is incomplete (e.g., no equations were provided and intake flow values were omitted due to EPA's stated concerns about confidential business information ("CBI")), details of EPA's method had to be inferred from EPA's cursory narrative descriptions. Section III.A.1.b (below) contains an algebraic interpretation of EPA's method that was inferred from EPA's narrative descriptions. The identified concerns are based on this interpretation of EPA's method.

a. Concerns Regarding EPA's Method of Extrapolating Biological Losses for Tampa Bay Facilities

EPA's extrapolation method for Tampa Bay is based on the assumption that the loss (expressed as pounds lost to the fishery, production foregone or age-1 equivalents) per MGD of intake flow is the same at all four of the Tampa Bay case study facilities (i.e., Bartow, Hooker's Point, Big Bend and Gannon).

Hartman (2002) challenged the validity of this assumption given the locations of the four facilities within the Tampa Bay estuary (i.e., the Hooker's Point and Gannon facilities are in upper Hillsborough Bay near the city of Tampa, the Bartow facility is on the western shore between Old Tampa Bay and Middle Tampa Bay, and the Big Bend facility is on the eastern shore between Hillsborough Bay and Middle Tampa Bay) and the range of environmental conditions (e.g. salinity, water clarity, dissolved oxygen, and water depth) at those locations.

b. Interpretation and Critique of EPA's Method of Extrapolating Biological Losses for Tampa Bay Facilities

EPA estimated baseline biological losses for the Gannon, Bartow and Hooker's Point facilities based on baseline biological losses at the Big Bend facility and on intake flow rates (MGD) at the four facilities. Given EPA's description of its extrapolation method (CSA page D3-15), it appears that EPA estimated the total baseline biological losses for the four reference facilities as the product of the baseline biological losses at the Big Bend facility and the ratio of 1) the sum of the intake flow rates for the four facilities to 2) the intake flow rate for the Big Bend facility:

[see hard copy for equation 1]

EPA justified its method of extrapolation for Tampa Bay facilities with the following assumption (CSA page D3-15):

"Because intake characteristics, the fish community, and hydrodynamic conditions associated with the CWIS of Tampa Bay are similar, EPA assumed that I&E at Big Bend is representative of I&E at other Tampa Bay CWIS and that I&E is strictly proportional to intake flow."

However, EPA provided no data to validate its claim of similarity in intake characteristics, fish community and hydrodynamic conditions.

Stated another way, EPA's assumption was that the loss rate (i.e., loss per unit of intake flow) was the same at each of the four facilities:

[see hard copy for equation]

If this assumption were satisfied, equation (1) would produce unbiased estimates of the total biological losses for the four Tampa Bay case study facilities. But EPA provides no data supporting its assumptions, and available data suggest that the assumptions are not well-founded (e.g. see Hartman, 2002).

Because EPA's documentation (CSA, Chapter D3) of its method is incomplete (i.e., its narrative description is ambiguous and no equations were provided) and EPA did not list the facility-specific intake flow rates it used in its calculations, this reviewer could not verify using the data presented in CSA, Chapter D3 that equation (1) accurately represents the methodology EPA applied.

2. Ohio River

This section contains a summary of concerns regarding EPA's extrapolation method for Ohio River facilities (Section III.A.2.a). Because the documentation of EPA's extrapolation method (CSA, Chapter C3) is incomplete (e.g., no equations were provided and intake flow values for many facilities were omitted due to stated CBI concerns), details of EPA's method had to be inferred from EPA's cursory narrative descriptions. Section III.A.2.b (below) contains an algebraic interpretation of EPA's method that was inferred from EPA's narrative descriptions. The identified concerns are based on this interpretation of EPA's method.

EPA's Ohio River case study identified nine case study facilities and 29 in-scope facilities located on 14 navigational pools (defined by locks and dams). As part of its extrapolation method, EPA defined 6 pool groups that collectively contained all 29 in-scope facilities, and that had at least one case study facility per pool group (see Table 5).

a. Concerns Regarding EPA's Method of Extrapolating Biological Losses for Ohio River Facilities

EPA's extrapolation method for Ohio River facilities was based on the following assumptions (CSA page C3-22):

".. .I&E is strictly proportional to intake flow and that I&E at the 9 Ohio River case study facilities are representative of I&E at other CWIS in the same or nearby pools."

EPA did not provide data to support its assumption that I&E biological losses at the case study facilities were representative of I&E biological losses throughout a pool group. Hartman (2002) challenged this assumption based on ecological conditions in the pools and the substantial distance between some case study facilities and in-scope facilities (e.g., as indicated in Table 5, the Shawnee facility is over 500 miles downriver of the Clifty Creek facility — the case study facility on which EPA based its estimates of I&E biological losses at the Shawnee facility).

If EPA's assumptions were satisfied, the relationship between I&E biological losses and intake flows for facilities within the same pool would be linear with a positive slope and an intercept equal to zero. Therefore, the validity of the assumptions can be addressed by examining data from pools that contained at least three case study facilities (the minimum number needed to identify a linear relationship). EPA identified six navigational pools that contained at least one case study facility. Of those six pools, four contained one case study facility, one contained two case study facilities, and only one (Markland pool) contained three case study facilities.

A plot of the I&E biological losses (expressed in terms of production foregone, which was the component that made the largest contribution to the value of I&E biological losses for the Ohio River facilities) versus the operational intake flows for case study facilities within the Markland pool is depicted in Figure 1. The plot clearly shows that EPA's assumptions were not satisfied.

b. Interpretation and Critique of EPA 's Method of Extrapolating Biological Losses for Ohio River Facilities

EPA estimated the baseline biological losses for 29 in-scope facilities on the Ohio River based on estimated biological losses at the nine case study facilities on the Ohio River. The nine case study facilities are located within six pool groups (defined by EPA), and EPA conducted a separate extrapolation from the case study facilities to the in-scope facilities for each of the six pool groups (see Table 5). EPA apparently used this approach to account for possible differences in the fish communities that inhabited each of the pool groups.

Given EPA's description of its extrapolation method, it appears that EPA estimated the total baseline biological losses for the 29 reference facilities as the sum of the pool group-specific extrapolations:

[see hard copy for equations 2 and 3]

As noted above, EPA justified its method of extrapolation for Ohio River facilities with the following assumption (CSA page C3-22):

" … I&E is strictly proportional to intake flow and that I&E at the 9 Ohio River case study facilities are representative of I&E at other CWIS in the same or nearby pools."

Stated another way, EPA's assumption was that the biological loss at each facility within a pool group was equal to the intake flow rate for the facility times a constant loss rate, CLRp (numbers of fish per unit volume of intake flow) for the pool group:

[see hard copy for equation]

If this assumption were satisfied, equation (3) would be a reasonable estimator for the total biological losses within a pool group. However, as discussed above, the available data on I&E biological losses within the Markland pool indicate that this assumption was not met. Furthermore, the range of ecological conditions present within the pool groups (Hartman, 2002) suggest this assumption would not be satisfied.

Because EPA's documentation (CSA, Chapter C3) of its method is incomplete (i.e., EPA did not provide detailed equations), and EPA did not list all facility-specific intake flow rates it used in its calculations, a comprehensive verification of equations (2) and (3) was not possible. However, in response to questions this reviewer posed to EPA regarding apparent inconsistencies in its tabulated results in Chapter C3 of the CSA (document entitled "RESPONSE TO UWAG QUESTIONS RE: PHASE II PROPOSAL RECORD -- Revised July 3, 2002"), EPA conceded that it had made errors in its calculations for the Robert C. Byrd pool group and the Markland pool group.

B. Extrapolations of Economic Losses from Case Study Facilities to All In-scope Facilities within a Given Waterbody Type

This section reviews EPA's methods for extrapolating from estimated economic losses at selected case study facilities (i.e., reference facilities) to the economic losses at other in-scope facilities within a waterbody type. As indicated in Table 2, EPA used a combination of facility-specific estimates of economic losses and extrapolated values for its estimate of overall economic losses within each waterbody type. For each waterbody type, EPA identified a reference facility or group of reference facilities on which to base its extrapolation to in-scope facilities for which it did not have facility-specific estimates of economic losses. For example, for the Estuary — Non Gulf waterbody type (which includes 78 in-scope facilities), EPA had facility-specific economic loss estimates for the Salem, Brayton Point, Contra Costa and Pilgrim facilities and chose Salem as the reference facility on which to base its extrapolations to the remaining 74 in-scope facilities.

For the Estuary — Non Gulf, Great Lake and Ocean waterbody types, EPA assigned dollar values <FN 4> to its estimates of biological losses at the Salem, Whiting and Pilgrim facilities, respectively, and based its extrapolations on those estimates of economic losses. For the Freshwater waterbody type, EPA assigned dollar values to its estimate of biological losses at the 29 in-scope facilities on the Ohio River (discussed above), and based its extrapolation on that estimate of economic losses. For the Estuary -- Gulf Coast waterbody type, EPA assigned dollar values to its estimate of biological losses at the four in-scope facilities in Tampa Bay (discussed above), and based its extrapolation on that estimate of economic losses.

EPA used two methods for its extrapolations from reference facilities to other in-scope facilities. Depending on the waterbody type, EPA either used the average of the national estimates from the two extrapolation methods, or chose one method to use as its "best" estimate.

EPA's first extrapolation method (Flow Index extrapolation) was to estimate the national baseline economic losses based on the baseline economic losses at the reference facilities and on the operational intake flows at the reference facilities and at all other in-scope facilities. For this extrapolation method, EPA divided its estimate of economic loss at the reference facility (or group of facilities) by its Flow Index for the reference facility (or group of facilities). This method is equivalent to computing the economic losses per unit volume of intake flow ($/operational MGD) at the reference facilities and then multiplying that amount times the total of operational intake flows for all in-scope facilities.

EPA's second method (Angling Index extrapolation) was to estimate the national baseline economic losses based on the baseline economic losses at the reference facilities and on the number of angler days of recreational angling that occurred within 120 miles of the reference facilities in comparison to the sum of the number of angler days that occurred within 120 miles of each of the other in-scope facilities. For this extrapolation method, EPA divided its estimate of economic loss at the reference facility (or group of facilities) by its Angling Index for the reference facility (or group of facilities). This method is equivalent to computing the economic losses per angler day (in the vicinity of the facility) at the reference facility and then multiplying that amount times the sum of the number of angler days in the vicinity of each in-scope facility.

EPA's documentation of the Flow Index extrapolation method and of the Angling Index extrapolation method was not sufficiently complete or detailed (e.g. no equations were provided, key underlying assumptions were not listed, and key input parameter values were not reported) to support a thorough review of EPA's assumptions and estimates of national baseline economic losses. Therefore, this reviewer inferred the details of EPA's method from EPA's narrative descriptions. Key underlying assumptions of EPA's methods then were derived from the inferred details of EPA's methods.

In the following two sections (III.B.1 Flow Index Extrapolation and III.B.2 Angling Index Extrapolation), concerns regarding the validity of EPA's extrapolation methods are identified based on the key underlying assumptions of the methods. Following the discussion of the concerns regarding each method is a discussion of details and assumptions of EPA's method that were inferred from EPA's narrative descriptions.

1. Flow Index Extrapolation

This section contains a summary of major concerns regarding EPA's Flow Index method (Section III.B.1.a). Because the documentation of EPA's Flow Index method of extrapolation (EBA, Chapter C3) is incomplete, and was not presented in mathematical form, details of EPA's method had to be inferred from EPA's cursory narrative descriptions, and from tabulated values presented in EPA's reports. Section III.B.1.b (below) contains an algebraic interpretation of EPA's method that was inferred from EPA's narrative descriptions. The identified concerns listed below are based on this interpretation of EPA's method.

a. Concerns Regarding EPA‘s Flow Index Method of Extrapolation

EPA's Flow Index method could be a valid method for estimating total baseline economic losses for a waterbody type if(l) the estimated economic loss per MGD at the reference facility (or group of reference facilities), on which the extrapolation is based, were an unbiased estimate of the average economic loss per MGD over the other in-scope facilities within the waterbody type, and (2) economic losses were directly proportional to intake flow. This reviewer found no indication that EPA tested either of these assumptions. Furthermore, EPA did not use the generally accepted practice of randomly sampling (to select its reference facilities), which would have helped to address the first assumption. And, with the exception of the Freshwater waterbody type, EPA based its extrapolations on data from a single reference facility, i.e., it had a sample size of one. The lack of randomization and the extremely small sample size almost guarantees that EPA’s assumption was not satisfied <FN 5>.

B. Interpretation and Critique of EPA's Flow Index Method of Extrapolation

According to EPA's description of its Flow Index (EBA page C3-2), the Flow Index was computed separately for all in-scope facilities within each waterbody type as:

[see hard copy for equation]

EPA claimed that "dividing by the baseline [economic] loss at a case study site by the flow index yields an estimate of the total baseline [economic] loss at all facilities drawing cooling water from the same type of waterbody." (EBA page C3-2). Accordingly, EPA's estimate (based on its Flow Index) of the vlaue of the toal baseline economic losses at facilities within a waterbody type was computed as:

[see hard copy for equation]

Although not stated in its description of its national extrapolations (EBA Chapter C3), it appears that EPA's justification for this method of extrapolation is based on the assumption it relied on in its Case Studies for Delaware Estuary, the Ohio River, and Tampa Bay: "EPA assumed that … I&E is strictly proportional to intake flow" (CSA pages B3-10, C3-22, and D3-15), i.e.,

[see hard copy for equations]

Equations 6 and 7 show that if:

-The average economic losses per MGD ($ per MGD) at facility I is equal to the average economic loss per MGD over all in-scope facilities,
-Economic losses are strictly proportional to flow,
-Baseline economic losses (in dollars) at a facility are proportional to the biological losses), and
-All input parameter estimates are accurate and precise,

then EPA’s estimator would be a valid method for estimating national baseline economic losses. EPA provided no indication that it tested any of these assumptions.

2. Angling Index Extrapolation

This section contains a summary of major concerns regarding EPA’s Angling Index method <FN 6> (Section III.B.2.a). As was the case for EPA’s Flow Index method, the documentation of EPA’s Flow Index method of extrapolation (EBA, Chapter C3) is incomplete and details of EPA’s method had to be inferred from EPA’s cursory narrative descriptions, and from tabulated values presented in EPA’s reports. Section III.B.2.b (below) contains an algebraic interpretation of EPA’s method that was inferred from EPA’s narrative descriptions. The identified concerns listed below are based on this interpretation of EPA’s method.

a. Concerns Regarding EPA's Angling Index Method of Extrapolation

1) Multiple-Counting of Angler Days

Although EPA's description of its Angling Index is not very thorough, the description given indicates that the denominator of the Index is the sum of angler days over all in-scope facilities within a waterbody type: "the angling index is a measure of the facility's percentage share of the total angling days estimated at all in-scope facilities located on a similar waterbody" (EBA page C3-3). And as noted above, the number of angler days for each facility is the sum of angler days within a 120 mile radius of the facility: "EPA then defined the area for each facility to include the county the facility is located in and any other county with at least 50 percent of its population residing within 120 miles of the facility" (EBA page C3-2), and "EPA then summed angling days across all counties in a facility's area to yield estimated angling days" (EBA page C3-2).

Since many facilities are within 120 miles of each other (e.g., see CSA Figure Gl2 which depicts several facilities within 50 miles of each other), EPA's method for computing the Angling Index would multiple-count angler days. The extent of this problem appears to be very widespread as indicated by analyses conducted by Edison Electric Institute (see Attachment).

Multiple-counting angler days would have the effect of artificially reducing the magnitude of the Angling Index for any specific station (because the denominator would always include multiple-counted angler days). An Angling Index value that is biased low would cause EPA's extrapolation to be biased high because EPA divided the economic losses at the reference facility (or group of facilities) by the Angling Index for the reference facility (or group of facilities).

Consider the following hypothetical example, which illustrates the bias in this method. Suppose three facilities (#1, #2, and #3) are included in a waterbody type. Counties A, B and C are within 120 miles of the reference facility (facility #1), counties D, E, and F are within 120 miles of facility #2, and counties E, F and G are within 120 miles of facility #3. Further suppose that there are 100, 50, 50, 100,200,200, and 100 angler days in counties A, B, C, D, E, F and G, respectively. A total of 800 angler days are spent by residents of the counties within 120 miles of the three facilities, 200 angler days are spent by residents within 120 miles of the reference facility, 500 angler days are spent by residents within 120 miles of facility #2, and 500 angler days are spent by residents within 120 mile of facility #3. The Angling Index for the reference facility should be 0.25 (i.e. 200/800), and the extrapolated economic losses should be 4 times (i.e., 1/0.25) the economic losses at the reference facility. However, if the Angling Index is computed as described by EPA, the angler days in counties E and F would be counted twice (because they are within 120 miles of facility #2 and facility #3). Therefore, EPA would compute the Angling Index for the reference facility to be 0.167 (i.e. 200/[200+500+500]), and the extrapolated economic losses would be 6 times (i.e. 1/0.167) the economic losses at the reference facility.

EPA noted the problem of multiple-counting angler days in reference to the Freshwater case study facilities (CSA page C3-3):

Because of the large number of facilities in the Ohio study and their proximity to each other, EPA used a slightly different method to estimate angling activity at these facilities. Rather than calculating the angling days within the 120-mile radius of each individual facility, EPA instead summed the angling days in all counties within 120 miles of any of the 29 Ohio facilities and divided this by the number of angling near any freshwater facility nationwide. Essentially, this method treats the 29 Ohio facilities as one large facility for the purposed of calculating an angling index. This eliminates the problem of multiple-counting of angling days in counties that occurs because the Ohio facilities are so close to each other.

However, although aware of this problem, EPA apparently did not address it for any other waterbody type. Furthermore, EPA's method for addressing the problem for Ohio River facilities does not fully address the problem, since the denominator of its Angling Index would still include multiple-counting of non-Ohio River facilities.

The bias that can be introduced by this type of multiple-counting can be very large. For example, the Hope Creek facility (one of the in-scope facilities within the Estuary — Non Gulf waterbody type) is located directly adjacent to the Salem facility within the Delaware estuary. Due to the very close proximity of the two facilities, the angler days assigned by EPA to the Hope Creek facility would be the same angler days EPA assigned to the Salem facility. Accordingly, the number of angler days within 120 miles of the Hope Creek facility would be the same as the number of angler days within 120 miles of the Salem facility. Therefore, EPA's Angling Index method would predict that the economic losses at the Hope Creek facility would be the same as the economic losses at the Salem facility. This result is preposterous because the Hope Creek facility uses a cooling tower, whereas Salem uses once-through cooling. Not only does EPA's method double-count the angler days, it completely ignores the fundamental difference in the cooling systems of the two facilities.

2) Representativeness of Reference Facilities

As was the case with EPA's Flow Index method, a necessary assumption of its Angling Index method is that EPA's reference facilities are representative of all in-scope facilities. This reviewer found no indication that EPA tested this assumption. Since (with the exception of the Freshwater waterbody type) EPA based its extrapolations on data from a single reference facility (i.e., it had a sample size of one), and did not randomly select its reference facilities, it is very likely that EPA's assumption was not satisfied.

A comparison of the reference facilities to all case study facilities provides a limited basis for assessing the representativeness of the selected reference facilities. The comparison should be in terms of the product of the reduction in recreational catch and the proportionality constant which relates the dollar value per fish and the number of angler days (see section III.B.2.b, below). However, because the biological losses may be independent of the proportionality constant, an initial assessment of the representativeness of the reference facilities can be based on estimates of reductions in recreational catch alone.

An examination of EPA's recreational loss estimates for the case study facilities indicates that the reference facilities EPA selected were not representative (Figure 2). For each of the waterbody types the reference facility EPA selected had the highest biological losses of all Case Study facilities in the waterbody type. If the selected reference facilities had higher biological losses than the average for all facilities within a waterbody type (as suggested by this very limited comparison based on case study facilities), then the use these reference facilities would produce estimates that would be biased high.

3) Recreational Value as a Proportion of Total Value

As indicated below, EPA's Angling Index method does not produce meaningful extrapolations because it was applied to estimates of economic losses that included commercial, nonuse and production foregone, as well as recreational components. However, if the non-recreational components contributed little to the estimates of baseline economic losses, then as a practical matter, EPA's Angling Index method might still be a reasonable approach. To assess this possibility, the percentage of the value of baseline biological losses (from benefits transfer estimates) attributable to the loss of recreational catch was examined. As indicated in Figure 3, the value of lost recreational catch generally was much less than half of the total value of baseline biological losses. Therefore, EPA's Angling Index is not a valid method for extrapolation in this case.

4) Assumptions Underlying Angling Index Values

According to EPA's description of its Angling Index, the following assumptions were made:

-The number of days per year spent fishing by residents of Rural counties is the same for residents of all counties within a state, regardless of the county's proximity to water.
-All residents of a county are either Rural or Urban.
-The proportion of anglers that are from Rural counties is the same in all states of the nation.
-Each facility impacts a fishery that is utilized by all anglers who live within 120 miles of the facility.

In its description of its Angling Index, EPA did not justify any of these assumptions and did not address the sensitivity of its estimates to these assumptions.

b. Interpretation and Critique of EPA's Angling Index Method of Extrapolation

According to EPA's description of its Angling Index (EBA pages C3-2 and C3-3), the Angling Index (computed separately for each waterbody type) was defined as:

[see hard copy for equation]

EPA claimed that "dividing the baseline [economic] loss at a case study site by the angling index yields a second estimate of the total baseline [economic] loss at all facilities drawing cooling from the same type of waterbody." (EBA page C3-3). Accordingly, EPA's estimate (based on its Angling Index) of the total baseline economic loss at all facilities within a waterbody type was computed as:

[see hard copy for equation]

EPA did not justify the use of its estimator, nor did it discuss the properties of its estimator. In general, equation (14) would not produce valid estimates of total baseline economic losses. Some relationship between angler days and the baseline economic losses at each facility would need to exist in order for equation (14) to be a valid estimator of national baseline economic losses.

EPA's heuristic arguments for its method of estimation (e.g., "the number of angler days in the area ... reflects the degree to which there is a demand (value) by local residents to use the fishery that is impacted," EBA page C3-2), suggest that EPA justified its method with the assumption that the average value per fish caught by recreational anglers is correlated with the "demand by local residents to use the fishery" (EBA page C3-2). Given this assumption, the average value per fish caught could be expressed as a function of the number of angler days. The following function (i.e., the average value per fish caught being proportional to the number of angler days) is a simple representation of that type of relationship:

[see hard copy for equations]

Equations (19) and (22) show that if the biological losses (expressed in terms of reduction in recreational catch) times the proportionality constant at facility i are equal to the average (over all in-scope facilities) of the product of biological losses times the proportionality constant then EPA's estimator could be an acceptable means for estimating total baseline economic losses. This would be the case if the following assumptions were met: 1) the value per fish caught is proportional to the number of angler days, 2) the economic loss at a facility is equal to the product of the average recreational value per fish caught and the reduction in recreational catch due to entrainment and impingement, and 3) all input parameter estimates were accurate and precise. EPA provided no indication that it attempted to test any of these assumptions.

Furthermore, EPA's estimates of baseline economic losses for each facility are not based exclusively on reductions in recreational catch. EPA defined the baseline economic losses to include components for reductions in commercial harvest, non-use value and forage, in addition to the reduction in recreational catch:

[see hard copy for equation]

Nevertheless, EPA applied its Angling Index to the total baseline economic losses at the reference facilities:

[see hard copy for equations]

In contrast to the arguable existence of a correlation between the value per fish of recreational catch and the number of angler days, there is no basis to assume a direct relationship exists between the number of angler days and the value per pound of commercial harvest or forage. Therefore, although the first term in equation (25) could (under the special conditions describe above) be an acceptable estimator of the value of the recreational baseline losses for the waterbody type, the second term in equation (25) does not reduce to any meaningful quantity. Therefore, EPA's Angling Index should not have been applied to the portions of the baseline economic losses attributable to reductions in commercial harvest and forage, since doing so produces a meaningless quantity.

C. EPA's Choice of "Best" Estimates from Range of Values

In the final step of its methodology, EPA selected "best" estimates of the value of national baseline economic losses from the range of values it had compiled. For the Estuary — Non Gulf, Estuary — Gulf Coast, and Freshwater waterbody types, EPA used the mid-point of its low and high values for its "best" estimate. However, for the Great Lakes and Ocean waterbody types, EPA chose its high estimates of value (which were based on HRC estimates) to be the "best" estimates. EPA stated that the HRC estimates were preferred over the benefits transfer estimates because: "The HRC estimates cover losses for a much larger percentage of fish lost due to I&E, whereas the benefits transfer approach addressed losses only for a small share of the impacted fish." (EBA page C3-10). This rationale appears to directly contradict EPA's rationale for using the benefits transfer approach for its initial estimates of economic losses. EPA repeatedly claimed (CSA pages B4-1, C4-1, D4-1, F4-1, G4-1, H4-1, I4-1) that by considering recreational catch, commercial landings and production foregone in its baseline economic losses (using benefits transfer techniques) EPA captured "the total economic impact of I&E". Furthermore, EPA's choice of high values only (i.e., HRC estimates) for Great Lakes and Ocean waterbody types is inconsistent with its use of the midpoint of high and low values for Estuary — Non Gulf waterbody types, which includes the Brayton Point facility (for which EPA computed HRC estimates). Finally, reviewers of EPA's HRC method (Stavins, 2002; Desvousges, 2002; and Strand, 2002) have concluded that the method is fatally flawed and should not be used as a benefit assessment method.

D. Summary of Concerns with EPA's Extrapolation Methods

This review has identified four major concerns regarding EPA's extrapolation method. First, the assumptions upon which EPA's extrapolations for the Tampa Bay and Ohio River waterbodies were based are not likely to be valid. The fish community in the vicinity of the Big Bend facility is likely not representative of the fish community within Old Tampa Bay and Hillsborough Bay (an assumption required by EPA's method). The data that EPA presented for case study facilities within the Markland pool (the only pool containing at least three case study facilities) of the Ohio River indicate that I&E biological losses are not proportional to intake flows (an assumption required by EPA's method).

Second, EPA did not ensure representativeness of reference facilities by randomly selecting the facilities on which to base its extrapolations. Furthermore, EPA (with the exception of the Freshwater waterbody type) based its extrapolations on data from a single reference facility (i.e., EPA used a sample size of one).

Third, EPA's Flow Index rests on the key assumptions that (1) impingement and entrainment are strictly proportional to flow and (2) the economic value of those losses is strictly proportional to flow. EPA tested neither assumption, and analysis of the only data set sufficient for this reviewer to conduct an evaluation indicate that the first assumption, at least, is not supported. Given the close relationship between the first and second assumptions, it appears equally likely that the second assumption also is not warranted.

The fourth major concern is EPA's use of its Angling Index as a basis for extrapolation. Although it may have some superficial heuristic appeal, EPA's Angling Index method is simply not a valid method for estimating national baseline economic losses. If used at all, it should only be applied to the portion of value lost that is attributable to reductions in recreational catch. Even in that case, the Angling Index method likely would produce biased results because the biological losses at the reference facilities appear to be substantially higher than the average biological losses at other case study facilities. Furthermore, EPA's method of applying its Angling Index is biased because it includes multiple-counting of angling days. The effect on estimates of national baseline economic losses of eliminating the use of EPA's Angling Index method is examined in the following section.

The fifth major concern is with EPA's basis for choosing "best" estimates. EPA's rationale for using the high estimates (rather than a mid-point of high and low estimates) for the Great Lakes and Ocean waterbody types seems to contradict its rationale for using benefits transfer techniques for its initial estimates of the value of baseline economic losses. Moreover, EPA's sole reliance on the HRC estimates ignores the range of estimates of value that it compiled. The effect of using a midpoint of high and low estimates for all waterbody types, rather than using only high estimates for Great Lakes and Ocean waterbody types, is examined in the following section.

IV. Effects of Identified Concerns with EPA's Extrapolation Methods on Estimates of National Baseline Economic Losses

Five major concerns with EPA's methods for estimating national baseline economic losses were identified in previous sections of this report. Although there is reason to question the validity of EPA's Tampa Bay and Ohio River loss estimates, the data and information presented in the Case Study and Economic and Benefits Analysis reports do not support a quantitative assessment of the effects (on estimates of national baseline economic losses) of possible errors in those estimates. The same is true regarding the effects of apparent violations in assumptions of the Flow Index extrapolation method.

As indicated above, EPA's Angling Index extrapolation method is not a valid method for estimating national baseline economic losses. Also, EPA's method for selecting "best" estimates is inconsistent, poorly justified and therefore appears very arbitrary. A quantitative assessment of the effects of eliminating the Angling Index extrapolation method and of standardizing the choice of "best" estimates is possible given the data and in formation presented in the EPA reports. The sensitivity of EPA's estimates of national baseline economic losses to the Angling Index extrapolation method and to EPA's method for choosing "best" estimates is presented below.

EPA reported its "best" estimate of national baseline economic losses (for the 539 in-scope facilities) due to entrainment and impingement to be $1,521,000,000 (from EBA Table C3-6). The use of midpoints as "best" estimates for all waterbody types (rather than using the upper bound estimates as "best" estimates for the Great Lakes and Ocean waterbody types) reduces the national baseline estimate from $1,521,000,000 to $1,350,000,000 (Figure 4). Elimination of the use of EPA's Angling Index method of extrapolation (and use of only the Flow Index method for extrapolation) further reduces the national baseline estimate to $1,081,000,000.

EPA's use of the invalid Angling Index method (rather than using only the Flow Index method) coupled with its inconsistent method for choosing "best" estimates (rather than using midpoints of high and low estimates for all waterbody types) had the effect of increasing its national baseline estimates by over 40%.

[see hard copy for tables 1-5, figures 1-4, and attachment (coded as 316bEFR.072.401)

Footnotes

1 EPA-821-R-02-001. Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule. Office of Water. USEPA. February 2002.

2 EPA-82 1-R-02-002. Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities.

3 The steps as described in this report, and the order of those steps, are intended to facilitate this review of EPA's methodology, and are not intended to reflect EPA's chronology (which was not documented in the CSA and EBA reports)

for computing its national baseline loss estimates.

4 EPA used several techniques (e.g., benefit transfer method, random utility model, habitat replacement cost method) for assigning dollar values to biological losses; see Desvousges (2002), Harrison et.al. (2002), Stavins (2002) and Strand (2002) for reviews of these techniques.

5 As indicated in EBA Table C3-3, EPA used its estimates of the economic losses (from the CSA report) rather than extrapolated values for the Brayton Point, Contra Costa, Pittsburgh, Monroe and Seabrook facilities. A comparison of extrapolated values (estimated by this reviewer using EPA's Flow Index extrapolation method and design intake flows) for these facilities to EPA's estimates (from the CSA report) for these facilities showed a negative correlation. If the assumptions of the Flow Index extrapolation method were satisfied, the extrapolated and estimated values should have showed a strong positive correlation. The negative correlation suggested the assumptions of EPA's Flow Index extrapolation method and/or the assumptions of its facility-specific estimation methods were not satisfied. However, because EPA did not present its estimates of operational flows (due to stated CBI concerns), and this reviewer's analysis therefore was conducted with design flows, the results of the analysis should be considered with caution.

6 Also see Desvousges (2002) for an independent review of EPA's Angling Index Extrapolation method.

EPA Response

The commenter requests a succinct definition of "baseline losses". The commenter is correct that baseline losses can be correctly interpreted as "estimated economic losses due to I&E given current facility practices and technologies."

The commenter is correct that term "case study facility" was used to refer to all CWIS facilities within a case study waterbody and also to refer to facilities with I&E data that EPA used in its analyses. The latter definition is the correct one as pertains to the extrapolation of results and is the definition used in the analysis for the final rule.

The commenter raises several points that are addressed in EPA's responses to other comments. Please see responses to these comments as follows:

The commenter raises questions about the number of case studies that were performed and how facilities were chosen for use in the extrapolation of benefits. In the cost-benefit analysis for the final 316(b) Phase II rule, EPA analyzed data for a much larger number of facilities (46 for the final rule, compared to 18 for the proposed rule). Extrapolations were made based on several facilty-specific factors, including flow and waterbody type. For EPA's response to comments on the methods used for extrapolating results please refer to EPA's response to comments #316bEFR.041.041 and #316bEFR.041.037. On a related note, the angling index is no longer used in extrapolation of benefits.

For EPA's response to comments on assumptions about entrainment survival, please refer to the response to comment #316bEFR.305.506.

For EPA'S response to comments on compensation, please refer to #316bEFR.025.015.

For EPA's response to comments on valuing forage fish, please refer to #316bEFR.005.028

For EPA's response to comments on valuing commercial fishing benefits and losses, please refer to the response to comment #316bEFR.005.029.

For a discussion of issues related to non-use valuation, please see Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003); and Chapter D1 of the final Phase II EBA document (DCN #6-0002) regarding break-even analysis. See also, EPA's response to comments on the habitat replacement cost (HRC) method (#316bEFR.005.035) and the societal revealed preference method (#316bEFR.005.006).

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Author Name Hunton & Williams

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Benefit Estimation Methodology

Comments on the Benefit Estimates Of EPA's Proposed Phase II 316(b) Rule

Prepared by:

William H. Desvousges, Donna M. Clark, Matthew F. Bingham, Ateesha F. Mohamed, Sean M. Small, David F. Ludwig

Triangle Economic Research

1. EXECUTIVE SUMMARY

1.1 Introduction

Triangle Economic Research has prepared this report for the Utility Water Act Group (UWAG) members involved in commenting on the U.S. Environmental Protection Agency's (EPA's) proposed 316(b) Rule for Phase II Existing Facilities. Cooling water intake structures (CWIS) are regulated under Section 316(b) of the Clean Water Act. This statute directs the EPA to assure that the location, design, construction and capacity of CWIS reflect the best technology available (BTA) for minimizing adverse environmental impact (AEI). The EPA is developing national technology standards in three phases: Phase I for new facilities, Phase II for existing electric generating plants that use large amounts of cooling water, and Phase III for manufacturing plants and existing electric generating plants that use smaller amounts of cooling water. The Phase II Rule applies to existing electric generating plants with a design cooling water intake flow of 50 million gallons per day or greater. The EPA estimates that this regulation will affect nearly 550 electric power plants nationwide. These plants represent approximately $75 billion in electric industry revenues and account for 50 percent of the total electricity produced in the United States.

EPA's proposed Phase II Rule would establish national standards to require percentage reductions in impingement mortality and entrainment associated with the use of these structures. Impingement occurs when fish and aquatic species become trapped on equipment at the entrance of the cooling system. Entrainment occurs when aquatic organisms, eggs, and larvae are taken into the cooling system, through the heat exchangers, and discharged back into the waterbody. The proposed rule bases required reductions in I&E on a plant's waterbody source, capacity and capacity utilization rate. The proposed rule, referred to as Option 3, outlines the following performance standards:

1) Facilities that reduce their CWIS design intake flow commensurate with a closed-cycle, recirculating cooling system (cooling tower) are not subject to further requirements.

2) Facilities with a capacity utilization rate less than 15 percent must reduce impingement mortality by 80—95 percent.

3) Facilities located in an estuary, tidal river, ocean or Great Lake must reduce impingement mortality

by 80—95 percent and entrainment by 60—90 percent.

4) Facilities located in a freshwater river or stream with a design intake flow greater than 5 percent of mean annual flow must reduce impingement mortality by 80—95 percent and entrainment by 60—90 percent.

5) Facilities located in a freshwater river or stream with a design intake flow 5 percent or less of mean annual flow must reduce impingement mortality by 80—95 percent.

6) Facilities located in a lake or reservoir must reduce impingement mortality by 80—95 percent and if they propose to increase their design intake flow they cannot disrupt the natural thermal stratification or turnover pattern.

EPA has also evaluated five regulatory alternatives that consist of CWIS technologies with different expected percent reductions in I&E. The five options that were evaluated in addition to Option 3 range from installing I&E controls at all facilities to installing dry cooling systems or cooling towers based on waterbody type, all the way to installing cooling towers at all facilities.

Under the proposed Phase II Rule, facilities have four compliance alternatives. First, they can demonstrate they already meet the new standards and thus no action is required. Second, they can select and implement new CWIS technologies that would bring the facility into compliance. A third option is to request a site-specific assessment of the BTA for minimizing I&E. This option is relevant if the costs of compliance are significantly greater than those considered by EPA during development of the rule, or significantly greater than the environmental benefits of compliance. A fourth option is to implement restoration measures that would maintain the levels of fish in the waterbody comparable to levels that would be sustained with the improved CWIS technologies.

EPA has conducted a benefit-cost analysis (BCA) of the proposed rule and five regulatory alternatives. They chose eight case study areas:

-Delaware Estuary Watershed Study
-Tampa Bay Watershed Study
-Ohio River Watershed Study
-San Francisco Bay/Delta
-New England Estuary (Mount Hope Bay)
-New England Coast
-Great Lakes
-Large River Tributary to Great Lakes.

EPA estimates benefits for each of the case study areas and then extrapolates to the national level. Recreational fishing, commercial fishing, forage species, and nonuse benefits are the major benefit categories.<FN1> The methods employed to estimate the benefits include Benefits Transfer, Random Utility Models (RUMs), Habitat Replacement Cost (HRC), and Societal Revealed Preference (SRP).<FN2> EPA estimates the total benefits of the proposed rule (Option 3) to be $735 million. Their estimate of the costs is $283 million for a net benefit of $452 million. Option 3 is selected as the preferred regulatory option because it has the highest net benefits of all the alternatives evaluated.

1.2 Major Concerns with EPA's Benefit-Cost Analysis

This report comments on EPA's economic benefits analysis of the proposed Phase II rule. The methods EPA employs to estimate the benefits of the regulatory options contain serious flaws and inconsistencies. There are many instances where the methods are not consistent with the EPA Guidelines for Preparing Economic Analysis (EPA Guidelines) (U.S. EPA 2000). Nor is EPA's application consistent with the OMB guidelines for conducting regulatory impact analyses<FN3>.

Additionally, the EPA benefits transfer application routinely violates both the similarity and soundness criteria used to evaluate the appropriateness of a transfer. The Agency's choice of the studies to represent the case study areas reflects many bad economic judgments. Moreover, EPA's failure to account for the appropriate timing of future benefits leads to significant overstatement. The commercial fishing benefits estimation methods use assumptions that are without economic foundation, leading to a substantial overstatement of benefits. The nonuse benefit estimates are calculated using a rule of thumb method that is based on studies conducted more than 20 years ago and are inappropriately transferred to the CWIS application. The Agency's rule of thumb fails to account for any of the recent studies that have raised serious concerns about the reliability of nonuse value estimates. EPA's method of extrapolating benefits to the national level systematically biases estimates upwards. Finally, the valuation methods referred to as Habitat Replacement Cost and Societal Revealed Preference confuse the fundamental concepts of benefits and costs, invalidating them for use in a benefit-cost analysis.

In preparing this report, we have reviewed the documentation and data provided by EPA. As we note in several places, our review has been limited by the lack of documentation of EPA's analysis and the format and timing of the data provided by the Agency. This has limited our ability to perform alternative calculations particularly of the recreation benefits estimates. Although we have been able to evaluate some of the significant issues in the benefits analysis, we are not sure that all fundamental flaws have been discovered because of the lack of clear documentation provided by the Agency. The sections below summarize the major problems with EPA's benefit estimate methods and provide some alternative benefit calculations to the extent that was possible.

1.2.1 Habitat Replacement Cost Benefit and Societal Revealed Preference Estimates Are Without Economic Foundation.

EPA's Habitat Replacement Cost (HRC) method and the Societal Revealed preference method are inherently flawed. Both methods use costs of one type or another as a substitute for benefit estimates. This assumption that benefits equal costs is fundamentally flawed. Consumer surplus, not cost, is the basic measuring concept for estimating benefits. There is no justification for using costs as a proxy for benefits in the economics literature nor is this approach consistent with EPA's Guidelines for Preparing Economic Analysis. EPA provides various rationales for using these non-economic methods to measure benefits. In this report, we refute each of the purported rationales for these approaches. In several instances, the rationales are inconsistent with EPA's own benefits analysis for the proposed Phase II rule.

1.2.2 Commercial Fishing Benefits Are Significantly Overstated Because of Suspect Empirical Analysis.

The methods EPA uses to calculate the benefits of increased commercial dockside landings are suspect. Areas of particular concern include incorrect specification of benefit timing and inappropriate benefit transfer. EPA's benefit timing assumptions ignore the time from implementing the CWIS investments to the time that fish mature sufficiently to be caught for commercial purposes. Any potential benefits accruing to commercial anglers will begin some time in the future and should be discounted appropriately. EPA's Guidelines clearly state that, "present consumption is valued differently from future consumption" (p. 34). In addition, only some surviving age 1 equivalents are caught in their first year of adulthood. Others in this cohort are partially harvested each year of their remaining expected lifetime.

The magnitude of incorrectly specifying this time profile on benefit estimates depends upon the appropriate discount rate, which is 7 percent for commercial fishing. The effect of time-lag to adulthood and partial benefit realization on net present value also is species dependent. However, EPA's analysis recognizes that more valuable fish such as striped bass and black drum take the longest to reach adulthood and live the longest. Thus, the appropriate discounting has a greater effect on the benefits from the most valuable species. Completely accounting for the effects of benefit timing and discounting is beyond the scope of this review. However, assuming a five-year lag to benefit accrual and harvesting of an entire cohort in its first year of adulthood produces an 11.9 percent reduction in EPA's benefit calculations.<FN4> Table 1.1 details the effects of appropriate adjustments to commercial fishing benefits on overall benefits estimates.

Table 1.1: Adjustments to EPA National Benefits
[See hard copy for table]

Moreover, the assumptions and studies used by EPA to obtain societal benefits estimates arising from short-run analyses to a long-run situation is improper. In a short-run analysis, commercial anglers can only change the amount of labor, fuel, or other variable inputs. In the long run, anglers can purchase new boats or make other capital improvements. More importantly, the longer the time period, the more likely that new entrants will be attracted by economic profits or larger producer surpluses. Thus, economic theory dictates that long run producer surplus and thus benefits to commercial angling should be zero. EPA provides no alternative theoretical explanation for the basic theory not to hold, nor does the Agency provide any empirical evidence required by its Guidelines to support this adjusted transfer. Thus, EPA's assumption that commercial fisherman will receive long-run profits ranging from 40—70 percent of increased dockside value is unwarranted. Removing the effect of these incorrect assumptions results in the 4.8 percent reduction in EPA's total benefits estimates depicted in Table 1.1.

EPA's multimarket producer surplus estimates hypothesize that long run increases in producer surplus also accrue to related fish markets. Here again, EPA inappropriately transfers a 4.5 benefit multiplier from a short-run study. The existence of long run producer surplus in any open market is an anomaly. According to a study cited by EPA, striped bass wholesalers receive markups of between "10 and 20 percent of the price paid to fisherman" (Norton, Smith, and Strand 1983). Prices are determined not by wholesalers, but by supply and demand situations at the Fulton Fish Market. Clearly, this is a description of a competitive industry with market participants receiving only normal market returns. Removing these inappropriate benefits from EPA's calculations results in a 36.6 percent reduction in EPA's total benefits estimates. Thus, the inappropriate inclusion of commercial fishing benefits leads to a combined overstatement of benefits of 41.4 percent.

1.2.3 Recreational Fishing Benefit Estimates Are Overstated and Based on Inadequate Methodologies.

EPA estimates recreational fishing benefits using benefits transfer and RUM analysis. Major areas of concern with EPA's recreational fishing benefit analysis include inaccurate characterization of the timing of benefits<FN5>, incorrect specification of random utility models, and improper selection of studies for benefits transfer. In the context of 316(b) regulations, random utility models provide the best opportunity for correctly valuing increased catch hypothesized to result from I&E reductions. These models are the most widely used method for valuing recreational fishing. The models assume that a fishing site is a bundle of features such as accessibility, aesthetics, relative fishing success, and distances from anglers' homes. The RUM models also assume that anglers choose fishing sites that will maximize their satisfaction or utility. By observing the choices angler make, and the distances they are willing to travel, it is possible to measure the value of increasing a single feature of a recreation site, such as improved fish catch, which would be associated with the 316(b) regulations.

However, EPA's analysis as presented, is unsuitable for this purpose. In particular, with the random utility approach, the specification of opportunity cost of time and the estimation technique employed are key features of the model. EPA's random utility analysis contains several errors in these areas that invalidate their results. In particular, departures from standard random utility methods in terms of sampling methodology, calculation of implicit trip costs, and participation modeling lead to inflated benefit estimates many times those found in typical RUM studies. Because EPA's RUM-based per fish valuation numbers arise from nonstandard techniques and appear greatly inflated, we conclude that they are inappropriate for the current application. Relying solely on benefits transfer numbers reduces overall benefits estimates by 8.4 percent as shown in Table 1.1. Furthermore, Table 1.1 shows that the combined effect of adjusting for the timing of benefits and relying only on benefits transfer numbers reduces EPA's benefits estimates by 9.5 percent.

For benefits transfer, EPA focuses on comparing the physical characteristics of the study areas to each case study site. Studies chosen for the transfer are based on waterbody type, geographic location, and relevant species of fish. However, there are other aspects in which the studies used are not similar. These include the comparability of affected populations and the nature of the effects being valued in the study.

Furthermore, EPA selects recreational fishing studies to use that are not scientifically sound in terms of the response rate and estimation techniques, thereby violating the soundness criterion for benefits transfer. Moreover, the dated nature of some of the studies results in estimation methodologies that are no longer consistent with the best practices in the economics profession. In violating the similarity and soundness principles of the benefits transfer method, EPA produces recreational fishing estimates that are upwardly biased. Correctly implemented original random utility studies or performing a detailed meta-analysis<FN6> of existing recreation valuation studies would provide the best opportunity for measuring the recreational benefits hypothesized to arise from 316(b) regulations.

1.2.4 The Conceptual and Empirical Bases of the Nonuse Benefit Estimates Are Flawed.

There is considerable agreement that some people hold nonuse values, also referred to as existence or passive-use values, for some resources. Whether nonuse benefits should be included in a benefit-cost analysis is more controversial (Madariaga and McConnell 1987) and (Hausman 1993). Citing difficulties with contingent valuation (CV), EPA employs a benefits transfer approach for nonuse valuation. They cite Fisher and Raucher (1984) as well as Freeman and Sharma (1977) in stating that nonuse values should conform to a simple 50 percent (of use values) "rule of thumb." According to this approach, the theoretical existence of positive nonuse values justifies an approximation. The 50-percent rule of thumb approximation is based on an average of resources for which both use and nonuse values have been calculated.

However, EPA makes no effort to investigate the similarity of these situations to CWIS improvements. For example, because nonuse values do not depend on direct contact, concepts such as uniqueness, awareness, and the motives people may have for nonuse values are important factors in their determination. A cursory investigation indicates that the marginal improvements to fisheries being studied here are not likely to be unique or be something that creates substantial awareness. In addition, EPA's argument that nonuse values result from existence and bequest motivations is unconvincing. EPA provides little data or results to support effects that are not captured in use values. For this regulation, we conclude that nonuse values are not zero, but are likely to be negligible. Table 1.1 includes nonuse values that are 10 percent of the combined use values, which reduces the EPA benefits estimates by 8.6 percent.

1.2.5 The Aggregation of Benefits to the National Level Uses Improper Statistical Methods Resulting in Biased Estimates.

EPA developed an extrapolation method to estimate national benefits from the proposed Phase II Rule and five regulatory alternatives. National baseline losses from I&E are estimated by extrapolating data from the facilities in the five case study areas to 539 in-scope facilities. Only a subset of these facilities is included in the actual aggregation, further limiting the size of the sample for estimating aggregate national benefits.

Moreover, several fundamental flaws in the EPA extrapolation methodology render the results unreliable. One of the biggest problems is the manner in which EPA chooses the case study facilities. They do not select a random sample of facilities for the case studies, which introduces a systematic bias to their results. EPA's grouping of the case study facilities into five waterbody types does not allow for variability of habitat, fish populations, and resulting I&E risk within a waterbody category. The habitat and respective I&E risk of the selected facility is applied to all in-scope facilities in that waterbody type resulting in biased benefit estimates.

Additionally, EPA introduces a systematic bias into their results by computing estimated fish lost per million gallons per day (MGD) based on flow indices. Estimates are developed for each waterbody type based on an arbitrary selection of a facility within that type. The fish populations present near that particular facility will determine the magnitude of the estimates. These fish loss estimates are then applied to all facilities within that waterbody type regardless of the nearby fish populations. Calculating a weighted average by waterbody type reveals the extent of bias in these calculations. Although not all data are available, our preliminary calculations suggest that flaws in EPA's aggregation methods overstate benefits by more than 12 percent. See Heimbuch (2002) for a more detailed explanation of EPA's procedure.

Finally, EPA's method of computing angling indices for each facility results in an overestimate of angling days due to their lack of consideration of substitute fishing sites. Overestimating angling days leads to an overestimate of benefits. Again, EPA bases extrapolations on estimations of recreational catch from only one facility per waterbody type. Lack of information limits our ability to quantify the extent of this bias. However, a cursory examination indicates that the degree of bias is similar to that found in EPA's flow index extrapolation method. Heimbuch (2002) contains a more thorough critique.

1.3 Maximum Net Benefit criterion

EPA also has requested comments on possible criteria for evaluating regulatory options. The maximum net benefit criterion is the only criterion that is consistent with the basic economic principle of efficiency. In its most basic form, benefit-cost analysis (BCA) seeks to find the technological alternative or other social investment that provides the most benefit for the smallest possible cost, thereby maximizing the net benefit (benefit - cost) of the improvement.<FN7> Thus BCA is a framework for determining which alternative will enhance economic efficiency the most. Efficiency addresses two broad considerations:

-In a world of limited natural, human, and financial resources, it is desirable to achieve any given goal at the least possible cost.

-When faced with multiple goals, we should allocate our scarce resources among these goals so as to achieve the greatest total benefit for any given expenditure of scarce resources.

Maximum net benefit is the preferred economic criterion for evaluating the efficiency of decisions.<FN8> It is the only criterion that identifies the alternative that will yield the highest potential gain in efficiency. That is, the alternative that will yield the largest gain in benefits to society. Maximum net benefit is preferred to maximizing the benefit cost ratio because it reflects the scale of alternative projects. For example, a project could have a high benefit-cost ratio but not produce the maximum net benefits simply because it is a low-cost alternative that produces relatively large benefits.

However, another project could involve higher costs, but produce larger total benefits and subsequently have a higher net benefit.

The maximum net benefit criterion has several important strengths and is especially well-suited to address the regulatory matters related to the 316(b) regulations. In particular, the criteria, when it is implemented as part of a BCA, organizes important information about the large number of potential CWIS investments in a logical form that allows for trade-offs and relates directly to a rule for identifying BTA. It also systematically incorporates considerations of uncertainty about both costs and benefits. Comparisons about uncertain benefits and costs are based on expected outcomes. Clearly, because of a lack of information or the limits of available methodologies, it may not be possible to accurately monetize all possible benefit or cost categories. In such cases, the BCA will qualitatively describe the benefits and costs in question. In cases where monetized benefits fall short of costs, decision makers may decide whether or not the likely value of identified, nonmonetized net benefits is large enough to justify the investment.<FN9> Thus, BCA is sufficiently flexible to address both monetized and non-monetized benefits.

BCA critics assert that such emphasis on human-use values neglects the value of ecological services. However, accurately measured human-use values incorporate values for ecological services. These ecological services provide benefits to humans even if they are not consumed directly by humans. For example, food-chain services provided by benthic organisms are analogous to factor inputs in production processes. These organisms derive their values from the value of the outputs that they produce, which are quantified by using nonmarket valuation techniques. Moreover, such benefits can be quantified and included in the analysis, even if they cannot be reliably monetized.

In addition, the criticism that BCA is overused or that subjective, non-monetary factors are neglected in public policy decisions are unfounded. Both OMB and EPA have issued guidance that requires careful accounting of uncertain and unquantified values and outlines established methods of doing so.

However, evaluating nonmonetized net benefits should not be confused with a wholly disproportionate cost test, which would mandate CWIS investments whose measured costs exceed measured benefits by a substantial margin. Such a test is arbitrary and tends to overcompensate for uncertainty. The net effect would be to waste scarce public and private resources. The wholly disproportionate approach seems motivated by the unjustified assumption that measured benefits are consistently and significantly understated relative to costs. In the context of CWIS, both costs and benefits include components that are difficult to measure and thus involve some degree of uncertainty. BCA of CWIS alternatives should incorporate OMB and EPA guidance on accounting for uncertainty and risk in both expected cost and expected benefit calculations.

Finally, some might argue that BCA is expensive and an unnecessarily complicated exercise. Economists have developed the benefits transfer approach as a cost-effective way to implement the framework. This approach uses the available data and models developed in the professional literature as a way to control the costs of the analysis. Nevertheless, the transfer is performed using sound economic principles that and is based on the maximum net benefit criterion. Additionally, the transfer can be tailored to meet the needs of a particular situation. In simple cases, the transfer is likely to be straightforward. More complicated cases may involve a mixture of targeted data collection and analysis, but this is still less expensive than a full-scale original study. Even those studies may be warranted in cases where the potential investment costs are sizeable and there is substantial uncertainty. Appendix A summarizes how the benefits transfer approach can be implemented cost-effectively.

1.4 Summary

EPA's analysis of the benefits presumed to arise from 316(b) regulations are predicated upon growth in commercial and recreational fish catch due to decreased juvenile mortality. EPA also accounts for nonuse benefits in their calculations, and includes some value for forage fish as well. As shown in Table 1.1, correcting only some of the more obvious flaws in EPA's benefits analysis reduces the aggregate benefits estimates from approximately $735 million dollars to $42 million dollars, or by 94 percent. Thus, EPA's benefits estimates are more than 16 times higher than the adjusted estimates discussed in this report. This level of overstatement indicates the gross inaccuracies in EPA's economic analysis. If more complete information had been provided and more time allowed, we are confident that even these revised estimates overstate the potential benefits associated with these 316(b) Phase II regulations.

The most significant reductions, slightly more than 40 percent, result from eliminating the dramatic overstatement of the commercial fishing benefits, especially the highly dubious benefits that purportedly would arise in secondary markets for fish. The highly competitive nature of such markets makes such benefits illogical and unlikely to ever occur. The second most significant reduction (almost 23 percent) occurs when the habitat replacement cost estimates are replaced by estimates based on economic principles. As we have indicated in our comments, there is no economic justification for EPA's use of this method.

Additionally, EPA's methods for aggregating benefits contribute at least another 12 percentage points to the overstatement. This results from a combination of serious sampling errors and other flaws that further weaken the fragile underpinnings of EPA's analysis.

Finally, recreation benefits and nonuse benefits contribute about 18 percentage points to the overstatement. However, these benefits are not adjusted for the inaccurate quantities that are contained in EPA's methodologies. Thus, EPA's benefits analysis contains many fundamental flaws that could easily have been avoided with more careful economic and statistical analysis. The combination of these errors yields benefits estimates that are more than 16 times higher than the estimates that result from correcting some of the more serious analytical flaws.

This report provides the rationale for our conclusion that EPA's benefit estimation is unsound and not reliable. Section 2 presents a detailed discussion of the major concerns with EPA's BCA incorporating examples from their case studies. Appendix A describes the benefit transfer framework and how to conduct a benefits transfer using sound economic principles. Appendix B discusses the habitat replacement cost method. Appendix C presents a summary of the recent literature on recreational fishing that EPA could have considered in their benefits transfer.

2. DETAILED DISCUSSION: MAJOR CONCERNS WITH EPA'S BENEFITS ANALYSIS

2.1 Commercial Fishing Benefit Estimates

EPA's benefits analysis assumes that a reduction of l&E improves commercial fishing through an increase in adult fish catch. This expected increase is derived through the biological assessment detailed in Chapter A5. More specifically, EPA calculates catch increases by "estimating the number of fish (and species associated pounds) of commercial species reaching harvest age, and then increasing landings in accordance with species- and location-specific fishery mortality rates." Here, species-and location-specific mortality rates are the percent of a given fish stock that fishery experts believe is harvested. The hypothesized increase in catch is directly valued through multiplication of the anticipated increase in species-specific pounds of fish landed by a ten-year average of each species' market value. This treatment produces the expected dockside value of one year's anticipated increase in catch. Finally, EPA converts the change in dockside value to a change in societal benefits by transferring values from previous studies. Studies cited include Huppert (1990); Rettig and McCarl (1985); Cleland and Bishop (1984); Bishop, personal communication (2002); Holt and Bishop (2002); and Norton et al. (1983).

The methods EPA uses to calculate the benefits of increased dockside landings are highly suspect. Actual estimates are flawed to the point of compromising their usefulness. Particularly questionable is EPA's apparent assumption of an immediate relationship between expenditures on CWIS technology and benefits due to increased commercial landings. According to the EPA's Guidelines (p. 36), many EPA policies are characterized by large early investments leading to benefits that begin sometime in the future and accrue over a long period of time. Time to implement new CWIS technologies and fish maturation requirements mean that this is an appropriate description of cost and benefit scheduling under the proposed Phase II Rule.

In addition, not all surviving age-i equivalents are caught in their first year of adulthood. Rather, this cohort is partially caught each year of their remaining expected lifetime. Thus, if the current analysis is to be in agreement with EPA Guidelines, the time profile of benefits arising from I&E reductions should be characterized appropriately. EPA's failure to appropriately schedule benefits leads to incorrect discounting and a significant overstatement of potential benefits from CWIS technology.

EPA also uses inappropriate assumptions and studies in their benefits transfer. In particular, EPA adopts the approach of scaling benefits from transfer studies to make them appropriate for the current situation. EPA Guidelines (p. 87) advise that, "judgments of this type should be based on economic theory, empirical evidence, and experience." In this case, EPA scales estimates arising from short-run analyses to a long-run situation. Economic theory dictates that these situations are vastly different. Not surprisingly, EPA offers no support for this ad hoc transformation. In fact, such a transformation is without foundation. Scaling estimates in this manner leads to a dramatic overstatement of benefits.

2.1.1 Inappropriate Characterization of Benefit Timing

EPA's failure to appropriately characterize the time profile of benefits leads to significant overstatement of benefits. EPA Guidelines (p. 34) for BCA clearly state that, "present consumption is valued differently from future consumption." However, EPA never considers the timing of benefits in their analysis. The magnitude of this omission depends upon species-specific benefit scheduling and the discount rate that is applied. Thus, while both recreational and commercial benefits should be discounted, the effect of discounting on present value is greater for commercial fishing.<FN10> Figure 2.1.1 demonstrates appropriate discounting and increased yield accrual for a single year on increased commercial Weakfish catch from the Delaware Estuary Case Study.

Figure 2.1.1: Example of Timing of Commercial Benefits from Reducing I&E: Weakfish (Delaware Estuary Case Study)
[see hard copy for figure]

Figure 2.1.1 demonstrates that once EPA's 316(b) rule becomes final, facilities will take some time to install protective technology. At that point the technology begins saving eggs and larvae. An egg or larvae takes about a year to become an age 1 equivalent, and another species-dependent time span to be a harvestable adult. At this point, some, but not all fish can be caught each year until the remainder of their life expectancy. EPA assumes that eggs and larvae are saved as soon as the rule becomes final, and that all benefits are realized immediately. The magnitude of this incorrect assumption depends on the lag between cost incurrence and technology readiness for all species. This number is not immediately available; however, more comprehensive and expensive remedies will generally take longer to implement.

Additionally, the influence of inappropriate benefit scheduling on net present value is species dependent. However, EPA's document recognizes that more valuable fish such as striped bass and black drum take the longest to reach adulthood and live the longest. The long lag to adulthood means all benefits accruing from harvest of these species will be subject to the stronger discounting. Long lifespan means that increased yield in these species will be spread over a longer period of time. This dilution of benefits further magnifies the impact of discounting. These are important factors reducing benefit estimates in commercial fishing. Thus, EPA's omission of appropriate discounting leads to a significant overstatement of benefits.

2.1.2 Producer Surplus to Primary Markets

After calculating the total yearly change in dockside value, EPA converts this number to a change in societal benefits. Specifically, changes in producer and societal surplus are obtained by transferring values from previous studies. EPA cites Huppert (1990) and Rettig and McCarl (1985) in estimating that producer surplus in commercial fishing ranges from 50-90 percent of market value. EPA attributes the very high marginal profit rate implied by these numbers to "very high fixed costs relative to variable costs" in the commercial fishing industry. The high end of the cited producer surplus values (90 percent) assumes that additonal fish are brought in nearly costlessly and sold at 9 times (90 percent divided by 10 percent) over variable costs. These studies assume that there is no additional capital expenditure associated with the increase in catch. This assumption may be appropriate for the short-run marginal imporvements considered in these studies. However, as we have previously demonstrated, catch improvements attributable to CWIS technology are predicated upon a yearly increase in fish stock. EPA hypothesizes that this larger stock will yield a stream of benefits over a period of many years. According to EPA Guidelines (p 87), the extent of change in transfer studies and the case being analyzed should be similar. The studies EPA employs are short-run. They do not consider the probability of new entrants to the marketplace. The extent of change that takes place in a long-run situation as compared to a short-run situation is markedly different. Therefore, transferring values from these studies is inappropriate.

EPA recognizes that there are stark differences between the studies cited and its analysis. In particular, the 90 percent estimate implies that "supply is relatively inelastic and demand is relatively unaffected by changes in supply." EPA believes that 90 percent producer surplus is suitable in the short term when effort and prices do not change. However, Huppert (1990) clearly states that his study "emphasizes issues of benefits estimation at any given time, but giving (sic) short shrift to complications associated with the dynamics process." Rettig and McCarl (1985) recognize that "common-properly resource theory, positie net benefits are reflected in increased profit, entry leads to decreased profit and net benefit." So, both studies cited explicitly state that they are short-run analyses. In addition, they recognize the fundamental dissimilarity between short and long run economic situations. However, rather than conducting primary research or transferring values from appropriate studies, EPA transfers values across very dissimilar situations. Recognizing that the study conditions are not alike, EPA simply scales the 50-90 percent producer surplus estimates to 40-70 percent.<FN11> This conversion is entirely without foundation. As shown in the references cited by EPA, and consistent with economic theory, Rettig and McCarl state, "if there were no new impediments to entry, net benefits in thelong run would tend toward zero."

Even if EPA uses appropriate transfer studies, according to Rettig and McCarl (1985), in the long run producer surplus tends toward zero as long as there is open access fishing. The tendency for economic profits, that is, producer surplus, to reach zero in the long run is a well known foundation of microeconomic theory (Mansfield 1988). However, the elimination of profits through competition depends upon an absence of market restrictions. In an open access fishery, new entrants are expected as long as the price of anticipated catch exceeds the cost of entry. The entry of new suppliers tends to reduce the stock of fish raising the cost of catching fish for all participants. Suppliers will continue to enter as long as the expected profits are above the normal rate of return for this class of investment. Entry ceases when the price and average cost of fish are equated at the industry level and producer surplus is eliminated.

It may be theoretically possible to produce profits that are greater than zero if market restrictions exist. However, nowhere does EPA mention the importance of or even consider the existence of such restrictions. At a minimum, an analysis predicting long-run producer surplus should consider commercial fishing restrictions. A complete analysis of fishery markets and restrictions for every coastal state is beyond the scope of this review. However, a cursory investigation conducted by TER provides some insight. Table 2.1.1 describes commercial fishing restrictions by state for four relevant commercial species based on publicly available information.

Table 2.1.1 demonstrates that open access is the norm for most relevant species and markets. Thus, once all adjustments are made, markets reach equilibrium and there is no producer surplus.<FN12> For this reason, it is generally incorrect to associate changes in fish stock with long-run changes in producer surplus. However, EPA bases the remainder of its analysis on the premise that long-run producer surplus associated with CWIS technology is 40—70 percent of market value.

Table 2.1.1: Commercial Fishing Restrictions for Coastal States
[see hard copy for table]

2.1.3 Producer Surplus to Secondary Markets

EPA contends that total benefits may accrue not only to the commercial fishing sector, but also to processors and retailers. Therefore, total surplus estimates should include benefits in these secondary markets. However, rather than conducting an appropriate general equilibrium analysis or transferring values from one (for example, see Thurman and Easly 1992), EPA again transfers values inappropriately. They state that producer surplus is about 22 percent of “total surplus accruing to watermen, retailers and consumers combined.” This “multi-market” estimate derives from citations of Bishop, personal communication (2002); Holt and Bishop (2002); and Norton et al. (1983). Here again, EPA inappropriately transfers short-run values to a long-run analysis. For example, Holt and Bishop specifically state that “in the empirical application we concern ourselves with the estimation of short-run demands for fish landed in the U.S. Great Lakes.” Nevertheless, EPA uses these two studies to support total benefits estimates that are 4.5 (1/0.22) times the producer surplus expected to accrue to commercial anglers.

The discussion above clearly demonstrates that long-run producer surplus is not a relevant concept for commercial fisherman in most U.S. markets. Thus, multiplying the calculated commercial fishing producer surplus values by any factor can only serve to compound existing errors. In addition, the absence of fixed production factors or legal entry restrictions in processing and retailing markets casts severe doubt on the existence of long-run economic profit in secondary markets. Fish processing and retailing in the U.S. are both relatively atomistic industries with tens of thousands of market participants. The competitive nature of these markets invalidates the existence of long-run producer surplus in fish processing and retailing. Therefore, EPA’s 4.5 multiplier is invalid as well.

2.1.4 Conclusion

EPA makes significant errors in calculating the expected benefits to commercial fishing arising from a reduction in I&E rates. Their analysis fails to correctly characterize benefit timing, resulting in inappropriate discounting and overstatement of potential benefits. In addition, the nature of fisheries markets highlights the long-run nature of this situation. In a competitive, atomistic market such as commercial fishing, equilibrium prices associated with higher fish quantities are reached quite rapidly. The existence of large auction outlets, such as the Fulton Fish Market, further facilitates rapid price transition.

EPA's analysis ignores basic benefits transfer methodologies in transferring values arising from studies of short-run phenomena to a long-run situation. To compensate, EPA scales expected benefits. However, they provide no rationale for the scaling factor employed. According to economic theory, new entrants will dilute profit until all participants earn a normal rate of return. The likelihood of long-run producer surplus accruing to commercial anglers depends heavily upon market entry restrictions. However, the analysis provides no evidence that entry conditions have been researched. Because such information has apparently not been considered, it is impossible to give any credence to EPA's commercial fishing producer surplus estimates.

A similar argument applies to estimation of producer surplus accruing tc watermen, processors, retailers, and restaurants. EPA's analysis provides no rationale supporting the existence of long-run producer surplus in these markets. The implication of this omission is that EPA's calculation of producer surplus in secondary markets is simply wrong. The appropriate value should be zero. In fact, the only likely long-run benefactors of CWIS technology are consumers, and even here the likely gains would be modest given the nature of the anticipated regulatory effects.

All other things equal, lower fish prices would presumably benefit consumers. Unfortunately, the only long-run concept relevant to this analysis, consumer surplus, is barely considered by EPA. Taken separately, each fundamental error in applying discounting, benefits transfer methodology, and basic economic theory gravely undermines the credibility of this work. Together, the methods employed are so erroneous that it is impossible to credibly identify any long-run societal benefits from commercial fishing from CWIS technology using this effort.

2.2 Recreational Fishing Benefit Estimates

This section summarizes our comments on EPA's recreational fishing benefits from reducing l&E. Our comments focus on the benefits from the case studies for the Delaware Estuary and Tampa Bay. These two case studies figure prominently in EPA's benefits analysis and are representative of the deficiencies throughout the analysis. Time constraints limited the opportunity to comment on the other case studies that attempted to use the appropriate economic methodologies. <FN13> Finally, this section discusses EPA's inappropriate characterization of the timing of benefit estimates.

2.2.1 Benefits Transfer Approach

EPA transfers values from recreational fishing studies that estimate the WTP for increases in catch and converts these values to "1 fish per trip" estimates in 2000 dollars. The EPA Guidelines (p. 59) provide the following important standards for transferring values:

Existing value estimates, for example, are often subject to large uncertainty bounds due to measurement error, model uncertainty, and the inherent variability of individual preferences. When drawing from these studies—and when using quantitative estimates of any kind— analysts should carefully assess the quality of the data and should clearly state the reasons for their analytical choices.

Despite this, EPA does not include an assessment of the quality of the data in any of their case studies. EPA simply lists each of the studies used. EPA chooses each of the studies used in the transfer because they report values for the relevant species of fish in the case study area. However, simply selecting studies on the basis of geographic area and fish species does not fulfill the requirements for benefits transfer as discussed in Appendix A. The next two sections critique the studies EPA uses for their benefits transfer on the basis of similarity and soundness.

Similarity

In addition to the criteria presented in Appendix A for similarity, the EPA Guidelines (p. 87) recommend the following for applicability (similarity) of the studies used in a benefits transfer:

-the basic commodities must be essentially equivalent
-the baseline and extent of the change should be similar
-the affected populations should be similar.

However, EPA focused on only selecting studies that were similar to the case study areas on the basis of:

-Geographic area
-Waterbody type
-Fish species

For example, for the Tampa Bay case study, the studies used (McConnell and Strand 1994 and Milon et al. 1994) were marine fish studies in Florida. For the Delaware Estuary case study, the studies used were marine studies that included sites from Florida to New York State. The San Francisco Bay/Delta case study used a study of the San Francisco Bay (Huppert 1989). EPA focused on comparing the physical characteristics from the studies transferred to each case study area. However, there were other aspects of the similarity criterion in which the studies used were not similar, such as those recommended in Appendix A.2.1 and by EPA's Guidelines.

According to Norton et al. (1983), used in the Delaware Estuary case study, their report is basically a snapshot of the recreational fishing industry "as it existed during 1979 through 1980. Changes have occurred in the industry since 1980, especially in response to changes in legislation." Since the study was conducted, there have been bag limits on the number of striped bass caught in the State of Delaware (2 per day). Furthermore, studies using data prior to 1990 may no longer be suitable because the affected angling populations may be different and the travel time and costs would be different in the because of increased congestion and new roads. For these reasons, Table 2.2.1 illustrates studies used in the Tampa Bay, the Delaware Estuary, and the San Francisco Bay/Delta case studies that are not applicable.

Table 2.2.1: Studies Using Data Prior to 1990

[see hard copy for table]

Furthermore, catch improvements transferred are not comparable, thereby biasing estimates. For example, the Norton et al. (1983) study is not similar to the situation considered in the Delaware Estuary case study (Delaware and New Jersey). One important difference is in relative catch improvements. The numbers transferred value a catch rate increase of 1 striped bass per trip for the mid-Atlantic (New York, New Jersey, and Delaware). According to the Norton, et al. (1983) study, 76 percent of all striped bass landings are in New York State. New York average catch rate (fish per trip) was 0.68 as compared to 0.07 for New Jersey, and 0.33 for Delaware. The average catch rate for the mid-Atlantic was 0.48. Hence, transferring the numbers for the mid-Atlantic for an additional striped bass is an overestimate (due to the high New York State average) and is not suitable because the basic commodities, average catch rates, are not essentially equivalent.

In addition, the studies EPA employs do not measure a 1 fish per trip catch increase. The studies are not measuring an increase in catch rate of 1 fish per trip but other catch measures. For example, McConnell and Strand (1994) reports a “two-month value per angler for a half fish catch increase per trip.”<FN14> Agnello (1989) reports values for “consumer surplus for a 20-percent increase in catch rate for all fish.”<FN15> Huppert (1989) reports, “willingness to pay (WTP) for a doubling of catch rate” and “WTP to avoid a 50-percent decrease in catch rate.”<FN16> EPA manipulates the numbers using simple mathematics to convert the values to 1 fish per trip numbers. However, for this transformation to be applicable, the value of fish must be linear, which is inconsistent with basic economic principles. in particular, the law of diminishing marginal utility says that as anglers catch more fish, the additional utility or benefit from catching an additional fish will decline (Mansfield 1988). Once again, the basic commodities are not “essentially equivalent” as required by the EPA Guidelines.

Another concern is that EPA uses the average values of all fish species to estimate the recreational value per fish for species that are not valued in the literature. However, value per fish is dependent on the species and studies tend to focus on more popular/valuable fish. For example, small gamefish is \$2.30 and king mackerel is \$5.53 (according to Table D4-2 from the proposed rule). The basic commodities (fish species) are not essentially equivalent. For this reason, values are biased upward.

Finally, EPA has not considered the effect of bag limits and fish consumption advisories in their analysis. In the San Francisco Bay/Delta case study, Huppert (1989) estimates the lower bound WTP for a 100-percent increase in catch. With an estimated 1.36 striped bass caught per trip, the catch rates would have to increase to 2.72 per trip. There is currently a two-fish bag limit on striped bass fishing in the San Francisco Bay/Delta estuary. The WTP estimates for increases in catch exceed the bag limits in this case study area. EPA does not consider the similarity in fish quality with this study either. There is a fish consumption advisory on striped bass in the estuary and no assessment is made to determine whether or not the value of a fish with consumption advisories is the same as the WTP values transferred from Huppert’s (1989) study.

Soundness

EPA selects recreational fishing studies to use in their benefits transfer that are not scientifically sound. Important factors EPA does not consider include response rates and sampling protocols. The response rate is the percentage of respondents that complete the survey. A sampling protocol includes the target population definition, sample selection methodology, and sample size. Studies of particular concern are discussed below.

The Milon et al. (1994) study used in the Tampa Bay case study is a mail CV<FN17> survey conducted in Florida. The study evaluates the economic value to anglers of marginal changes in management of certain near-shore marine species. Factors undermining the credibility of the study include: (1) it uses hypothetical situations and not actual behavior,<FN18> (2) the response rate was 53.8 percent (below the 70 percent recommended by NOAA), and (3) there were many zero bids (zero dollar values ranged from 60 percent for redfish average catch changes to 95 percent for mullet bag limit changes).<FN19> In addition, the McConnell and Strand (1994) study employed in the Delaware Estuary and Tampa Bay case studies uses sequential estimation to calculate their welfare values, which understates the variance in the estimated values as explained in Section 2.2.2.

The Huppert (1989) study used in the San Francisco Bay/Delta case study estimates WTP using an average of values from a CV model and a travel cost model (TCM). The data consisted of a phone survey of central California residents followed by a mail survey of angling households contacted. This study had an overall survey response rate of 38.3 percent, which is well below the 70 percent recommended by NOAA. The CV questions used hypothetical situations and not actual behavior, further undermining the credibility of the study. The response rate was also very uneven among levels of avidity. The response rate was 24 percent for anglers not fishing in the past 2 months and 72 percent for anglers fishing more than twice in the past 2 months. This avidity bias causes the WTP estimates to be biased and potentially overstated.

The Agnello (1989) study used in the Delaware Estuary case study employs a single-site TCM in the analysis. The TCM recognizes that exclusive of entrance fees, recreators at a particular site pay an implicit price for using a site's services through the travel and time costs associated with visiting that site. The EPA Guidelines (p. 74) indicate that TCMs are "limited, however, in their ability to model the recreationist's choice among competing sites." When there are numerous close substitutes available for a given site, WTP for small changes in natural resource services can be much less than if there are few alternatives available. Hence, the more sites to select from, the smaller the impact a change at one site will have on a recreator's utility. Since there are substitute sites in the case study areas, neglecting the role of substitutes will overstate consumer surplus and therefore benefits of CWIS investments. For these reasons, the Agnello (1989) study is not a sound study for use in the benefits transfer for estimating the value of recreational anglers catching additional fish.

As can be seen in this section, EPA uses many studies that are not similar or scientifically sound in their recreational benefits estimations, thereby biasing their results. EPA needs to select studies more carefully on the basis of similarity and soundness. Appendix C summarizes some of the recent literature on recreational fishing that EPA could have considered in their benefits transfer at a reasonable cost.

Furthermore, EPA never evaluates, quantifies, or discusses uncertainty in their analysis, which makes their benefits transfer incomplete. See Appendix A.3 for a detailed discussion on the role of uncertainty in benefits transfer. This discussion describes the impacts of uncertainty and how to account for uncertainty in a benefits transfer. EPA also fails to document their necessary assumptions and analyze the quality of the data in each transfer study as recommended by their Guidelines. For these reasons, EPA's recreational fishing benefit estimates from their benefits transfer analyses are biased and invalid.

[comment text continued in 316bEFR.041.452]

Footnotes

1 In this report, we focus our attention on the habitat replacement cost estimates that relate to forage fish.

2 Although EPA used the SAP method in the San Francisco Bay/Delta case study, the Agency did not use this case study in the national extrapolation of benefits.

3 Economic Analysis of Federal Regulations under Executive Order 12866. See www.whitehouse.gov/omb/inforegMaguide.html

4 This conservative assumption employs a 7 percent discount rate and does not spread benefit accrual over the life cycle of a fish cohort.

5 Corrections to benefit timing and discounting in recreational benefits analysis are similar to commercial corrections but less influential (2.3%) due to a lower (3% versus 7%) discount rate.

6 Meta-analysis is the statistical synthesis of a large number of similar studies.

7 An early definition states that BCA is a “technique that measures impacts in dollars or other quantified values and that also provides systematic recognition of unquantifiable values and significant qualitative impacts” (Liroff 1982). More recently, Arrow et al. (1996) provide eight principles on the appropriate use of BCA.

8 See Stavins (2002) for further discussion of this criterion.

9 Where substantial risks are involved, decision makers may be able to quantify the monetary value of the risks and include it as a cost associated with that alternative. This approach is the way financial markets absorb information about investments with varying risks.

10 We use a 7-percent discount rate to approximate cost of capital in commercial fishing. For recreational fishing we use the 3-percent social discount as specified by OMB.

11 EPA's calculation of producer surplus accruing to commercial fisherman consists of simply multiplying the expected value of increased landings by 0.4 for a lower bound and 0.7 for an upper bound.

12 Documents cited by EPA describe the nature of fish markets. Norton et al. (1983) specifically recognize that the atomistic and competitive nature of the industry constrains markups to 10% to 15% over costs.

13 In addition to the Delaware Estuary and Tampa Bay case studies, we include comments for the San Francisco Bay/Delta case study in this section only.

14 EPA converted this value by using the average number of saltwater trips from the 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (1.5 trips in 2 months) and dividing it by 1.5 (per trip value) and then multiplying it by 2 (per fish value).

15 EPA justified using the values from this study by first estimating the average catch rate was 4.95 fish per trip and therefore, a 20 percent increase in catch would be equivalent to 1 fish.

16 EPA justified using the values from this study by first estimating that anglers took 6.2 trips per year and catch 1.36 fish per trip. They converted this to fish per year and divided this into the WTP estimates to estimate WTP per fish. The lower bound was estimated using the WTP of having a 100-percent increase in catch and the upper bound used the WTP of avoiding a 50-percent reduction in catch.

17 The contingent valuation (CV) method for estimating the value of natural resource services involves a direct survey of individuals to elicit their WTP for different levels of services. Concerns about the reliability of CV estimates of nonuse

values prompted the National Oceanic and Atmospheric Administration (NOAA) to commission a blue-ribbon panel to study CV results and make recommendations about the role of CV in measuring nonuse damages. Although the panel concluded that CV may provide a starting point for considering total values in a damage assessment, the panel also concluded that no cv study to date had produced reliable estimates of total values (58 Fed. Reg. 4613).

18 Economists prefer preference data based on actual behavior rather than responses to hypothetical situations. With CV, the question format can influence respondents.

19 Zero bids may be protest bids (made by respondents who reject the ground rules of the CV study for one or more reasons that may include skepticism of the policy being described or the ability of the government to implement the policy) and hence, may bias your results.

EPA Response

The comment states that "the methods EPA employs to estimate the benefits of the regulatory options contain serious flaws and inconsistencies," and that "there are many instances where the methods are not consistent with the EPA Guidelines." EPA does not agree. EPA's approach to economic analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003) (DCN #6-1931). Moreover, EPA's Guidelines expressly state that they "do not provide a rigid blueprint or a 'cook-book' for all policy assessments ... [and that t]he most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment to apply." Id. at p. 2. The Guidelines also recognize that the choices made on how to approach the economic analysis issues in a given situation will necessarily be influenced by factors such as the nature of the issues present, the relevant statutory requirements, the availability of data, the cost and time needed to obtain data, and the need for expedition in taking regulatory actions. Id. at pp. 3, 5 (n. 2), 59, 64. Therefore, EPA's Guidelines for Preparing Economic Analysis are not legally binding and, in fact, allow EPA to use the most up to date approaches to benefit estimation, if applicable.

EPA has changed and improved many of the methods used to estimate benefits for the final Phase II 316b rule. Therefore, a number of the points made in this comment are no longer relevant. Nevertheless, specific concerns regarding EPA's approach to economic analysis of the Section 316(b) Phase II regulation are discussed below.

1. The Aggregation of Benefits to the National Level Uses Improper Statistical Methods Resulting in Biased Estimates

EPA has greatly expanded its analysis since the case studies were presented at proposal. EPA's final analysis evaluates many more facilities (a total of 46) and extrapolates I&E estimates within regions rather than across a waterbody type nationwide. Seven regions are evaluated—5 coastal regions (North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, and California); the Great Lakes region; and the Inland region. I&E data from multiple facilities in each region were used to develop each regional estimate. In some cases, all of the facilities with I&E data in a region were evaluated (e.g., California). Given that the goal of EPA's analysis was to develop estimates of impacts and benefits at the national scale, EPA believes that this regional approach provided a reasonable basis for extrapolation.

For EPA's response to comments on the extrapolation method used at proposal, please see the response to comment #316bEFR.041.041.

Please see response to Comment 316bEFR.072.055 for a discussion of the size and representativeness of the sample of facilities used in EPA's analysis for the final rule.

2. Commercial Fishing Benefits

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316EFR.005.029.

3. Recreational Fishing Benefits

For EPA's Response to comments on the methods used to estimate recreational fishing benefits for the proposed Phase II rule, please see the response to comment 316EFR.075.504.

EPA agrees that random utility models (RUMs) "provide the best opportunity for correctly valuing increased catch." For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Therefore, the comments on benefit transfer presented here are no longer relevant.

EPA does follow standard and generally accepted practices for sampling methodology, calculation of trip costs, and participation modeling. Please see responses to comments #316bEFR.041.452 and #316bEFR.072.058 for details regarding EPA's application of RUM modeling.

4. Discounting of Future Benefits

EPA has included species-specific discounting of future benefits in its final rule analysis, as recommended in this comment. This discounting takes into account both the lag in installation of the technology, and the lag in growth of fish to harvestable size.

5. Habitat Replacement Cost Benefit and Societal Revealed Preference Approaches

The habitat-based replacement cost (HRC) and societal revealed preference (SRP) methods are not used in the cost benefit analysis for the final Section 316(b) Phase II rule. While the Agency agrees that the HRC is cost of replacement and not benefits, the Agency believes that understanding what it would cost residents in an area to replace CWIS losses is a very useful tool in the regulatory process and also informs decisions on the use of restoration. The HRC like the HEA is a process that requires the analyst to systematically evaluate the losses caused by a CWIS, quantify them, and then consider the steps that would be necessary to replace these individuals and species. The species by species consideration of losses, even if not monetized, is a useful tool in considering the environmental effect of CWIS losses. or EPA's response to comments on the HRC method, please see response to comment # 316bEFR.005.035. For additional information on the HRC, please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003). For EPA's response to comments on the SRP method, please see response to comment #316bEFR.005.006.

6. Non-use Benefits

EPA agrees that “nonuse values are not zero,” but does not agree that nonuse values are negligible. As stated in the NODA, EPA attempted to include non-use benefits categories for the final Section 316(b) Phase II rule analysis. As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Given the unavoidable uncertainties in estimating non-use benefits at the national level, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

EPA has responded to concerns regarding the Agency’s non-use valuation methods presented in the NODA in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

7. Use of the Maximum Net Benefit Criterion

The comment suggests that the best way to evaluate the regulation is to use the maximum net benefit criterion. The comment points out that, using this criterion, it may be difficult to monetize all benefits and costs, and that it is appropriate and necessary to qualitatively or otherwise describe benefits and costs that cannot be monetized.

For the 316(b) Phase II regulation, the Agency was not able monetize benefits for 98.2% of the age 1 equivalent losses of all commercial, recreational, and forage species. (The percentages by region are as follows: California 95.2%, North Atlantic 99.0%, Mid Atlantic 98.4%, South Atlantic 98.1%, Gulf of Mexico 95.8%, Great Lakes 99.8%, and Inland 99.9%.) This means that the benefit analysis represents the benefits associated with less than 2% of the total age 1 equivalents lost due to impingement and entrainment by cooling water intake structures (CWISs)." EPA’s Guidelines for Preparing Economic Analyses recommend that benefits be considered from a qualitative perspective when developing monetized estimates is not feasible. The Agency believes that it adequately considered the benefits of the environmental protections at issue in the final 316(b) rule and carefully developed a qualitative assessment of ecological benefits stemming from the final 316(b) regulation. See responses to comment #316bEFR.206.047 regarding further detail on limitations in EPA’s benefits analysis.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

8. Considering Bag Limits and Fish Consumption Advisories

The comment suggests that EPA should consider the effects of bag limits and fish consumption advisories (FCA) in the recreational fishing benefits analysis. EPA was unable to do so because data are not available indicating the effects, if any, of these factors on values for increased catch rates. It is likely that such effects vary widely and are dependent on various factors, such as region, anglers' preferences, the level of bag limits, etc. For example, some anglers practice mainly catch and release, in which case a bag limit or consumption advisory would have no effect on their value for recreational fishing. Other anglers may fish for subsistence reasons, in which case, they may value species with higher bag limits and without consumption advisories more than species with bag limits and advisories. There is an endless variety of possible scenarios, so that such factors would be quite difficult to quantify without extensive survey data. The overall effect of the bag limits and FCA on the estimated benefits of the 316(b) rule is likely to be insignificant.

9. Evaluating Uncertainty of Benefit Estimates

Regarding uncertainty, EPA provides a discussion of uncertainty in I&E estimates in the context of its analysis in Chapter A6 of Part A of the Regional Study Document for the final rule. EPA notes that the lack of confidence intervals for EPA's I&E estimates reflects the lack of information in facility documents on the variance in facility estimates of I&E. In many cases only 1 or 2 years of annual estimates are presented. Moreover, given the complexity of EPA's analysis, involving 46 facilities, dozens of species and hundreds of life history values, characterizing uncertainty would be a large undertaking in and of itself. For example, Chapter A6 provides an example Monte Carlo analysis exploring uncertainty associated with foregone yield estimates. The example illustrates the high level of effort involved to conduct such an analysis for only one type of loss (entrainment) for one metric (foregone yield) for one species at one facility.

EPA also carefully evaluated and discussed uncertainty of its benefit estimates. For example, see the uncertainty and limitation section in Chapter A11 and Chapter 4 in Parts B through H in the regional study document prepared for the analysis for the final Phase II rule (DCN # 6-0003). The Agency, however, points out it is not always feasible to quantify uncertainty due to data limitations. When feasible, the Agency used state-of-the-art approaches, such as the Krinsky and Robb simulation method, to quantify uncertainty (see Chapter A12, Non-use Meta-Analysis Methodology, in the regional study document for detail, DCN # 6-0003).

[comment continued from 316bEFR.041.451]

2.2.2 Random Utility Analysis

Overview of Method

Random utility models (RUMs) were initially developed to analyze transportation-mode choices (McFadden 1974). More recently, they have been applied to recreation-site choices (Schuhmann 1998). The random utility approach posits that the benefit an individual receives from a given activity is observable with a degree of uncertainty. However, actual choices are based upon the expected utility that an individual associates with a particular choice (McFadden 1973). The probability that a person chooses to recreate at a particular site is based upon the expected utilities of all sites within the recreator's choice set.

Thus, the RUM does not predict the actual number of trips that an individual will take to a recreation site. Rather, a RUM estimates the probability that an individual will choose to visit a given recreation site. This probability depends on the characteristics of that site, the characteristics of available substitutes, and the travel costs to all the sites in a recreator's choice set. The better the characteristics of a site, the higher the probability that an individual will choose that site, and thus the higher the value of that site will be. With the focus on site characteristics, RUMs can be used to estimate the value of a marginal change in a single attribute at a single site. For this reason, RUMs are well suited for the type of analysis usually required for regulatory analysis. Although standard protocols for applying RUMs to recreation site choice are still evolving, Federal agencies have approved their use for valuing natural resources. (See U.S. Environmental Protection Administration, 2000, and National Oceanic and Atmospheric Administration, 1996 [61 Fed. Reg. § 439—510]). In the context of 316(b) regulations, random utility analysis presents the best opportunity for correctly valuing increased catch hypothesized to result from I&E reductions. However, EPA's analysis as presented is unsuitable for this purpose. In particular, with the random utility approach, the specification of opportunity cost and the estimation technique employed are key features of the model. EPA's random utility analysis contains several errors that invalidate their results.

Data

The data needs for a RUM are much more extensive than the data needs for the traditional travel-cost models. Typically for a RUM, respondents keep a log of their recreation trips, noting the location of each trip. They also provide personal information that may influence their recreation decisions, such as age, gender, and whether they own a boat. RUMs also require data on site-quality characteristics, not only for the recreation site being studied, but also for all relevant substitute sites. In addition, researchers need to know the round-trip travel costs from each recreator's origin to all potential recreation sites.

The data collection phase of an original RUM study can be time-consuming and costly. Rather than conducting an original study, EPA chooses to employ “Marine Recreational Fishery Statistics Survey (MRFSS) combined with the 1994 Add-on MRFSS Economic Survey” for their random utility analysis. There are several problems with EPA’s presentation of these results that make interpreting them difficult. Areas of particular difficulty include the following: programs were originally provided in PDF (not editable) format, editable programs were provided late, programs are not well documented, the link between random utility model output and benefit calculation is unclear, benefit calculation spreadsheets have unreadable “CBI” cells, and the link between benefit calculations and values listed in EPA’s report is unclear.

Despite these difficulties, TEA has replicated EPA’s random utility dataset and RUM output for the Delaware Estuary case study. This replication indicates that EPA’s construction of the random utility data set will result in overstatement of benefits. Important issues include, but are not limited to:

-Employing unweighted intercept data
-Incorrectly calculating trip costs.

EPA incorrectly utilizes the MRFSS intercept data for benefits estimation, which leads to inflated benefits estimates. Intercept surveys select respondents at specific recreation sites rather than at their residences. The major problem with this type of data for benefits estimation is that unweighted intercept data are not descriptive of the general population of anglers (McFadden 1981). Over-representation of avid anglers occurs because the probability of surveying an angler is related to the number of trips the angler takes. Thus, those individuals who presumably value an activity most highly are disproportionately represented. In the case of MRFSS data, a random digit telephone survey provides initial trip information. However, this information is combined with the 1994 Add-on MRFSS Economic Survey. While EPA documentation is vague on this point, it appears that economic information is derived from an intercept survey add-on. Thus, while angling activity may be fairly represented, valuation estimates are influenced by avidity bias.

In addition, responses of anglers typically exhibit recall bias. Recall bias is the well known tendency of recreators to overstate the number of trips they take (Westat Inc. 1989). Furthermore, the upward bias in benefits estimates caused by intercept sampling is compounded by anglers’ tendency to overstate their level of fishing activity. MRFSS attempts to minimize this problem by limiting sampling to two-month trip recall windows. However, daily trip logs are preferable. Some attempt at adjustment for this form of bias would be appropriate.

TER’s investigation of EPA’s programs for setting up their RUM data indicates additional problems.<FN20> An important area is in the specification of trip costs. EPA uses two variables (tripcst and timecst) to quantify the costs associated with a fishing trip. The following excerpt demonstrates that costs associated with a particular trip are heavily dependent upon respondent wages and whether or not respondents reported that they lost wages due to the trip. Boldfaced text is TEA interpretation of EPA SAS code.

467 if lost_nc=1 then do; (If respondent says Income was lost)

468 tripcst = (0.29*ds*2) + ((wage*(ds/40))*2);
(Cost of trip is $0.29 per mile + wage x hours)

469 timecst =0; (lime cost is $0)
470 end; (Stop)
471 else do; (If respondent says income was not lost)
472 tripcst = (0.29*ds*2); (Cost of trip is $0.29 per mile)
473 timecst = (ds/40)*2; (Time cost is travel hours)
474 end; (Stop)

Estimation of the opportunity cost of time is a controversial issue in economics. The approach generally taken in the literature is to specify opportunity cost as one-third of the wage rate (McConnell and Strand 1981). EPA's approach assigns the full wage rate to all respondents reporting lost wages. Their travel costs are lost wages plus $0.29 per mile in traveling expenses. Travel costs for those who did not report losing income are $0.29 per mile. Thus, trip costs are heavily dependent upon the validity of responses to the question about lost wages and to the estimation of the wage rate. According to EPA's data summary for Delaware Bay/Atlantic Coast anglers, "forty-seven percent of the anglers indicated that they had flexible time when setting their work schedule." This number includes fully employed, partially employed, students, homemakers, and retired individuals. It is unclear what question of the 1994 Add-on MRFSS Economic Survey provides justification for EPA assigning respondents to the "lost wages" category. Possibilities taken from the survey include:

26. Can you choose to work more or fewer hours per week?

28. Did you forgo any wages by taking this trip?

29. About how much money could you have earned if you hadn't taken this trip?

Again, precisely interpreting the approach taken is difficult. However, EPA's trip cost estimation technique focuses on wages lost due to travel time. For this reason, Question 28 from the 1994 Add-on MRFSS Economic Survey (which focuses on wages) is apparently the variable used to identify trip costs. This approach assumes that anyone losing wages lost the full pretax value of his or her average wage rate. This is an extremely generous allowance for the opportunity cost of time, leading to inflated value estimates.

The importance of wage approximations appears in additional EPA calculations. Because respondents are typically reluctant to report income, EPA estimates missing wages as a function of state, sex, age, employment status, and boat ownership. In every case, EPA employs assumptions leading to high wage estimates. For example, line 392 reads:
392 if unempl=. then unempl=0;

If the survey respondent does not describe unemployment status, he or she is considered fully employed. Line 435 reads:

435 if unempl=1 or retired=1 or home_mk=1 then wage=5.15;

Thus, minimum wages are assigned to people who are not working. Lines 389 and 390 do not include the homemakers and retirees considered in line 435, meaning that these respondents are considered full-time employees. In addition, people who work part time and report losing income are assumed to lose the full value of their estimated wage rate.

389 if student=1 or unempl=1 or partime=1 then fulltime=0;

390 else fultime=1;

Because of the difficulties in reconciling EPA's results, it is impossible to precisely state the effect of these factors. However, it is clear that all of these factors lead to high trip-cost estimates. EPA's approach of assigning full wage rates for those reporting any lost wages also leads to inflated trip costs. The costs associated with taking a fishing trip form the basis for quantifying benefits associated with an improvement in trip quality. Thus, eliminating these cost inflationary factors will necessarily lower the value of positive trip attributes such as increased catch.

Analysis

RUMs can be used to estimate both the distribution of trips among sites with various characteristics and the total number of trips across all sites in a given time period. The total number of trips taken in a given time can be modeled as a function of demographic characteristics, flexibility of time of the recreator, weather-related factors, and a measure of the attractiveness or utility of the set of choices available to recreators. This attractiveness index is estimated using site-choice data. Each recreator has a bundle of recreation sites from which to choose because time and budget constraints limit the number of sites that are available. As a result, the number of trips a person chooses to make in a given period of time is affected by the quality of the set of choices available. For example, a person living within 20 miles of 10 relatively unattractive sites has a less appealing set of recreation opportunities and therefore is likely to make fewer trips than a person who lives within 10 miles of 20 attractive recreation sites. EPA evaluates the effect of increased site attractiveness on overall visitation in a three-step process. First, the Agency evaluates the baseline utility for the set of relevant sites. Then EPA calculates overall expected utility using increased catch rates hypothesized to arise from I&E reductions. Finally, the Agency specifies the number of trips taken per year as a function of overall expected utility and a number of demographic variables.

Correctly specified, the RUM recognizes that there are several levels at which people make decisions, and the RUM explicitly models choice among available alternatives at each level. Thus, the researcher must make basic judgments about how to model the structure of the decision process. As the RUM becomes more widely used for natural resource valuation, the effects of alternative modeling strategies will be more clearly identified. However, EPA's technique of modeling trips in a sequential manner is incorrect. Current random utility participation models invariably model the decision to recreate and the selection of recreation site simultaneously (Morey 1999). Thus, EPA's method of estimating increased participation is flawed. Modeling trips sequentially in this manner guarantees increased participation and value estimates because it does not consider time limitations that can preclude such trips. Neither does this method recognize that the value of an additional trip is its marginal benefit when other opportunities are considered.

The RUM is the preferred method for valuing gains in recreational catch, such as those anticipated to arise from 316(b) regulations. However, EPA's programming and modeling is unclear, leading to difficulties in interpreting results. An analysis of programs and models reveals non-standard approaches to sampling, trip-cost specification, and participation modeling. Moreover, EPA's per-fish valuation numbers are many times those found in published literature (Schuhmann 1998). We presume that inappropriate specification underlies these results. For this reason, we cannot recommend using EPA's random utility estimates in their current form. In the absence of primary research, or at a minimum, more transparent benefits estimation, we recommend transferring values from appropriate random utility studies found in the economics literature.

2.2.3 Inappropriate Characterization of Benefit Timing

Similar to the commercial fishing benefit estimates, EPA fails to discount the recreational benefits appropriately in their analysis. The rate selected for discounting also impacts ultimate benefit estimates. Figure 2.2.1 demonstrates appropriate discounting and increased yield accrual for a single year of increased recreational Silver Perch catch from the Tampa Bay Case Study.<FN21>

As stated previously, the influence of inappropriate benefit timing on net present value is species dependent. For species with a long lifespan, such as black drum, which can live as an adult for 50 to 60 years, the total benefits accruing to recreational anglers from catching these species will be subject to stronger discounting. For such species, this dilution of benefits further magnifies the impact of discounting. These are additional important factors that reduce benefit estimates for recreational fishing. Thus, EPA's omission of appropriate discounting leads to a significant overstatement of recreational benefits.

Figure 2.2.1: Example of Timing of Recreational Benefits from Reducing I&E: Silver Perch (Tampa Bay Case study)
[see hard copy for figure]

2.2.4 Conclusion

The studies EPA chose for the benefits transfer are based on waterbody type, geographic location, and relevant species of fish. EPA focuses on comparing the physical characteristics of the study areas to each case study site. However, there are other aspects in which the studies used are not similar. These include the comparability of affected populations and basic commodities. Furthermore, EPA selects recreational fishing studies to use that are not scientifically sound in terms of the response rate and estimation techniques, thereby violating the soundness criterion for benefits transfer. EPA should select better studies to use in their analysis in terms of similarity and soundness. In violating the similarity and soundness principles of the benefits transfer method, EPA produces recreational fishing estimates that are biased.

When conducting a benefits transfer, competent analysts carefully document necessary assumptions and the sensitivity of estimates to these judgments. EPA fails to state their reasons for choosing a particular study, thereby transferring the assumptions and flaws of the methodology used in the original study.<FN22> In addition, EPA never evaluates, quantifies, or discusses uncertainty in their analysis, which makes their benefits transfer incomplete and their estimates incorrect.

In conducting their RUM analyses, EPA employ unweighted intercept data and incorrectly calculate trip costs. Unweighted data is not descriptive of the general population of anglers due to the over-representation of avid anglers and possible recall bias. In addition, avid anglers tend to overstate their level of activity, leading to an upward bias in recreational benefits. EPA's trip costs are high because of the use of the full wage for individuals reporting any lost wages instead of the general one-third of the wage rate approach. Finally, EPA's fails to characterize the timing of recreational benefits appropriately in their analysis, thereby inflating their estimates. For all the reasons presented in this section, EPA's recreational benefits are biased, overstated, and flawed.

2.3 Nonuse Benefit Estimates

Nonuse values do not require visiting or using a resource (Krutilla 1967). There is considerable agreement that some people hold these values, also referred to as existence or passive-use values, for some resources. Whether such values should be included in a benefit-cost analysis is more controversial (Madariaga and McConnell 1987; Hausman 1993). A major source of the controversy is the inability to externally validate the estimates with methods that do not rely exclusively on hypothetical responses.

Measuring nonuse values through revealed market behavior is not feasible because no behavior is required to experience a nonuse value (Freeman 1993). For this reason, economists have developed hypothetical valuation methods. Currently, CV is the most widely used technique for measuring nonuse values.<FN23> In the CV approach, respondents are asked hypothetical valuation questions in a survey setting. Theoretically, responses are a direct measure of compensating surplus. In practice, answers are often complicated by hypothetical bias.<FN24> Thus, responses do not accurately reveal preferences. Responses are biased upward, in some cases leading to dramatic overstatement of actual values (Hausman 1993). In general, bias undermines the validity and reliability of nonuse value estimates. As a result of these serious measurement problems, it is unclear what the magnitudes of true nonuse values actually are.<FN25>

Citing difficulties with CV, EPA employs a benefits transfer approach for nonuse valuation. While EPA states that difficulties with CV present difficulties with primary research, they base benefits transfer estimates on research using that very technique. Research conducted since Fisher and Raucher (1984) has indicated the lack of reliability of CV (Hausman 1993). Specifically, they cite Fisher and Raucher (1984) in stating that nonuse values should conform to a simple 50 percent (of use values) "rule of thumb." According to this approach, the theoretical existence of positive nonuse values justifies an approximation. The 50-percent approximation of use values is based on an average of resources for which both use and nonuse values have been calculated. For further support, EPA cites Sutherland and Walsh (1985) and Sanders et al. (1990) in implying that nonuse values for angling improvements may actually be greater than 50 percent of the corresponding use value.

In applying this rule, EPA recognizes its weaknesses. Specific drawbacks emphasized by EPA include (1) the dated nature of the supporting literature; (2) differences between the current situation and study subjects; and (3) problems in applying results consistently across different nonuse valuation scenarios. However, instead of explicitly considering these factors, EPA simply acknowledges them and states that they will apply the 50-percent rule until they are able to "revisit the body of literature." The value of applying the 50-percent rule to the current situation depends heavily on the factors EPA mentions. However, the study contains no systematic comparison of theoretically important resource characteristics across studies. At a minimum, EPA's stated intention to revisit relevant literature should include such a comparison.

A review of Fisher and Raucher (1984) employed by EPA indicates that this study focuses solely on the nonuse benefits associated with intrinsic benefits of water quality improvements. Applying the

Fisher and Raucher (1984) findings to nonuse values of marginal changes in catch rate is an extension far beyond that supported by this study. Applying a ratio that values water quality, a nonconsumptive good, to changes in catch rate, a consumptive good, does not comply with EPA Guidelines. As mentioned earlier in Section 2.2.1, the EPA Guidelines (p. 87) recommend using studies in which the basic commodities are essentially equivalent and where the baseline and the extent of change are similar.

Water-quality improvements are in no way similar to marginal changes in catch rates, and, therefore, cannot be considered “essentially equivalent” commodities. Naturally, different commodities cannot have similar baselines or changes. The extent of change for water-quality improvements, such as improved aesthetics, is qualitative with a high level of awareness to a presumably large group of nonusers. The extent of change for marginal changes in catch rates is quantitative with limited levels of awareness to some anglers who could be categorized as nonusers. Another important factor to consider is whether the nonuse-to-use ratios cited in the Fisher and Raucher (1984) study use total benefits as valued by respondents or net benefits (consumer surplus). It is more appropriate to use net benefits that account for associated costs, as this is a true measure of consumer surplus and could affect the nonuse-to-use ratios. Fisher and Raucher (1984) do not indicate what components comprise the use and nonuse values reported in their paper.

The type of in-depth investigation proposed by EPA should consider the theoretical components of nonuse value and their importance in the current situation. In particular, because nonuse values do not depend on direct use of the resource, concepts such as uniqueness, awareness, and value motivation are important factors in their determination. Each of these factors is discussed below.

2.3.1 Uniqueness and Awareness of the Valued Resource

A classic example of a resource often believed to have significant nonuse values is the Grand Canyon (Carson 1991). People may hold positive values for the existence of the Grand Canyon, even if they never plan to visit it. As with use values, we expect that characteristics of the Grand Canyon influence its value, however the traits that matter may be different. Instead of particular physical details, the significance of the resource as determined by its uniqueness and a high level of awareness is more important.

For the mere existence of a resource to have value to people, it must be in some way unique. The Grand Canyon evokes nonuse value in people because it is one-of-a-kind and could not be replaced if damaged. Arguably, there are very few, if any, resources in the world that are a meaningful substitute for the Grand Canyon. This uniqueness and irreplaceability make it valuable for people that never go there. By comparison, resources lacking these qualities should have relatively lower nonuse values.

Even if a resource is unique, it cannot provide nonuse value to a person who is totally unaware of its existence. In the Grand Canyon example, many people in the western United States have considerable awareness and knowledge of the Grand Canyon because information is readily available. Awareness is likely to decrease as distance from the resource increases, even for a prominent resource like the Grand Canyon. For other, less significant resources, awareness is likely to diminish much faster as distance increases (Johnson et at. 2001).

A brief analysis of important nonuse value factors indicates that 50 percent of use values is probably an excessive estimate for CWIS improvements. Awareness and uniqueness are important factors that do not apply to catch improvements from CWIS technology. A healthy marine fishery is a significant and relatively unique resource. Awareness of the presence or absence of such a fishery should be reasonably high, especially for those who live nearby. However, the use component of this study reveals that a healthy fishery is not what should be valued. EPA's recreational benefits analysis values marginal improvements in catch; therefore, nonuse values must be based upon marginal improvements. The nonuse values for marginal improvements in catch rates are quite different than the nonuse values people hold for the presence of a viable fishery. Similarly, awareness of marginal improvements in catch rates is likely to be insignificant for non-anglers. Desvousges et at. (1993) discuss the additional empirical burdens that arise in trying to measure nonuse values that are associated with marginal changes in natural resources. This complication adds further concern as to the appropriateness of using a broad average to value marginal changes in natural resources.

2.3.2 Motivations for Holding Nonuse Values

Consideration of the motivations underlying nonuse value should be part of the analysis. EPA's study states that nonuse values typically embrace "the concepts of existence (stewardship) and bequest (intergenerational equity)." However, EPA makes no effort to consider the applicability of these concepts to the proposed rule. This requires careful consideration of both the improvement being valued by users of the resource and the impact of that value realization on nonusers. To generate use benefits, EPA values catch improvements for current anglers. These catch improvements are both realized by and valued by current anglers. Because EPA's study does not restrict recreational angler benefits to catch-and-release fishing, it is reasonable to conclude that at least some catch improvements are harvested. This fact severs the link between use and nonuse values, undermining the validity of the 50-percent rule for this situation. The nonrenewable nature of use benefits realized by recreational anglers significantly diminishes the likelihood of both existence and bequest motivations for nonuse values. Use of the resource reduces the stock of fish, which is purportedly increased through reduced I&E impacts. Once these benefits have been realized, they are no longer available to others. Thus, in this instance, nonuse valuation predicated upon existence or bequest motivations seems at odds with the presence of recreation use values.

2.3.3 Conclusion

Resources such as fish may have nonuse values, and in some cases these values could be significant. It also is likely that the use values are not capturing all the benefits associated with the 316(b) regulations as there could be some effects on the food chain or other ecological considerations. Of course, EPA has not provided any information to support the presence of such benefits, other than to assert their existence. If EPA were concerned that these values could be significant for these regulations, a prudent course would have been to conduct a properly designed study to evaluate their potential significance. Instead, they have chosen to rely on a convenient rule of thumb that was developed more than 20 years ago and is based on studies that value considerably different changes in environmental quality than the likely effects of the 316(b) regulations.

It is our conclusion that EPA's approach to nonuse values is inconsistent with both sound theory and good empirical practices. In particular, economic theory implies that nonuse values are most important for unique resources with high awareness levels. An entire stock of marine fish could certainly be considered significant. However, it is important to recognize that the potential benefits under consideration are not a consequence of a large discrete change such as the complete loss of a fishery, the improvement in water quality at a waterbody, or the Grand Canyon. Rather, it is a very marginal change to a significant resource, fish, and some poorly defined other effects on the ecosystem. This recognition is crucial because it undermines the validity of EPA's 50-percent rule. Furthermore, from a theoretical perspective, EPA has not addressed the potential inconsistency between its use benefits, which result from the extraction of resources from the ecosystem and nonuse benefits, which often are purported to arise from knowing that fish are present in the ecosystem. This weakens EPA's claim that nonuse values for CWIS technology improvements arise from existence and bequest motivations. Thus, there could perhaps be some motive for valuing the potential effects on the ecosystem beyond fish, but the Agency has not provided a sufficient theoretical or empirical rationale for such benefits. Clearly, such vague connections do not justify EPA's method of deriving nonuse values as 50 percent of use values. While such an approach may be expedient, it is inconsistent with good economic practices. Based on our review of the available information provided by EPA and the current economic literature on nonuse values, we conclude that if such values were relevant for the 316(b) regulations, their empirical magnitude would be quite modest and certainly less than 50 percent of use values.

2.4 Aggregation of Benefits to the National Level

EPA developed an extrapolation method to estimate the national benefits of the proposed Phase II Rule. EPA posits extrapolating data from the eight case study areas to the national level. There are 23 power plants represented by the eight case study areas and no indication that EPA randomly selected these plants. Furthermore, EPA uses only five of these eight case study areas for their extrapolation to the national level. Of these five case studies that represent 19 facilities, three use economic methods<FN26> and two employ the habitat replacement cost method. EPA estimates there are 539 power plants affected by this proposed rule. The case studies are chosen on a convenience-sampling basis with considerations given to data availability.

EPA's use of a convenience sample rather than a scientifically drawn random sample of the case study facilities produces biased results. Convenience samples consist of partial lists of sample members, which is inconsistent with good sampling practices. Random sampling methods are well established protocols for aggregating from a sample to a population based on scientific sampling principles. EPA's Guidelines recognizes the appropriateness of using random samples. Random samples also can be stratified, or grouped, if some types of facilities, or sizes of facilities, or locations of facilities are of greater importance than others. There is no scientific justification for using convenience sampling.

An evaluation of the geographic distribution of the facilities shown in Table 2.4.1 below shows that the Northeast region is over-represented by almost 50 percent. There is no case study example in the Southwest region even though 10 percent of the affected facilities are located here. There is only one case study representing 2 facilities for the entire west coast and there are none located in twenty-five states between Ohio and California. In addition, there is evidence that the EPA sample is biased towards larger facilities. A comparison of the facilities' net generation (as a proxy for size) reveals that the mean of the case study facilities is twice as large as the mean of all in-scope facilities<FN27>. For these reasons, the sampling method EPA employs in selecting the case study facilities is not a random sample and is therefore not representative of the population, resulting in biased estimates. It is possible that the sample is non-representative based on other criteria in addition to geography and plant size (existing CWIS technology, waterbody fish populations, etc.). This would introduce a systematic bias to their results as well. Attempts to secure this data from the EPA were unsuccessful, preventing further evaluation of this issue.

Table 2.4.1: Geographic Distribution of Affected Facilities vs. Case Study Facilities
[see hard copy for table]

EPA employs two methods in aggregating the data to the national level: the Flow Index and the Angler Index. In order to account for the unique characteristics inherent to different types of waterbodies, EPA groups the facilities into five categories prior to indexing: (1) Freshwater, (2) Estuary—Non-Gulf, (3) Estuary—Gulf, (4) Great Lake, and (5) Ocean. For these groupings, EPA assigns Flow and Angler Index weights and extrapolates the baseline losses for all facilities. By grouping the facilities by these five waterbody types, EPA is contending that there is no variability in I&E risk within each of the waterbody types. This is not the case as each waterbody has different species and populations of fish that are at different life cycle stages. For example, the 29 facilities in the freshwater category are extrapolated to 393 facilities. All 29 of these facilities are located on the Ohio River. This applies the I&E risk of the Ohio River to more than 70 percent of the facilities used to develop the national benefit estimates. EPA's grouping of the facilities into general waterbody categories disregards habitat variability and biases the benefit estimates.

The Flow Index relates facilities by the I&E stress they place on their environment. This stress is measured by the millions of gallons per day (MGD) used in the operational flow of the facility's cooling systems. EPA establishes a facility's weighting in the Flow Index based on their operational flow as a percentage share of the total operational flow of all facilities in the same waterbody category. Next, they apply the Flow Index to the baseline losses of the reference facility for that grouping. EPA then sums the total losses for each waterbody type to generate the national baseline losses for all facilities. (See Heimbuch [2002] for a discussion on the mechanics of EPA's Flow Index Method of Extrapolation and concerns about this method.)

EPA uses baseline loss data from selected case study facilities as reference values for the extrapolation. Then they select what they refer to as the "best estimates" which are the "set of extrapolation values the Agency believes are the most reflective of the baseline loss scenarios for each waterbody type." An estimate of fish lost per MGD is developed for each waterbody type based on an arbitrary selection of a facility with that particular waterbody type. This estimate will be correlated with the fish populations present near the plant that was selected: those with the highest fish populations will have the highest fish lost per MGD estimates. EPA then applies this estimate to all facilities within that waterbody type regardless of the fish populations present near the plant. If EPA selects facilities located near large fish populations, I&E estimates will be overstated. An examination of the case study facilities selected for the extrapolation supports this assertion.

Table 2.4.2 illustrates that EPA I&E estimates are overstated because they have selected the facilities with the highest fish lost per MGD within each waterbody type to serve as their reference value.<FN28> For example, EPA chose Salem as the reference facility for the Estuary (Non-Gulf) category. As Table 2.4.2 illustrates, Salem's fish lost (expressed as Year 1 Equivalents) per MGD is 50 to 200 times higher than the other Estuary (Non-Gulf) facilities for which EPA has l&E data. Another example is EPA's use of the Pilgrim facility as the reference value for the Ocean category. Pilgrim has fish lost per MGD values almost four times higher than the other Ocean facility, Seabrook. EPA has sufficient I&E risk data by facility to calculate an average fish lost per MGD across each waterbody type. However, EPA selected only one reference facility per waterbody category—and this analysis suggests they chose the one with the highest fish lost per MGD—thereby producing inflated national benefits estimates. Heimbuch (2002) discusses in more detail EPA's improper use of reference facilities for national extrapolation.

Table 2.4.2: A Comparison of Fish Lost per MGD Across Case Study Facilities by Waterbody Type
[see hard copy for table]

EPA uses the Angler Index to assign a relative "value" to each affected fishery and uses this value to assign a weight to each facility. The Index uses angling activity (measured in Angling Days [AD]) within 120 miles of the facility as a measure of the demand for the affected fisheries. The Angler Index for each facility is divided into two categories—rural and urban AD. EPA calculates the total AD for each facility as a percentage share of the total AD for each waterbody category—thus establishing each facility's weighting in the Angler Index. Finally, they apply the Angler Index to the baseline losses of the reference facility. In estimating the number of angling days by facility, EPA's analysis does not consider the availability of substitute fishing sites. This creates a problem of multiple counting of angling days. In the freshwater category, EPA makes an adjustment for this by treating the 29 Ohio facilities as one facility. They do not make an adjustment for the possibility of an angler choosing a substitute site in any of the other waterbody categories. This approach results in an overestimate of angling days and an overestimate of benefits. See Heimbuch (2002) for a more detailed description of EPA's Angling Index Method of Extrapolation.

2.5 Habitat Replacement Cost Benefit Estimates

EPA introduces the habitat replacement cost (HRC) method for valuing losses of aquatic resources that result from I&E of organisms by a CWIS. EPA argues that HRC can be used to value a broad range of ecological and human service losses associated with 316(b) regulations. They argue that it can both be viewed as a substitute for and a complement to conventional valuation methods because it provides a full valuation of species associated with l&E losses. EPA argues that conventional benefits methods can omit important ecological and public services.

EPA uses the HRC method for the Brayton Point, Pilgrim, and JR Whiting case studies. The estimates are extrapolated from the case studies to the Ocean and Great Lakes aggregate benefits categories. Generally, the Agency uses a four-step process to determine the cost of replacement habitat to provide sufficient offsets for the I&E losses associated with the facility. The process involves quantifying losses, identifying habitat requirements and alternatives that would offset losses, and estimating the cost of the associated habitats. EPA performs this analysis for specific species, assuming that each species represents a biological service. Costs are estimated as annualized unit costs of implementing the various measures.

EPA conveniently overlooks one fundamental flaw associated with using the HRC to measure benefits: it measures costs not benefits. There is no economic rationale for confusing these two different concepts: benefits are associated with people's willingness to pay to have certain products or services while costs are the opportunity costs of the forgone resources used to produce that product or service. There is no reason to expect that costs would be a good proxy for benefits. They may be higher, lower, or the same but that will depend on the unique circumstances of each situation. Thus, there is no basis in economic theory or practice for using replacement costs to approximate benefits. Such an approach is inconsistent with EPA's own Guidelines and contradicts concepts based on hundreds of years of development.

EPA argues that because recreational fishing benefit valuation studies only focus on certain desirable game fish, they do not reflect the benefits from protecting forage fish. (See All-i.) This conclusion is erroneous in that economics recognizes that one can choose to evaluate the consequences of a regulatory action in either the input market, which would correspond to the forage fish, or at the output market, which would be recreational fishing. (See Carlson 1988, and Just, Hueth, and Schmitz 1982). Since changes in the number of forage fish, either positively or negatively, would affect the game fish, it is possible to measure the value of changes in forage fish through their effects on recreational fishing.

In addition, EPA argues that HRC addresses a broad range of ecological and human services that are either undervalued or ignored by conventional valuation approaches. However, EPA's own benefit calculations contradict this view. In particular, EPA includes benefits for nonuse values in their assessment of the 316(b) regulations. (While we disagree with the magnitude of these benefits, we do not disagree with the notion that some benefits beyond use values may be generated by the regulation.) Presumably, these nonuse benefits are intended to reflect values that go beyond direct use values. As we note in our discussion of nonuse values, EPA provides very little documentation on the linkages that are expected between the regulations and nonuse values. This lack of documentation makes it hard to know exactly whether the nonuse values do indeed reflect the benefits that would accrue from protecting fish other than game fish. Thus, if our interpretation of the nonuse value component is correct, then EPA has already addressed the benefits for protecting forage fish with the inclusion of nonuse values, and to contend that HRC is needed, is not substantiated.

EPA suggests that I&E losses may affect services that include human uses such as diving, birding, or boating. (See A11-2.) The difficulty that EPA fails to overcome is to substantiate any linkage between I&E and these activities. EPA's Guidelines discusses the need to establish baseline conditions and to describe exactly how the regulations would change such conditions. (See page 21.) In order for benefits to occur, boaters would have to experience an increase in satisfaction from their boating activities because there are more forage fish or game fish in the relevant areas. The basis for such a linkage seems tenuous at best. Diving and birding also would seem to have at most a marginal impact. Other features such as accessibility would dominate the choices made by these recreators relative to the marginal changes in fish species that would likely accompany the reduction of I&E. Thus, EPA's motivations for including HRC are without economic foundation and are not supported by the purported rationales.

2.6 Societal Revealed Preference Benefit Estimates

EPA employs a method they refer to as Societal Revealed Preference (SRP) to determine the economic value of I&E of special status fish. Special status fish are those fish that are classified as threatened and endangered (T&E). In the San Francisco Bay/Delta estuary, there are eight species of T&E fish that inhabit the waters near two power plants: the Pittsburgh and Contra Costa power plants. The SRP method is used to determine society's value of a T&E fish. The estimated number of T&E fish lost to I&E is then multiplied by this estimated value to determine the total value of lost T&E fish.

EPA contends that a CV study would be the best way to estimate society's value of a T&E fish, or society's willingness to pay. An alternative method was developed due to the cost and time needed to conduct a CV study. The actual amount of money society dedicates to restoring and preserving T&E species was used as a proxy for society's revealed preference value of protecting T&E species. This decision is completely inconsistent with sound economic principles. There is no valid rationale for such an approach within the economic literature, or other regulatory guidance. Moreover, it is not supported in EPA's own Guidelines, which only considers approaches that are based on the principles of consumer sovereignty such as willingness to pay.

Additionally, the Societal Revealed Preference approach leads to nonsensical results. For example, suppose you have two programs, each of which protects the same number of fish equally well. Suppose also that Program 1 costs half as much to administer and implement as Program 2. Under this approach, if an agency chose to implement Program 2, it would be justified in doing so, because the benefits would automatically equal the costs. This result would occur despite the fact that another program could deliver the same results for half the cost. Thus, a higher cost program does not necessarily yield values that are higher than a low cost program. EPA violates basic common sense in confusing costs and benefits. Costs are based on the opportunities forgone and benefits are based on users willingness to pay to have a product, service, or even a government program.

EPA's SRP approach also requires the implicit assumptions that regulatory or management agencies always provide exactly what consumers would have wished and exactly in the correct amounts. There is considerable literature on the factors that can affect a regulatory agency's choice of specific programs (McFadden 1975 and Spence 1975, for example). While the CALFED Bay-Delta Ecosystem Restoration Program Plan (ERPP) program may well be a model of efficiency, there is considerable reason to think that specific programs will be influenced by many factors ranging from the scientific disciplines of the program administrators to their perceptions of the relative importance of certain species or geographic areas. There is little reason to think that these factors will result in decisions that conform to the willingness to pay principle.

Additionally, it is useful to not confuse SRP with the averting behavior approach, which uses the costs of actions that individuals take to reduce their exposure to some form of pollution as a lower bound estimate of benefits. (See Smith and Desvousges, 1986 and EPA's Guidelines). Two fundamental differences separate the averting behavior and SAP approaches. First, in the averting behavior approach, individuals are making decisions that maximize their own personal welfare. In the SAP approach, we have government agencies making decisions based on some unknown utility maximization process. Secondly, in the averting behavior approach, it is possible to directly link the expenditures to the specific harm being avoided. In SRP, the costs are not linked to specific actions but include fixed costs that are unrelated to protecting threatened and endangered species.

Finally, EPA rationale that it was impractical to conduct a CV study is of limited foundation. For example, if such benefits were likely to be significant, then EPA would have had sufficient time to conduct the study since they started addressing these regulations in one form or another in the early 1990's. Moreover, EPA could have chosen to undertake a benefits transfer, as they have done on the recreation benefits. At a minimum, benefits transfers are based on the correct theoretical foundations and can be evaluated for the sensitivity of their results to key assumptions or data limitations. Clearly, this is not the case with the SAP approach. As we show in our Appendix A, benefits transfer also is both time and cost effective. Thus, the SRP approach should be rejected as being without economic foundation and unjustified based on any of the other rationales that EPA purports to justify the method.

EPA compounds the problem of using a completely inappropriate method for measuring benefits by the many logical inconsistencies in its implementation of the SAP methodology. Specifically, EPA identified the cost of the CALFED Bay-Delta ERPP to protect T&E species as one of the components of society's value of restoring and preserving T&E species in the San Francisco Bay/Delta estuary. However, The CALFED program protects more T&E species than those located near the Pittsburg and Contra Costa power plants. There is no adjustment to reflect only those costs incurred to protect the eight species of T&E fish near the power plants. Moreover, there are eleven program elements that address several goals in addition to restoring and preserving T&E species. The ratio of costs allocated to restoring and preserving T&E species are arbitrarily determined across program elements potentially overstating the cost estimates as well.

Another component of EPA's estimate of society's value of restoring and preserving T&E species in the San Francisco Bay/Delta estuary is the opportunity cost of foregone water used. The estuary provides over 50% of California's supply of freshwater and there are restrictions on withdrawals due to various endangered species acts. The amount of water restricted is based solely on a regulatory policy and not on society's willingness to forego consumption to preserve T&E fish.

EPA's methodology for developing these cost estimates involves arbitrary assumptions and adjustments. Specifically, EPA estimates water reductions of 40 to 60 percent from supply restrictions. They also estimate a baseline of 7 million-acre feet that represents unrestricted water use. However, EPA provides no supporting documents to substantiate the reasonableness of the baseline. The EPA's source of this information is from personal communications with the California Division of Water Resources and the Central Valley Project. These communications are not documented nor are they substantiated with other sources. EPA further estimates the value of water through a series of undocumented transformations. This exercise concludes with a series of calculations of per-fish values that are illogical and undocumented. Given the vagueness and lack of documentation of the assumptions throughout this analysis, the validity and reasonableness of the estimated value of foregone water used is highly questionable.

[comment text continued in 316bEFR.041.452]

Footnotes

20 The following text refers to the program Coastal Restricted Choice Sets III.sas.

21 The discount rate applied is the 3 percent recommended by OMB for social discounting.

22 In order to evaluate a study's soundness, the study must be well-documented. In some cases, studies cannot be used in benefits transfer simply because not enough information is available to properly evaluate it.

23 Recently, there has been some research into using stated preference (SP) surveys to measure nonuse values. While more complex than CV, SP still requires respondents to value unfamiliar, hypothetical commodities. As a result, SP is as subject to similar problems with hypothetical bias as CV.

24 Hypothetical bias is the potential error that results from not confronting an individual with a real situation. CV responses and SP responses likely reflect hypothetical bias.

25 See for example, Freeman's (1993) discussion of the difficulties associated with disentangling the use and nonuse

components of total value.

26 The economic methods are benefits transfer and random utility analysis.

27 Due to data restrictions, this analysis examines 396 of the 539 in-scope facilities, including 11 of the original 23 case study facilities

28 Due to insufficient data provided by EPA, we are unable to analyze the three other waterbody types in a similar manner.

EPA Response

The commenter states that random utility analysis presents the best opportunity for correctly valuing increased recreational catch resulting from reduced impingement and entrainment. The commenter, however, identifies several methodological flaws in EPA's analysis. From the commenter's point of view, these flaws completely invalidate EPA's results. Each of the commenter's arguments is addressed below.

EPA agrees that "In the context of 316(b) regulations, random utility analysis presents the best opportunity for correctly valuing increased catch hypothesized to result from I&E reductions." However, EPA does not agree with the commenter that EPA's RUM approach is invalid. It appears that the commenter did not properly understand EPA's analysis, the NMFS data used, and how NMFS' surveys are conducted and adjusted.

1. Use of the Intercept Data

EPA does use intercept data in the site choice model. Most RUM studies use intercept data to evaluate site choices. EPA uses data from the National Marine Fisheries Service (NMFS) Marine Recreational Fishing Statistics Survey. NMFS has very carefully designed its sampling strategy to capture the most representative sample of anglers possible, and they have been conducting and refining their surveys for many years, resulting in one of the best surveys available for recreational activities. The NMFS Data Manual, Chapter 1, Survey Methodology (http://www.st.nmfs.gov/st1/recreational/pubs/data_users/index.html) discusses data collection and sampling procedures (DCN #6-3189). Two independent surveys are conducted: a telephone survey of households, and an intercept survey of anglers at fishing access sites. Data on fishing trips in the previous two months is collected in the telephone survey. Information on actual catch is collected in the intercept surveys. Economic information is collected in an add-on to the intercept survey. According to NMFS: "Data from the two independent surveys are combined to produce estimates of total participation, effort and catch. Survey sampling and estimate generation is stratified by subregion, state, fishing mode..., fishing area, and bimonthly wave." For the intercept surveys, sampling is allocated between months of a wave (a two-month period, e.g. July - August) according to proportion of fishing pressure in each month. Survey sampling sites are randomly selected from all access sites, weighted by expected fishing activity. Sampling is also distributed among weekdays, weekends and holidays.

It is not necessarily true that the data provide estimates of values for changes in catch rates that are biased upwards. First, NMFS sampling strategies, described above, are designed to minimize such bias. Second, while it is likely that more avid anglers are more likely to be intercepted, it is not clear from economic theory that more avid anglers have higher values for increases in catch rates than less avid anglers. In fact, it is possible that the opposite could be true. A more avid angler might also be more skilled and therefore already have a higher catch rate than a less avid angler. Thus, the value of a marginal change for the more avid/more skilled angler would be lower than that for a less avid/less skilled angler, if diminishing marginal utility of catch rates holds.

EPA estimates total benefits by multiplying estimated values per day for changes in catch rates by the total number of fishing days in each region, as estimated by NMFS. NMFS refers to this estimate as "total fishing effort." Fishing effort is defined by NMFS as "the estimated number of fishing trips taken by individual anglers." This is estimated for each state, mode, and wave. Data are adjusted for outliers when estimating fishing effort, by reducing the number of trips for any household reporting more than the 95th percentile for the five-year distribution of trips to the 95th percentile. This generally reduces total fishing effort estimates by 15-20 percent. Estimates of fishing participation ("the number of participants in recreational fishing activities") are derived from intercept data and effort estimates. "The estimation procedure accounts for varying levels of reported fishing avidity...The probability of selection in the intercept survey is higher for a person who fishes frequently than for a person who seldom fishes. NMFS corrects differences in probability of selection by using the reciprocal of the mean number of trips each intercepted angler reported having taken in the previous 12 months." None of the NMFS studies, including the Hicks et al. study that several commenters recommend for benefit transfer, include further corrections for avidity bias.

In summary, EPA believes that NMFS has adequately corrected for sampling bias through long-established and tested survey and statistical methods. The NMFS data collection methods and estimates of fishing effort (number of trips) and total catch have been carefully designed, tested and adjusted in order to minimize bias as completely as possible. Because of the rigorous level of NMFS' statistical methods, EPA believes that sampling bias is minimized to the greatest degree possible.

2. Incorrect Estimation of Trip Costs

The comment indicates that the commenter did not properly understand EPA's analysis related to inclusion of wage rates in the RUM model. EPA follows generally-accepted RUM procedures for estimating the opportunity cost of time. In regions where data were available on angler income, EPA included income for anglers who reported that they lost income by taking the fishing trip, and who reported their income. However, in all of these cases, only a minor fraction of anglers in the RUM data set provided information on household income. For example, in the mid-Atlantic region, only 191 respondents reported losing income and reported income (or had income estimated using other data), and thus were assigned a value for income in the model; 11,911 anglers either did not lose income, did not report income, or were not assigned an estimated income, and thus were not assigned an income in the model. For these anglers, opportunity cost of time was measured only in terms of time spent driving, without a dollar value assigned to that time. Because only 191 of over 12,000 anglers were even assigned an opportunity cost of time, any changes in the opportunity cost of time in the model would have a minuscule affect on value estimates. Similarly, in the Gulf region model, 181 respondents were assigned an opportunity cost of time, while 10,081 respondents were not. It is most likely that including income for all anglers, at 1/3 the wage rate, would have increased benefit estimates. Thus, EPA's approach is conservative.

In some regions, NMFS did not collect income data. For these regions, EPA estimated income for each angler using the median household income by zip code from the U.S. Census. Opportunity cost of time was estimated as 1/3 of the household wage (household income divided by 2080 hours), as recommended in the comment.

In summary, EPA does not believe that the Agency's analysis incorrectly calculates opportunity cost of time in the RUM models. If anything, EPA's measure of opportunity cost of time would result in downward bias in estimates for regions where income was reported for extremely small numbers of respondents. For regions where income was estimated using median household income from the U.S. census, it is impossible to determine the direction of bias, if any, without having a way to compare the median income of anglers to the median income of all households in the region. EPA has followed standard, generally-accepted methods of RUM modeling, and there is no clear evidence of upward bias in per-day estimates.

3. Use of Incorrect Modeling Procedures

The commenter argues that sequential modeling of trips used in the proposed rule analysis is incorrect. EPA disagrees. A number of different approaches to modeling fishing participation appear in the published literature, including the Poisson trip model used in EPA's analysis and the repeated logit model that allows building the participation decision directly in the RUM (Morey et al.,1999). EPA believes that its Poisson trip model is adequate and valid for the purposes of the 316b analysis, because the trip model is used only to estimate the percent change in total trips when catch rates change, not the absolute number of trips. As described above, EPA uses NMFS' estimates of total fishing effort (fishing days) to estimate total values. The percent change in catch rates predicted by EPA's Poisson trip model is applied to NMFS total effort to predict the change in trips with increased catch rates. In most cases this percent change is quite small, so EPA does not believe that applying more complicated trip estimation methods would provide enough of a difference in the estimates to justify the additional effort in terms of programming required.

There is no general consensus among economists as to whether "modeling of trips in a sequential manner is incorrect." All of the NMFS studies, based on the initial study of McConnell and Strand (1994)(DCN #6-3174), use sequential estimation. From McConnell and Strand: "The random utility model departs from the standard framework by considering decisions on a particular choice occasion. It does not incorporate features to evaluate the angler's behavior over a longer period of time. ... We model the angler as first choosing the mode and target species and then, conditioned on this choice, choosing the site. These decisions can be separated because of the structure of the utility function (pp. 69-70)." "In applying random utility models to recreation systems, we model the decision per choice occasion and this leads to an additional limitation of the model. Because our discrete choice model explains decisions among discrete alternatives, it is structured so that each trip is a mutually exclusive event. From a practical standpoint, this simple model is satisfactory, because the direction of bias is known and likely to be small for most applications. ... Conceptual advances are illustrated by Parsons and Kealy (1994)(DCN #6-3257) and by Morey (1994) (DCN #6-3258), who have recently made progress in developing models to handle the quantity and distribution of trips (p. 71)." "The welfare estimates that are calculated are per choice occasion. ...if the change in circumstances is great enough to induce substantial changes in the number of trips taken, then the welfare measure will underestimate the effect of an improvement in circumstances and overestimate the effect of a decline. ... To compare the estimates derived from a constant trip assumption, we develop a model of the demand for trips as a function of the inclusive value, among other variables. This model, which is satisfactory in most pragmatic aspects, converts the unit of analysis from representative trips to individuals and hence requires estimates of the number of anglers for aggregation (p. 72)."

Parsons, Jakus, and Tomasi (1999)(DCN #6-3198) compare welfare estimates from four methods of linking site choice RUM models to seasonal trip (participation) models, using a single data set and applying each method to their data. The four methods compared in this study include: Morey et al. (MRW), Hausman et al. (HLM), Parsons and Kealy (PK), and Feather et al. (FHT) Although they "are ostensibly developed from different theories, we find that they are nearly the same mathematically." HLM estimate trips using a Poisson-based count model, with a price index based on the inclusive value as an explanatory variable to explain the number of trips. MRW use a repeated logit model to build the participation decision (i.e., go/don't go fishing choice) directly into the RUM. However, both relate the number of trips during the season to the inclusive value index. "Econometrically, they differ only in their treatment of the data-generating process (functional form and error distribution) selected for the estimation..." Parsons, et al. estimate a new model, using a demand function specified as in MRW, but applying HLM's welfare analysis, and find that the results are the same. "That is, analyzing the MRW empirical form using HLM theory and welfare analysis gives us the same welfare measure as using MRW theory and welfare analysis. The 'stories' told by the theorists to motivate their models are different, but they are equivalent mathematically when a common functional form is used." The same results hold when the HLM demand model is analyzed using MRW theory and welfare estimation. "With the exception of differences in functional form in their empirical analysis then, the MRW and HLM models are equivalent." All four models are estimated using FIML (Full Information Maximum Likelihood) with site and trip models estimated simultaneously. All (HLM, FHT, and PK) but MRW used Poisson count models similar to those used in EPA's analysis; MRW used nested logit.

4. EPA Results Are Not Comparable to Those Found in Published Literature.

The comment suggests that EPA's per-fish valuation numbers are "many times those found in published literature." However, EPA found that the Agency's per-fish numbers were for the most part comparable to estimates in the published literature. See Chapter 4 in Sections B through H of the Regional Study Report (DCN # 6-0003). The comment refers to an article by Schuhmann (1998). Table 11 of Schuhmann gives "Mean Compensating Variation for a 25% Increase in Expected Catch: Boat Mode" He does not give a value per fish, so that comparing EPA's estimated values to those from Schuhmann is not straightforward.

5. Inappropriate Characterization of Benefit Timing

In response to public comments received on the proposed rule analysis, EPA incorporated timing of benefits in its analysis of recreational use benefits of the final 316(b) rule. See Section XII.D.2 of the 316 (b) rule preamble for detail.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment #316bEFR.005.035.

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Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.02.01.01
General/Benefit Transfer

APPENDIX A: BENEFITS TRANSFER APPROACH

Benefit-cost analysis (BCA) provides the basic framework for comparing benefits and costs of technologies available for minimizing AEI of CWIS. Benefits transfer employs fundamental and cost-effective methods for interpreting, summarizing and integrating available information into a new policy context. EPA utilizes the benefits transfer approach to estimate the benefits from reducing I&E at existing large power plants. This section highlights the appropriate steps involved in performing a benefits transfer using sound economic principles and discusses how EPA's methodology is flawed.

A.1 Benefits Transfer Method

The benefits transfer method provides an economical way to conduct research when a full-fledged study is not practical or necessary. This method applies results from a previous study to a new policy context, occasionally with adjustments. The benefits transfer approach economizes on the time and expense of primary data collection and developing new estimates.<FN29> However, the benefits transfer method still requires careful analysis and use of information. Benefits transfer methods require the use of basic microeconomic and econometric tools, as well as careful judgment and creativity.

Figure A.1.1 illustrates the five basic steps involved when performing benefits transfer. The figure orders the steps to show the conceptual relationship between them, although in practice these steps may be performed in a different order or simultaneously.

The three types of benefits-transfer approaches are the basic benefits transfer, benefits function transfer, and meta-analysis. In the basic benefits transfer, the researcher selects the best available study from a range of studies that use other valuation techniques (i.e., CV, travel-cost method, or RUM) and simply transfers the average value from that study to the new site. EPA employs the basic benefits transfer approach in their estimation. For example, EPA selects the McConnell and Strand (1994) marine fishing study and transfers their value for small gamefish in Florida to the Tampa Bay case study.

Figure A.1.1: Five Steps for Performing Benefits Transfer
[see hard copy for figure]

There are several advantages to using the benefits transfer method. The first and foremost advantage is cost-effectiveness. Although there are certainly costs associated with the benefits-transfer method, it is the least costly method for valuing natural resource services due to the utilization of existing studies and data. As the EPA states in their Guidelines, original studies and data are costly and time-consuming, and benefits transfer can reduce the resources required to evaluate the benefits and costs of a proposed policy. This advantage is particularly important in light of the demands of the regulatory process. Benefits transfer can be used as a "scoping" technique to identify where more analysis is necessary and where it is unproductive. Furthermore while the benefits transfer process is both logical and thorough, it is also flexible. A benefits transfer can evolve over time as additional or better quality information becomes available.

Estimates using the benefits-transfer method obviously are not as accurate as results from carefully conducted original studies because the benefits-transfer method does not use estimates for the specific study site. Instead, the researcher is constrained by the availability of appropriate original studies. The original studies used for transfer purposes generally are not designed for the transfer application, and finding suitable studies can be difficult. As Brookshire and Neill (1992) comment, the transfer can be no more reliable than the original estimates upon which it is based and can only magnify the uncertainty surrounding the original estimates. To ensure acceptable results, transfer analysis must identify a transfer study that is both suitable for the specific transfer and scientifically sound.

Such assumptions introduce subjectivity and uncertainty into the analysis. Competent benefit-cost analysts carefully document necessary assumptions and the sensitivity of estimates to such judgments. This documentation provides decision makers with full information about the sources and nature of uncertainties and allows them to evaluate the potential consequences of uncertainties in making their decisions. This view is a reminder that BCA provides decision-making tools, not decision-making rules.

A.2 Selecting a Study for Benefits Transfer: Similarity and Soundness

The benefits transfer process described above hinges on the selection of appropriate studies to use in the transfer. Evaluating original studies for use in a benefits-transfer context relies on two key criteria: similarity and soundness. <FN30> If either of these assumptions is not met, then using that study for a transfer can result in biased estimates.

A.2.1 Similarity

The first criterion requires the evaluation of the similarity of the original study for answering the questions posed in the transfer study. In order to determine the similarity of the original study for transfer, the researcher can compare many different aspects of the study. For example, the physical characteristics of a resource will affect its value. Attributes such as size, water quality, accessibility, and amenities all factor into the value of a site and should, therefore, be as similar as possible between the original study site and the transfer site. In addition, the services provided by the site are important. For water resources, these services may include boating, fishing, swimming, shoreline hiking, and water skiing. Resources that support more services are more likely to have higher values, so services should be comparable across the original study site and the transfer site.

The number and quality of available substitute sites will also affect the value that people place on a site. A change in quality at a site with many substitutes will result in a smaller change in value than for a site that is relatively unique. As an illustrative example, consider two extremes. Site A is a small lake in the middle of an area with 30 other identical lakes. Site B is a lake in an area with no other flat-water recreational opportunities. A decrease in quality at Site A will have a much smaller effect on users than a similar decrease in quality at Site B because Site A users can easily substitute another site. Therefore, a researcher should not transfer a value for a unique resource with few substitutes to a resource that has many available substitutes because the transfer value will overstate the benefits of improving the latter resource.

The characteristics of the users of a resource can also affect the value of that resource. Because consumers have different preferences, some consumers may value certain features of a resource differently than others will. Socioeconomic characteristics, along with a budget constraint, help explain individual preferences for particular resource services, which affects demand. For instance, age may determine whether an individual uses a natural resource for specific recreational purposes. Similarly, income may affect individuals' value for the services of a natural resource. Transfer values may be adjusted to reflect differences in characteristics between the transfer site and the injured site. However, these adjustments should have some empirical justification. In the past, many researchers have made adjustments based on ad hoc professional judgments. Decisions based on the analysts' discretion increase the potential for adjustment errors.

A.2.2 Soundness

The second criterion of the benefits-transfer approach requires that the study being transferred is scientifically sound. Several economists (Smith 1992; Brookshire 1992; Desvousges, Naughton, and Parsons 1992; McConnell 1992; and Boyle and Bergstrom 1992) recommend reviewing existing studies for their scientific soundness because existing studies have varying levels of quality. Because the benefits-transfer approach involves transferring the value for a different site from a previous study and applying it to a new site, the analyst also transfers the assumptions and flaws of the methodology in the previous study.<FN31> Three important components of scientific soundness are sampling protocols, response rates, and estimation technique.

The sampling protocol includes the definition of the target population, sample selection methodology, and sample size. The sample should be randomly drawn and should reflect the target population. Also, the target population should be empirically determined and documented. An adequate sample size is necessary to obtain reliable estimates (Lansing and Morgan 1971; Backstrom and Hursch-Cesar 1981). Studies need to demonstrate that the sample size is adequate to estimate the valuation models with sufficient precision. Failures in the sampling protocol can bias the results of the original study.

Response rate is the second important aspect of scientific soundness. To minimize the potential for nonresponse bias, analysts should select benefits-transfer studies that have a high response rate. Nonresponse bias refers to the bias that may result from failing to include the values of nonrespondents. The concern is that nonrespondents are somehow different from respondents, and those differences are not reflected in the study results. Because nonrespondents are a part of the relevant population, study results may not be representative when response rates are low. While no definite guidelines exist for response rates, NOAA has recommended a 70-percent response rate as the threshold for environmental valuation studies (59 Fed. Reg. 1183 [1994]). <FN 32>

The third component of scientific soundness is that the existing study should use valid and accepted estimation techniques. The results must be robust and consistent with basic economic principles of demand and utility theory. Values should not be transferred from studies lacking these general qualities because the weaknesses will be transferred to the benefit-cost analysis for the site.

Economists generally prefer preference data based on actual behavior rather than responses to hypothetical situations. For example, in the case of recreational fishing benefits, RUMs are the best technique for estimating consumer surplus for improvements in fish catch. If no acceptable RUM results are available, then a high-quality SP or CV study may be the next best alternative for obtaining reasonably good estimates of consumer surplus for recreational fishing. <FN 33> Nevertheless, an SP or CV study produces hypothetical use values, not use values based on actual behavior or market transactions. Consequently, use values from even a high-quality CV study should be calibrated whenever possible using information on actual behavior or market transactions, as recommended in the NOAA proposed NRDA regulations (59 Fed. Rag. 1983 [1994]). <FN 34>

EPA focuses on comparing the physical characteristics of the studies to each case study in their benefits transfer. However, there are other areas in which the studies used are not similar, such as those listed above. Furthermore, EPA selects studies to use in their benefits transfer that are not scientifically sound in terms of the response rate and estimation techniques, thereby violating the soundness criterion for benefits transfer. EPA should select better studies to use in their analysis and should take more care in analyzing those studies in terms of similarity and soundness. Hence, EPA's benefit estimates are biased.

A.3 Role of Uncertainty in Benefits Transfer

EPA fails to evaluate, quantify, or discuss uncertainty in their benefits transfer analysis. This section discusses uncertainty in benefits transfers in terms of:

-the impacts of uncertainty
-how to account for uncertainty.

In statistical analysis, the term uncertainty refers to the statistical reliability of estimates. It means that a range of likely results can be inferred from observed data, where some outcomes are more likely than others. While uncertainty is an inescapable aspect of quantitative analysis, that does not imply that results are inevitably vague or indeterminate. Instead, benefit estimates are most useful to decision makers when the causes of uncertainty are clearly identified and quantified.

A.3.1 Impacts of Uncertainty

Although uncertainty is intrinsic in all forms of empirical analysis, it is a particular concern in transfer studies. Benefits transfer requires the creative use of limited information. Thus, professional judgment and simplifying assumptions necessarily play a central role. Any such transfer study must be regarded as incomplete if it lacks a careful evaluation, quantification, and discussion of uncertainty. Quantifying uncertainty can help clarify the effects of various forms of uncertainty and help decision makers interpret and use transfer estimates appropriately.

A.3.2 Accounting for Uncertainty In Benefits Transfer

While sources of uncertainty can be classified and often assessed, they cannot be eliminated entirely. To reflect the inherent uncertainty in a benefits transfer study, analysts should carefully track and quantify the uncertainty in their analysis. The results can then be presented as the most likely range of effects and thus help decision makers to interpret and use the analysis appropriately.

Statistical models use the attributes of a sample to infer information about the attributes of the group as a whole. This information generally takes the form of coefficients estimated to show the relationship between a dependent variable (such as the number of fishing trips taken) and explanatory variables (such as distance to a fishing site). The estimated coefficient represents the estimate that is most likely to be true, given the data used. For example, suppose a simple travel-cost model estimates the following relationship between distance and number of per-capita trips:<FN35>

Number of per-capita trips = 10—0.2 * (distance to the site)

The estimate in this example is the coefficient —0.2. It is the most likely value of the true relationship between distance and per-capita trips, based on available data. Thus, in this simple example, we expect that people living five miles from the site will take, on average, nine trips (10— (0.2 x 5 miles)) to the site.

In addition to the estimated coefficient, models also estimate a standard error for that coefficient, which indicates how precise or "noisy" the estimate is. Using that standard error, analysts can calculate a confidence interval around the coefficient estimate that reflects the variability of the observed response relative to the variability of the explanatory variables. A confidence interval is the range of values within which some percentage—say 90 percent—of repeated studies would fall. Viewed in another way, a 90-percent confidence interval provides a range in which the true value would fall with 90-percent certainty. In this simplified example, the coefficient estimate is normally distributed with mean —0.2 and standard error 0.09. In this case, the 90-percent confidence interval for the coefficient would range from —0.05 to —0.35, implying that there is a 90-percent chance the actual relationship between distance and number of per-capita trips falls into that range.<FN36>

A.3.3 Using Monte Carlo Simulations In Benefits Transfer

Monte Carlo simulations provide a more rigorous approach to measuring uncertainty when using estimates derived from a number of parameters and values. A Monte Carlo simulation draws a large number of random samples from each of the underlying distributions of values and then calculates the corresponding combined values for each draw.<FN37> For example, in the Delaware case study, EPA uses estimates from more than one study to derive their 1 fish/trip values for species of small game fish and bottom fish. EPA transfers the uncertainties about the applicability of the estimates as well as the statistical uncertainty from the original studies to these values. Using a Monte Carlo simulation in their analysis would have alleviated some of this uncertainty.

A.4 Using Sensitivity Analysis in Benefits Transfer

A sensitivity analysis evaluates the effect of assumptions and analytical decisions on transferred values. With this type of analysis, estimates are calculated under a variety of sets of assumptions to deduce the effect of each set of assumptions on the final value. In this way, a sensitivity analysis helps distinguish between important and unimportant assumptions and results in selecting a set of assumptions that are both plausible and conservative in a meaningful sense.

Performing sensitivity analyses has several additional benefits. Determining which assumptions have a large effect on the estimate helps to identify areas where additional effort in either obtaining further information or conducting additional analysis is likely to be relatively cost-effective. Thus, sensitivity analyses may indicate where limited analytical resources can best be allocated to produce the greatest improvement in the quality of the estimates. In addition, a sensitivity analysis can help distinguish between results that rely primarily on data and results that rely primarily on professional judgment. While “bad” data are not necessarily superior to good judgment, the analyst should make clear to what degree results depend on assumptions rather than empirical information.

Footnotes

29 See Desvousges, Johnson, and Banzhaf (1998) for a recent, comprehensive discussion of transfer methods for environmental policy analysis

30 National Oceanic and Atmospheric Administration’s (NOAA’s) proposed natural resource damage assessment (NRDA) regulations list three basic issues that federal trustees should consider when selecting transfer values:

-comparability of the users and the natural resource and/or service being valued
-comparability of the change in quality or quantity of the resources and/or services
-the quality of the studies being transferred (59 Fed. Reg. 1148[1994]).

NOAA also recommends several questions for researchers to ask with respect to these three basic issues, but does not elaborate on these issues. Thus, NOAA does not provide any specific criteria that federal trustees must follow when using the benefits-transfer approach. As noted in Smith (1992), such critena are needed to produce more reliable natural resource damage estimates

31 In order to evaluate a study’s soundness, the study must be well documented. In some cases, studies cannot be used in benefits transfer simply because not enough information is available to properly evaluate it.

32 There is no statistical criterion for determining the minimum acceptable response rate. Researchers must incorporate well known techniques for maximizing response rates in designing and administering the survey. Regrettably, growth in direct marketing has had a negative effect on the maximum achievable response rate in any given area. Even if contacts do not respond fully to the survey, collecting minimal information on demographic characteristics of refusals can help control for possible response bias in subsequent analysis.

33 While a high-quality CV study may produce reliable use-value estimates, CV does not produce reliable estimates of nonuse values (i.e., values that people may have for the mere existence of natural resources that they do not use). See our comments on NOAA’s proposed NRDA regulations for more details (Desvousges et al. 1994).

34 Calibration requires data that matches intentions with actual purchases. There are many such studies for recreation and many in the marketing literature. In particular cases, it may be possible to identify a study that is sufficiently similar to the problem under consideration to assist in adjusting for hypothetical bias.

35 The example here has been dramatically oversimplified to assist in the explanation of statistical concepts. It does not reflect an actual model.

36 The 90-percent confidence interval for a normally distributed variable is calculated as the mean ± (1.645 x standard error). In this example, the confidence interval would be (—0.2) ± (1.645 x 0.09).

37 See Fishman (1996) and Halton (1970) for an introduction to Monte Carlo techniques. Most commercial statistical software packages include procedures that can be adapted for Monte Carlo analysis. In addition, spreadsheet programs such as Excel can perform random draws on normal distributions for simple Monte Carlo simulations.

38 The proposal discusses and dismisses hatchery-based offset in Chapter A-11 of the Facilities Benefits Case Studies document. Yet the method as proposed cannot avoid “hatchery-style restoration” because of the focus on individual species, rather than whole-ecosystem services.

39 Likely the majority of cases, as pointed out on page 17192 if of the Federal Register notice, Vol. 67, No. 68, April 9, 2002

40 In practice, it would likely be difficult or impossible to measure the specific restoration-site related increase in production. This is due to inherent natural variability, not to measurement weaknesses. This is another strong argument for

compliance by habitat provision, not by (scientifically noncredible and nonmeasurable) production of particular species.

EPA Response

This comment focuses on EPA's use of benefit transfer for the proposed rule analysis.
For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed generally accepted procedures, and has carefully applied benefit transfer methods.

For detail on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

For the North Atlantic region, EPA's benefit transfer uses the benefit function from the Hicks, et al., study recommended by several of those who commented as the most appropriate study for benefit transfer for the North Atlantic region. By using benefit function transfer, EPA was able to make appropriate adjustments to Hicks' model, to estimate values for relevant changes in catch rates. This benefit function transfer follows accepted methods and was performed carefully to provide the best available estimates of values for changes in catch rates for the North Atlantic region.

For the Inland region, EPA did a benefit transfer using values from several studies. EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) in developing a benefits transfer approach for the Inland region. The steps were followed as recommended in the Guidelines when using BT: (1) describe the policy case; (2) identify existing, relevant studies; (3) review available studies for quality and applicability; (4) transfer the benefit estimates; and (5) address uncertainty. Further information on the methods EPA used to estimate recreational fishing benefits for the Inland region is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter H4: Recreational Fishing (DCN #6-0003).

EPA agrees with the commenter that it is necessary to evaluate uncertainty in benefits transfer analysis. The Agency, however, disagrees that it failed to evaluate uncertainty. EPA carefully evaluated and discussed uncertainty in the uncertainty and limitation section in the recreational fishing benefits chapters. See the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). The Agency, however, points out it is not always feasible to quantify uncertainty due to data limitation. When feasible, the Agency used the state-of-the-art approaches such as the Krinsky and Robb simulation method to quantify uncertainty (see Chapter A12, Non-use Meta-Analysis Methodology, in the regional study document for detail, DCN #6-0003).

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Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.02.03
Use of Replacement Costs (HRC and hatchery-based)

APPENDIX B: RESTORATION AND MITIGATION CONSIDERATIONS

Facilities may decide to undertake mitigation actions to offset the potential losses from I&E. The HRC can be used to help determine the appropriate scale of the mitigation options. However, it is important to not confuse this mitigation scaling with measuring the benefits of the mitigation. As noted in this report, appropriate economic measures of benefits require that they be based on the willingness-to-pay principle.

Conceptually, HRC is based on sound scientific principles and could play an important role in evaluating mitigation opportunities. It is also useful to consider HRC as part of larger regulatory programs such as Integrated Coastal Management (ICM) and Integrated Watershed Management (IWM). ICM is:

a process by which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space. The process is designed to overcome the fragmentation inherent in single-sector management approaches … ICM is grounded in the concept that the management of coastal and ocean resources and space should be as fully integrated as are the interconnected ecosystems making up the coastal and ocean realms … if a degraded coastal habitat affects the attainment of fisheries management goals, management of that habitat should be within the ambit of an integrated coastal management process (Cicin-Sain and Knecht 1998).

Similarly, IWM is:

...trans-media environmental management—management using the "ecosystem" concept… born of experience showing that single-medium or single-source management was not successful… (Heathcote 1998).

Although the HRC method in concept is useful for evaluating mitigation measures on a site-specific basis, the method in practice, as presented by EPA in the 316(b) proposal, is intensely flawed. Specific areas of concern are enumerated and discussed below.

1. The proposed rule should clarify that HRC would only be appropriate as a mitigation approach. In addition, it should clarify the revised objectives. As proposed, the objectives and compliance standards are vague and contradictory.

The proposal (as described in Section VII of the proposal published in the Federal Register) implies that restoration to offset losses would have the objectives of maintaining "fish and shellfish at a level comparable to that which you would achieve were you to implement the requirements of Section 125.94" and maintaining "biotic community structure and function" at a level "comparable or substantially similar to that which would be achieved through Section 125.94(b) or (c)." The proposal does not define "fish and shellfish," "biotic community structure and function," or "comparable or substantially similar." Elsewhere (in the Summary of Alternative Regulatory Options), the proposal seems to define “maintaining fish and shellfish” as “demonstration of comparable performance for species of concern.” The latter application (species-by-species offset valuation of restoration methods) is applied in the case studies provided with the proposal.

It is important to understand that individual species and biotic community structure and function are quite separate and distinct aspects of the ecosystem. Populations of individual species are highly variable in space and time, while ecosystem structure and function are higher-level properties and tend to be more stable (Odum 1983).

Restoration is not a meaningful concept if the objective is to replace or maintain precise species-by-species equality in a waterbody. To do this would simply mean that the exact number of individuals of each species and life stage lost via the CWIS would need to be replaced. In this case, restoration is an effective option only if the habitat required to “produce” the desired specific number of individuals of the desired particular species is known and can be provided. For most aquatic organisms and nearly all fish species, habitat is not so specific, nor can the productive capacity of habitat be known so specifically.

However, from an ecological perspective it may be more important to maintain the biological processes of the waterbody than the particular species relationships. For example, many, if not most, predatory fish species are willing to feed on a wide array of forage fish species as long as sufficient nutrition is provided by the forage base (Ryder and Kerr 1978, Gerking 1994). If the major impact of a particular CWIS is on the forage base of the waterbody, restoration options that would produce sufficient forage to offset the losses (without regard to species composition) would have high ecological value and should be encouraged in the rule.

The most effective way for the proposal to accommodate these ecological realities would be to clarify and specify restoration option objectives. In cases where CWIS effects are of concern because of individual species losses, the rule should specify that restoration options (and associated monitoring requirements) would focus on those species with the attendant technical needs for habitat-specific “production” and demonstration of same (acknowledging that for many species restoration other than individual replacement [as by hatchery] is difficult or impossible given the present state-of-the-science) <FN38> In cases where CWIS effects are of concern at the level of trophic interactions, <FN39> the rule should encourage restoration with monitoring requirements that specify appropriate, trophic-level (vs. individual species) demonstration thresholds. It is in the latter case that restoration alternatives are particularly applicable, both for their ecological usefulness and for their effectiveness in evaluating mitigation.

2. The proposed rule should be made consistent with the technical foundations of the HRC Method. As proposed, the language of the rule is highly inconsistent with the scientific basis of the HRC. This inconsistency makes it impossible to apply the HRC for compliance purposes.

The proposal (Section VII of the Federal Register notice) specifies the maintenance of “fish and shellfish” as a goal. Elsewhere (for example, on page 17190 of the Federal Register notice), the rule seems to equate “fish and shellfish” with particular species. On page 17190, bullet-point descriptions of CWIS impacts refer to “...aquatic species present...,” “...ages and life stages of aquatic species...,” “...species’ exposure...,” and (in two places) “...impacted species...” This equation of “fish and shellfish” with I&E losses is carried to the HRC methodology, which establishes that the restoration area be scaled specifically to species and loss levels associated with I&E.

This narrow focus on I&E is incompatible with the ecosystem approach on which the HRC must be based if it is to be implemented successfully. First, the ecosystem production capacity of particular habitats for particular species is known only within very broad bounds, and not known at all for many coastal and estuarine species. Second, the enormous year-to-year variability in populations and year classes of many species of fish and shellfish, and the high experimental uncertainty associated with monitoring, make it highly unlikely that a one-to-one production-to-loss goal could be established at a level beyond several orders of magnitude. Finally, whole-ecosystem restoration can provide the potential for individual species production, and indeed the likelihood that over the long term (on the order of decades), production will occur at specified levels. But it is well beyond the present capabilities of human beings to manage whole ecosystems or entire habitats to produce specific species in specific numbers. Indeed, the U.S. Fish and Wildlife Service now recognizes this in their endangered species management. The Service recognizes the need for:

… a transition from reactive species-by-species management to the generally more productive ecosystem approach… (FWS 2002)

Because habitat productivity of specific species in the pool of I&E fish cannot be known precisely or controlled with any certainty, the HRC method should not be applied as if it were possible to do so. Rather, the HRC method should be applied so as to generate the ecosystem potential to produce sufficient fish (of particular species) or sufficient resource services (for example, of a particular trophic level) to offset losses.

This application of the HRC methodology would lead to very different mitigation decisions. These thresholds would be characteristics of the restored habitat and NOT attempted measures of species production. With this shift in the mitigation concept, the HRC could be a useful tool for managing l&E in an integrated fashion, compatible with coastal and fresh water ecosystems.

3. Habitat restoration should be the focus of HRC in mitigation.

Chapter A11 of the Existing Facilities Benefits Case Studies (“A11” or “Chapter A11”) presents a brief sketch of how the HRC method is to be applied. The most fundamental step is at A11-2.l, “Quantify I&E Losses by Species.” The remaining steps of the method (and the restoration cost itself) are all scaled to the I&E loss values. The habitat to be restored is scaled specifically to produce the precise number of individuals lost per species per year (A11-2.6), and the total restoration is to be scaled precisely to offset losses of all I&E species (A11-2.6, paragraph 2).

Consider what would happen if a restoration project were to succeed in producing specifically, on an annual basis, the number of individuals of a species necessary to assume offset for I&E. The local subpopulation of that species would grow by the difference. The increased subpopulation would contribute proportionally to the I&E pool, yielding higher estimates of restoration required. Each increment of restoration would be followed by an incremental increase in losses, leading to an increase in necessary restoration, ad infinitum.<FN40>

No rational environmental manager of a regulated facility would adopt such a method, and no facility could in theory comply over the long term. This fundamental flaw in the HRC should be corrected before the method is proposed further.

4. The application of HRC in the case studies errors in these methods lead to grossly inflated offset cost estimates and should be corrected.

The Brayton Point case study is presented as an example of a full-scale application of the HRC methodology. The severe (fatal) flaws from a biological perspective, not to mention the inappropriate theoretical foundations, revealed in this case study are:

-Abundance is proposed as a surrogate for production to estimate restoration habitat value (F5-5, Step 5, page F5-8). It is a well-known fact of ecology that abundance must always underestimate production by a large amount. This is simply an artifact of energy flow, the foundation for all life, and the biological interactions by which organisms live. Measures of standing stock cannot be used to estimate production, as annual stock-recruitment relationships are highly variable in fisheries (Sissenwine 1984). The standing stock cannot effectively be used to account for the density-dependent and —independent variables that control compensation in fish stocks. As such, it will underestimate or create an erroneous estimate of production. Therefore, applying standing stock in the way it is describe here would assure that costs estimated by this method always grossly overestimate restoration requirements, because habitat productivity will always be grossly overestimated. The proposal should be revised to reflect this scientific reality, and possibly incorporate the potential to relate productivity to standing stock using factors developed in the technical literature or with site-specific data. The erroneous assumption specified here as “necessary given the limited amount of quantitative data” (F5-5, Step 5, second paragraph) cannot be used in this context.

-Implementation costs as estimated here are too simplistic (and inflated) to be useful. The basic restoration cost is estimated from a proposal to replant seagrass in three tiny (16 square meters) parcels. It is inappropriate and counterproductive to scale up from this proposal (at $93,000) to a much larger project, and the other cost components in this example are similarly estimated poorly. Table F5-4 illustrates clearly the effect of this caricature approach to cost estimation. For example, for tautog (impinged and entrained at a rate of 30,000 age 1 equivalents per year), nearly $1,000,000,000 annualized costs are necessary to offset the losses. Ignoring discounting, and assuming 30 years of losses at 30,000 fish per year, 900,000 year-i equivalent tautog are lost. Dividing the $1,000,000,000 by 900,000 fish yields a cost of over $1,000 per individual year-i tautog! This value is so divorced from reality as to be ludicrous. This is particularly true since the HRC method as proposed specifically prohibits the party undertaking the restoration from claiming any explicit “credit” for non l&E species produced, or for ancillary ecosystem benefits arising from the restoration project. The method should be revised to more completely capture all the relevant effects of restoration projects and much more effectively estimate the costs.

-Relative time is not accounted for accurately in the offset comparison. Specifically, a successful habitat restoration provides ecosystem values essentially in perpetuity. The life span of a generating station is on the order of decades. Accurate comparison of restoration habitat gains (in perpetuity) vs. CWIS losses (over decades) would in all cases demonstrate clearly the usefulness of effective habitat restoration as a means of mitigation. This is in fact one of the central features of habitat restoration—it is forever. This ecological (and valuation) reality should be reflected in the relevant calculations. Once again to provide a simplistic example (i.e., without accounting for discounting), consider the 900,000 tautog lost over 30 years as assumed in the bullet immediately above. Under the reasonable assumption that CWIS losses then cease but artificial reef production continues (see Table F5-4), the size of the reef needed to offset 30 years of CWIS losses would shrink considerably, as would the restoration costs. The HRC method for cost comparison should be revised to accurately reflect the differential time scales for restoration (long-term, essentially perpetual) vs. station life (short-term and finite).

EPA Response

First, regarding the commenter's discussion of restoration in general, EPA concurs that restoration should consider ecological processes. EPA also believes that restoration, as a concept, can include species-by-species equality.

Under the final rule, EPA allows use of restoration measures to minimize or to help to minimize adverse environmental impacts deriving from impingement and entrainment of aquatic organisms.

The final rule does not require the use of any particular method during the development of restoration measures. See EPA's response to comment 316bEFR.312.006 for additional discussion.

Second, regarding the use of the habitat-based replacement cost (HRC) method specifically, EPA concurs with the commenter that the HRC method is based on sound scientific principles and has value as a restoration scaling tool. However, the HRC method is not a part of the 316b rule, as the commenter apparently assumes. For additional information on the HRC method, please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003).

EPA concurs that abundance and productivity are important ecological concepts in the context of the HRC method. In restoration scaling it is important to use similar methodologies to convert abundance to productivity in both the loss (impingement and entrainment) and gain (habitat production) calculations. The Brayton Point example presented at proposal converted both losses and gains to age 1 equivalents to account for these differences.

Regarding implementation costs, the commenter assumes that linear scaling of costs in an HRC analysis is inappropriate. The assumption would be valid if there were recognized "economies of scale" (i.e., the more the restoration, the cheaper it gets). However, in the Brayton Point example, SAV restoration, artificial reef emplacement, and fish passageways require materials that are expected to vary linearly with the scale of implementation.

The annualized cost estimate discussed by the commenter is an alternative representation of the cost so that restoration costs could be compared with annualized cost estimates of alternative technologies to reduce I&E. However, as noted in the document on the HRC method (DCN # 6-1003), accurate and complete measurement of annual variation in I&E losses is often unattainable, limiting the utility of annualizing HRC.

The commenter is correct that the HRC analyses presented at proposal take no account of potential production of non-I&E species or any ancillary benefits of restoration. However, there is nothing in the HRC method that eliminates consideration of these other benefits if desired for a particular restoration objective.

The commenter is correct that if production increases from restoration actions are realized in perpetuity, in each year when the facility is not in operation there would be an increase in fish production that is not offsetting any loss. As noted in the document on the HRC method (DCN # 6-1003), the required scale of implementation should equate the expected present value increase in I&E with the expected present value of I&E losses over the period that a plant is in operation. Unfortunately, in the case of the HRC analyses for the 316b Phase 2 proposal, the expected facility operating lifetimes were unknown.

Finally, EPA concurs with the commenter that relative time should be accounted for and discounting is necessary when using the HRC method.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.01.01

General/Benefit Transfer

APPENDIX C: SUMMARY OF FISHING STUDIES

Table C.1: Summary of Fishing Studies
[see hard copy for table]

EPA Response

EPA noted this submission and took these studies into consideration in developing a benefits transfer approach for valuing recreational fishing benefits for the final 316(b) regulation.

EPA, however, has reduced its reliance on benefit transfer to estimate recreational fishing benefits for the final Phase II 316b analysis. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA followed generally accepted procedures, and has carefully applied benefit transfer methods. Further information on the benefits transfer method EPA used to estimate recreational fishing benefits for the Inland region is provided in of the final Phase II Regional Study Document (DCN #6-0003). See Chapter H4: Recreational Fishing.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.08

Extrapolation Methods

Review of the Biological Validity of EPA's Methods for Baseline Loss Estimates at Case Study Facilities and Extrapolation to National Estimates

Prepared for: Utility Water Act Group

Prepared by: K. J. Hartman, West Virginia University, Morgantown, WV

I. Introduction

This report reviews EPA's methodology for estimating case-study and baseline biological losses in its report entitled "Case Study Analysis for the Proposed Section 316(b) Phase II Existing Rule (CSA)." (DCN 4-0003). The objective of this review is to assess the validity of EPA's extrapolation methodology given what is known about factors that limit distribution of species (e.g., salinity, dissolved oxygen, water temperature, natural distribution), and to comment on the effect of identified errors on EPA's estimates of impingement and entrainment (I&E) and resulting national baseline losses. The primary documents examined as part of this review were Chapter C2 (Summary of Case Study Results) of EPA's Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facility Rule (EBA), and Chapters B3, C3, D3, and H3 (Evaluation of I&E Data for the Delaware Estuary, Ohio River, Tampa Bay, and Great Lakes Case Study Facilities) of the CSA.

This review does not include 1) an assessment of the validity of the entrainment and impingement data EPA used, 2) an assessment of EPA's estimates of pounds lost to the fishery, age-i equivalents, and production foregone, or 3) an assessment of benefit transfer techniques applied by EPA. Assessments of the validity of EPA's assumptions regarding entrainment survival rate estimates, and the validity of EPA's random utility model estimates, habitat replacement cost estimates, and societal revealed preference estimates (which factor into EPA's national baseline estimates) also are beyond the scope of this review. Other reviewers of EPA's CSA and EBA reports are addressing the validity of these estimates, methods and assumptions.

The remainder of this report is organized into two main parts. Section II discusses the validity of extrapolations among case studies and in-scope facilities on the basis of distributional biology and habitat characteristics at the case study facilities relative to in-scope facilities on the same general water body type, as well as temporal issues raised by EPA's assumptions. Section III describes, for each case study, how EPA's methods and assumptions consistently overestimate biological losses, and thereby lead to erroneous national baseline estimates.

II. Biological Aspects of EPA's Methodology

EPA chose to conduct a case study that relies on extrapolations of impingement and entrainment from a handful of case study facilities to in-scope facilities within a waterbody type. EPA identified five general waterbody types (rivers and streams, lakes and reservoirs, the Great Lakes, oceans, and estuaries). From these five waterbody types EPA selected eight case studies from which they estimated impingement and entrainment and used these estimates to further estimate impingement and entrainment for all facilities with 50 million gallons per day (MGD) or greater within a waterbody type.

For example, EPA selected the Delaware Bay as a case study to represent non-Gulf estuaries (apparently a subset of the estuaries waterbody type). Within Delaware Bay EPA identified four power plants (Salem, Hope Creek, Edge Moor, and Deepwater) and a number of other facilities that use Delaware Bay for cooling water (see CSA, Figure B 1-2). EPA decided to use only impingement and entrainment estimates from the Salem plant for estimates in Delaware Bay. However, engineering improvements at Salem were not in operation at the other three plants so EPA recalculated impingement and entrainment at Salem assuming no entrainment survival and then applied these estimates to the other three facilities (in-scope facilities) based on impingement and entrainment per flow in MGD:

[see hard copy for equations]

Where I and E represent impingement and entrainment and MGD is plant flow for in-scope facilities i or Salem, respectively.

In a similar manner, EPA used I & E estimates from the J. R. Whiting Generating Station, located on Lake Erie, to extrapolate predicted I & E for all Great Lakes facilities. From a purely statistical point of view, such extrapolations might produce unbiased estimates of I & E losses at other facilities provided that the temporal, physical, and biological characteristics of data used in the case study facilities is representative and unbiased relative to the in-scope facilities to which the data are extrapolated.

The temporal, physical, and biological characteristics of relevance to the appropriateness of the extrapolation include the following questions:

-Do differences in life history patterns or density of organisms influence the applicability of extrapolations?

-Do the locations of plants within their systems (e.g., relative to the salt wedge, water depth, or sources of life stages susceptible to I&E {such as spawning and nursery areas}, etc.) significantly affect the applicability of extrapolations?

-Are there substantial differences in species assemblages and densities of organisms between the case study plant locations and the locations of other plants within a waterbody type?

-Have biotic communities changed greatly since the time when in-scope data were collected?

-Are the years in which case study data were collected representative of typical conditions for the case study plants and in-scope applications?

To examine these questions we will use specific case study examples and attempt to relate them to documented information that can provide a measure of the extent of the applicability of EPA's methodology for estimating nationwide I&E losses from the case studies.

A. Estuary — Non Gulf Waterbody Type.

Background information.

This waterbody type extrapolation was based on a single reference facility — Salem Generating Station (Salem) - and applied to all in-scope facilities except Salem, Brayton Point, Contra Costa and Pittsburgh facilities, for which EPA accounted separately. Although EPA had data from a small number of other estuary non-gulf plants - (Brayton Point, Pittsburgh, and Contra Costa), it apparently found all, but the Salem data lacking. Furthermore, EPA ignored the extensive databases available from the power plants on the Chesapeake Bay and Hudson River. EPA therefore chose to apply the I&E data from Salem to all in-scope facilities. Essentially, EPA selected Salem in mid-Delaware Bay to represent the non-gulf estuary portion of the estuary waterbody type.

Salem is located at RKM 80, downriver of all other in-scope facilities in the EPA's case study. EPA used impingement and entrainment data for Salem from 1978-95 and 1997-98 for their extrapolation baseline. According to EPA, data from other non-gulf estuary plants was sufficiently flawed to preclude its use in their estimates. EPA used I & E loss estimates from Salem to represent losses at Salem assuming plant-derived estimates of impingement survival, but no entrainment survival. However, EPA recalculated the plant estimates of impingement at Salem assuming no survival and applied these flow-adjusted estimates of I & E to other in-scope facilities within Delaware Bay. These other in-scope plants are located from RKM 96 to RM 128 and are all located upriver of Salem in lower salinity waters. The higher salinity water at Salem compared to the in-scope extrapolation plants means that species found at Salem in I & E may be more or less affected at other in-scope facilities purely on the basis of species-specific salinity preferences. This represents a serious source of error for the case study and for extrapolations to the non-gulf estuary plants within the estuary water body type. To apply Salem I&E numbers to any other facility without similar biological (e.g. species composition and density) and chemical (i.e., salinity) regimes is inappropriate.

Biological issues

Extrapolating Salem loss estimates to other in-scope facilities is a potentially serious error in application due to differences in both species distributions and densities across locations of in-scope facilities. Salem is located in the salinity transition zone and area of the turbidity maxima on the Delaware Estuary. Assuming no survival, most of the estimated impingement of fish (i.e., age-i equivalents) from the Salem plant, consist of bay anchovy (Anchoa mitchilli), followed by species such as white perch (Morone americana), blue crab (Callinectes sapidus), spot (Leiostomus xanthurus), and Atlantic croaker (Micropogonias undulatus) (CSA, Table B3-3). EPA's estimated entrainment at Salem assuming 100 percent through plant mortality consists mainly of bay anchovy (97%), followed by Atlantic croaker, weakfish (Cynoscion regalis), spot, white perch, and striped bass (Morone saxatilis) (CSA, Table B3-7). When these estimates are used in EPA's EBA, benefits are identified as greatest for spot, striped bass, Atlantic croaker, and weakfish. Most biological losses to which EPA ascribes economic value are generated from extrapolation of entrainment of early life stages (ELS) of these species to numbers of fish that might have later contributed to recreational or commercial fisheries. Thus, about five species represent most of EPA's estimated losses and economic costs associated with the Salem facility. Therefore, these five species (bay anchovy, spot, striped bass, croaker, and weakfish) will form the basis of this analysis of the representativeness of extrapolating Salem I & E estimates to other facilities given species-specific differences in distribution and density within the Delaware Estuary.

Water Quality Conditions Influencing Fish Distributions

Water quality or environmental factors such as salinity, temperature, and dissolved oxygen can combine to influence the distributions of fish and ELS within the estuary. Thus, the location of in-scope facilities relative to these conditions, and the conditions experienced at Salem, will influence the representativeness of extrapolations from Salem to other in-scope facilities. Among these factors, temperature and dissolved oxygen appear to be less of an influence in this system relative to other estuaries, due to the high degree of mixing that produces more homothermic conditions within the estuary and improvements in water quality resulting in minimum summer dissolved oxygen (D.O.) levels of generally above 5.0 mg/l (Marino et al. 1991).

As with many other estuaries, salinity differences within the Delaware Estuary influence the distribution and abundance of fish species at these sites and influence the accuracy of extrapolations (Monaco et al. 1992; Weisburg and Burton 1993; Able and Fahey 1998; Able et al. 2001). Information presented as part of Salem's permit renewal documentation depicts the salinity conditions in the Delaware Bay under high and low flow conditions (Figure 1). Near Artificial Island, salinity ranges from 1-2 ppt during high flow years to 10-15 ppt during low flow years. Most of the in-scope facilities are located upriver of Salem in areas of lower average salinity. Salinity range for these facilities is typically 0-2 ppt. As the following discussion shows, the density and distribution of key fish species vary with salinity, thus the potential applicability of I&E data generated at Salem to other in-scope facilities is questionable. Below we examine how species-specific differences in distributions may influence these extrapolations for several key species identified above.

Key Species:

Bay anchovy

Bay anchovy distributions in estuaries are closely linked to salinity distributions. In the Chesapeake Bay, highest egg densities were found in salinities of 13-15 ppt, with a second peak observed at 17-23 ppt (Houde & Zastrow 1991). Houde & Zastrow (1991) reported that egg viability may decline at saliities below 8 ppt, while juvenile anchovy were found to prefer salinity ranges of 9-30 ppt. These data suggest that anchovy life stages generally decline in abundance with declining salinity. In fact, PSEG's (1999) studies of anchovy egg and larval distributions in Delaware Bay verify that densities of ELS's and young anchovy are much higher down-bay from Salem and much less abundant upriver of Salem. These distributions suggest that extrapolation of Salem bay anchovy I & E to other in-scope facilities within Delaware Bay overemphasizes the impact that in-scope facilities have upon this species.

Atlantic Croaker

Atlantic croaker has shown widely varying abundances in Delaware Bay. No eggs were collected from Delaware River (PSEG 1984; PSEG 1999), which is in keeping with their life history of marine spawning and estuarine recruitment of larvae and very small juveniles (Homer and Mihursky 199 1). During 1979, no larvae were collected from RKM 0— 117, but in 1980, larvae were collected from

September to December. Larval maps for Delaware Bay in 1980 show larvae abundance sometimes higher or lower than Salem during October to November (Figures 4-9 to 4-il, PSEG 1984). The general larval distribution pattern suggests Salem is not representative of upriver conditions to which it is extrapolated.

Juvenile croaker was most abundant from RKM 0-80 during October 1980— January 1981. During 1979 (Figure 4-5, PSEG 1984) and 1980 (Figure 4-6, PSEG 1984) in Delaware Bay, age-0+ croakers were more abundant below RKM 80 and RKM 32, respectively. Thus, if the distributional patterns observed during 1979-80 are typical, age-0 croaker are likely less impacted upriver and more impacted downriver than at Salem. Given that there were no in-scope facilities downriver of Salem, extrapolations of Salem impingement data to other in-scope facilities within the Delaware would represent an overestimate of losses. Similar overestimates would be expected for other facilities in non-gulf estuaries when EPA applies the Salem-derived estuary values to plants located in lower salinity waters than Salem for extrapolation of waterbody type and nationwide estimates of losses.

Weakfish

Weakfish are found throughout the Delaware Bay estuary from RKM 0— 117 (PSEG 1999). However, larval and juvenile abundances appear to be higher near the case study location (Salem) than in the vicinity of the in-scope facilities up-bay, apparently related to salinity or some other factor (PSEG 1984). Thus, extrapolation of weakfish I&E data to the in-scope facilities (all up-bay of Salem) likely will represent an overestimate of the I&E losses to weakfish in those facilities.

From 1979 to 1982 larval data suggest that larval abundance is lower upriver of Salem than at Salem. In 1979, postlarvae were of similar abundance from RKM 48 to 117, but show up in high densities somewhat earlier in the year at RKM 48-97. Thus, Salem data may overestimate losses that do not occur upriver of Salem (shorter duration of peaks and lower peaks in density). In 1980, postlarvae were more abundant, and occurred for a longer period, south of RKM 80-97. Peak densities occurred in RKM 80-97, but dropped off to near zero north of RKM 80-97. These same trends were observed in 1981 and 1982 with no larvae north of the region from 80-97 RKM. Thus, it appears Salem entrainment estimates will overestimate losses to weakfish when extrapolated to in-scope facilities located from RKM 80-97 (see, Figures 4-113 to 4-116 in PSEG 1984).

Bottom trawl data for age-0+ weakfish also suggest that data extrapolation from Salem to facilities up-bay will overestimate potential impact to weakfish. Age-0+ weakfish catches differed very little across river regions in 1979 during trawl surveys (PSEG 1984). However, from 1980 to 1982, there were similar spatial and temporal patterns in catch of age-0+ weakfish in bottom trawls, and much higher catches, of weakfish in bottom trawis in RKM 0—80 than upriver. Thus, the preponderance of data suggest that during years of high I&E of weakfish, extrapolation of Salem's I & E data to the in-scope facilities (all up-bay of Salem) will represent an overestimate of potential weakfish losses due to lower density of weakfish near the other in-scope facilities within Delaware Bay.

Striped Bass

Most of EPA's estimated losses at Salem for striped bass appear to occur as entrainment so evaluation of the applicability of extrapolations based on distributions should focus on striped bass ELS. Distributions of young striped bass appear to be governed somewhat by salinity. Striped bass spawning takes place near the freshwater interface (Setzler-Hamilton and Hall 1991) and larval striped bass typically are found in low salinity waters (Setzler-Hamilton and Hall 1991), despite reports of higher larval survival at 10 ppt (Morgan et al. 1981). As with other key species for the non-gulf estuary case study, PSEG's (1984 and 1999) studies provide the best information on which to evaluate the distribution of striped bass relative to the case study and in-scope facilities for extrapolations.

Recent studies completed by PSEG (1999) suggest that the majority of striped bass spawning in the Delaware River occurs in areas upriver of Salem. PSEG's (1984) studies reveal that in 1979 larvae were found in May-June in RKM 80 to RKM 117 (Figure 4-5, PSEG 1999). Similar results were observed in 1980. A study of egg and larval striped bass densities suggests that during 1972-1978, early life stages of striped bass were generally more abundant in the regions upriver of Salem (Weisburg and Burton 1993). If this is the case, densities of striped bass larvae may be more abundant upriver of Salem and hence, extrapolation of striped bass estimates from Salem to the other in-scope facilities may result in additional errors in EPA's calculations.

Spot

Spot are reported to metamorphose to the juvenile stage and become demersal prior to recruitment to estuarine nursery areas (PSEG 1999). Within the estuary, early juveniles appear to favor shallow water with muddy bottoms and low salinity (Dawson 1958; PSEG 1999), while later juveniles appear to be distributed in lower stations with higher salinity (Rogers et al. 1984).

In EPA's estimates of age-i equivalent losses, most of the losses for spot are attributed to entrainment. Entrainment losses for spot are inflated by just a few years of data. During the 19-year data series, only four times did the annual estimate exceed the 19-year average of 22.6 million age-i equivalent spot. In 1980, 1982, 1989, and 1995 estimated entrainment exceeded the average levels, ranging from 25.9 to 183.3 million (CSA, Table B3-8). Obviously, most of the "average" entrainment losses estimated by EPA occurred during a relatively few periods. This high variability in estimated entrainment, its significant impact in extrapolations, and the great likelihood that site-specific factors strongly influence I&E for this species, suggests that accurate estimates of I&E losses for spot will require sitespecific estimates of I&E and not estimates based on flow extrapolation methodology. Failure to incorporate site-specific estimates of I&E losses for species with such variable abundance has resulted in a great amount of uncertainty in EPA's estimates for the species and case study.

Water body extrapolations

Due to the reliance of the non-gulf estuary extrapolations on data from Salem, and differences in salinity at estuarine plants throughout the East coast of the U.S., the EPA's estimates of losses for the non-gulf waterbody type are biased. Many of the issues related to applying Salem estimates to the other in-scope Delaware Bay plants that were located in lower average salinity, apply to other estuarine plants. For example, in Chesapeake Bay the Calvert Cliffs facility is located in a similar salinity regiment as at Salem (Cory and Nauman 1970). However, many other stations (such as Chalk Point, MD, etc.) are located near freshwater and hence may have lower expected losses for bay anchovy, weakfish, spot, and croaker based solely upon salinity-related distributional patterns for key species. In the Hudson River estuary, the Albany, Danskammer Point, Bowline, Lovett, Indian Point and Roseton plants are all generally found in freshwater and the 59th Street Plant is located in higher salinity water than is found at Salem (Cooper et al. 1988; Hutchinson 1988). Given the influence that salinity has on distribution patterns of some estuarine fishes (Monaco et al. 1992; Weisburg and Burton 1993; Able and Fahey 1998; Able et al. 2001), it is likely that application of loss estimates derived from Salem for the non-gulf waterbody type inflict serious bias when applied to other non-gulf estuaries along the U.S. Atlantic coast. Such bias is likely even greater in applying Salem estimates to estuarine facilities on the U.S. Pacific coast with grossly different species assemblages and productivity than the Atlantic estuaries.

B. Great Lakes Waterbody Type

Background information

For the Great Lakes waterbody type, EPA used I&E data from the J. R. Whiting facility, located in western Lake Erie, to represent all facilities in the Great Lakes. This method may produce accurate results if the I&E rates used from J. R. Whiting are representative of all -- or even most -- of the CWIS facilities within the Great Lakes waterbody type. However, available data on relative productivity and species compositional changes among the Great Lakes (discussed below) do not appear to concur with that assumption. Western Lake Erie is the most productive portion of the most productive system in the Great Lakes. As such, extrapolation of J. R. Whiting loss estimates to all other flows within the Great Lakes waterbody type will result in a serious overestimate of I & E losses in these systems.

Biological Issues

A comparison of productivity and species assemblages between the J. R. Whiting site and the sites of other Great Lakes facilities demonstrates why the Whiting extrapolation seriously overestimates Great Lakes I&E losses. First, western Lake Erie, where J. R. Whiting is located, is the area of highest biological productivity in the Great Lakes (Wallen & Botek 1984; Jude & Leach 1993). The high productivity of Lake Erie relative to the other lakes has been documented through primary production estimates (Jude & Leach 1993) as well as earlier estimates of possible I&E in the Great Lakes (Kelso & Milburn 1979).

Lake Erie is the most productive of the Great Lakes (5.0 mg/rn3 mean chlorophyll a), followed by Lake Ontario (3.8 mg/m3 mean chlorophyll a), Lake Michigan (2.1 mg/m3 mean chlorophyll a), Lake Huron and Lake Superior (1.0 mg/rn3 mean chlorophyll a) (Jude & Leach 1993). The ranking of Lake Erie as most productive of the lakes is mirrored in an earlier estimate of I&E for Great Lakes facilities. Kelso & Milburn (1979) reported that entrainment estimates were highest in Lake Erie (588 million or 68.7% of total) despite the fact that Erie represented only 20.6% of the electricity produced from power plants on the Great Lakes. One way of examining whether the use of J. R. Whiting is representative of I&E losses from other sites in the Great Lakes is to examine the estimated I&E from Kelso & Milburn (1979) relative to electrical generation (megawatt of electricity, or Mwe). Thus, I&E / Mwe provides an index of differences in I&E loss associated with lake-specific differences in fish communities and productivity.

Overall projected I & £ rates per electricity produced were highest in the Lake Erie estimates. The other four Great Lakes and the Detroit/St. Clair system all had similar or lower I&E contributions relative to their electrical generation (Table 1). J. R. Whiting is situated in the most productive part of the most productive Great Lake, and this fact is reflected in higher I & E values than found in other Great Lakes systems. Thus, use of the I&E data for J. R. Whiting to represent all facilities in the Great Lakes waterbody type necessarily will lead to elevated estimates of the impact and costs associated with CWIS in those systems.

[see hard copy for table]

In addition to differences in productivity and resulting differences in I&E among Great Lakes facilities, data reported by Kelso and Milburn (1979) indicate that larval species groupings differ substantially among the various Great Lakes and the Detroit River/ Lake St. Clair system. These differences in species groupings will result in differences in impingement and entrainment among the Great Lakes due to species-specific differences in life history, density, behavior, etc.

For example, differences in species groupings will also affect EPA's economic analysis because of differences in the value of species affected. In Lake Erie, most of the clupeid grouping is represented by gizzard shad (Dorosoma cepedianum), while in the other Great Lakes these groups are likely dominated by the non-native alewife (Alosa pseudoharengus). In EPA's economic analysis, alewife have no commercial value, while EPA values gizzard shad at $0. 15/lb. Gizzard shad represent the majority of costs estimated for J. R. Whiting. Further differences in the Great Lakes are illustrated in the Kelso and Milburn (1979) study. There, no cyprinids were reported entrained in Lake Ontario or Detroit/St. Clair, and no percids were entrained in Lake Ontario. However, smelt (Osmerus mordax) were the dominant grouping entrained in Lakes Erie and Huron (Figure 2). Although the magnitude and direction of economic changes that would result from differences in species affected among Great Lakes facilities are difficult to assess with the available information, it is clear that biological differences in species assemblages across Great Lakes locations will greatly diminish the accuracy of EPA's I&E estimates.

For the J. R. Whiting case study, EPA used entrainment data from a 1979 study, and impingement data based on averages of available data from 1981-82, 1987, and 1991. Significant changes have occurred in Lake Erie (and other Great Lakes systems) since 1979, and even since 1991, that may influence the validity of applying these I&E data to current conditions. Fish community composition and the abundance of key species has changed a great deal during this time. The USFWS — Sandusky Biological Station has used the catch per unit effort (CPUE, fish / hour) of age-0 fish during fall bottom trawis at their East Harbor station as an index of abundance and trends in age-0 fish abundance since about 1960. This same data can be used to evaluate the magnitude of changes in the juvenile fish community of Lake Erie between the timing of the J. R. Whiting data sets and present extrapolations by the EPA. A comparison of the five-year average CPUE's from a period spanning the J. R. Whiting entrainment data (1978 — 1982) and for a five-year average from the most recent data (1996-2001) suggests that the composition of juvenile fishes and their abundance has changed markedly between the timing of the I&E losses studies and present (Figures 3 and 4). Species that accounted for most of the I&E numbers and the majority of economic costs estimated by EPA included gizzard shad, emerald shiner (Notropis atherinoides), sunfish spp. (Lepomis spp.), and yellow perch (Perca fiavescens). Among these species, gizzard shad appear to have declined in abundance from 16% to 4% of catches (Figure 3) and its relative abundance is only 56% of 1978-82 (Figure 4). Emerald shiner appear to have increased from 34% to 63% of age-0 fishes in trawls and are 3.66 times more abundant than in 1978-82. Yellow perch are less abundant (75% relative abundance) than in 1978-82, and declined from 6% to 2% of catches. Sunfish spp. were not collected in research trawis and thus abundance could not be assessed. Of the nine most commonly collected species in these research trawis, six have declined in abundance in the recent period in comparison with the period when I&E data were collected (Figure 4).

These changes are believed to be related to changes in the Lake Erie food web that have resulted from nutrient abatement programs (Millard et al. 1996) and invasion of the ecosystem by no less than five new species of fish and zooplankton, and perhaps most importantly, zebra and quagga mussels (Gopalan et al. 1998). Declines in commonly collected fish species include recreational species such as white bass (Morone chrysops), yellow perch, and freshwater drum (Aplodinotus grunniens), and forage species such as alewife, gizzard shad, and spottail shiner (Notropis hudsonius). Walleye (Stizostedion vitreum) are about 40% more abundant than in 1978-82 and white perch, a marine invader, (Schaeffer and Margraf 1986) has increased 13-fold in recent years.

Although the J. R. Whiting I & E database may represent the best available information for EPA's I&E analysis for Great Lakes waterbodies, significant changes have occurred in composition and abundance in the 20 years since those data were collected. Such differences in abundance and species composition will influence current I & E values and cast serious doubt as to the validity of I & E loss estimates for the Great Lakes in-scope facilities and the extrapolation of these data to other facilities of this water body type.

Productivity in Lake Erie and all the Great Lakes has declined tremendously since nutrient abatement activities in the mid-l980's and the invasion of the lakes by zebra mussels (Dreissena polymorpha) in the late 1980's and 1990's. Declines in productivity and a shift from pelagic energy pathways to benthic pathways has necessarily altered the ecosystems and resulted in declines in fish production and community changes (Johannsson et al. 2000, Lowe and Pillsbury 1995, Millard et al. 1996). These drastic changes in productivity and community structure undoubtedly translate into lower numbers of ELS and young fish susceptible to I&E. Thus, observed declines in productivity and changes in the fish community of Lake Erie and the other lakes since the case study data were collected suggest EPA's present estimates for J. R. Whiting severely overestimate I&E losses for Great Lakes facilities.

C. Gulf Estuary Type Extrapolations

Background Information

In the Tampa Bay case study, EPA used data from Big Bend located on the eastern shore of Tampa bay near the lower Hilisborough Bay, upper middle Tampa Bay region, to extrapolate to three other in-scope plants in Tampa Bay. The three in-scope plants to which Big Bend I&E loss estimates were extrapolated are located in: mid-Tampa Bay on the western shore (Bartow plant), and in the upper Hillsborough Bay (Hooker's and Gannon Point plants).

D.O. levels are similar between Big Bend and the P.L. Bartow plants, but quite different between the Big Bend plant and the facilities in upper Hillsborough Bay. D.O. is low in upper Hillsborough Bay. Many estuarine species of fish and shellfish avoid areas of low D.O. (Chesney and Houde 1989; Pihl et al. 1991) and as a result, EPA's extrapolations of losses from Big Bend to F. J. Gannon and Hooker's Point may result in an overestimate of losses at these two facilities. These biases are compounded in national estimates because EPA used the Tampa Bay estimates to apply to all gulf-type estuary facilities. Thus, all I&E losses and the benefits estimated by EPA in their analysis are derived from a biased extrapolation of the I&E losses at a single facility.

Spatial maps of the D.O. in Tampa Bay suggest that the Big Bend plant and Bartow plant are located in an area of adequate D.O. levels for estuarine organisms. However, the Hooker's Point power plant and F. J. Gannon plant are located in areas of consistently low D.O. with periodic hypoxia (Figure 5). Because low D.O. has been shown to negatively affect the distribution of bay anchovy (Chesney and Houde 1989), spot, Atlantic croaker, and other aquatic organisms (Pihl et al. 1991), it is expected that lower numbers of organisms will be found in the vicinity of Hooker's Point and F. J. Gannon facilities due to low D.O. The impact of low D.O. at Hooker's Point and F. J. Gannon will be even greater for ELS of bay anchovy and black drum, which are even less tolerant of low D.O. than juveniles and adults. Because the ELS are more often involved in estimated losses (through entrainment), reduced D.O. levels at these two plants will result in I&E losses being very much overestimated through EPA's extrapolations from the Big Bend estimates (where water quality is better). The result of this bias in extrapolation is that the I&E losses for Hooker's Point and F. J. Gannon will be overestimated by using extrapolations from Big Bend. This will result in significant overestimates of the I&E losses for the Tampa Bay case study and for the national extrapolation for this waterbody type.

Examination of EPA's I&E loss and economic analysis for the Tampa Bay case study suggests that most of the estimated losses are derived from a few species including bay anchovy, black drum (Pogonias cromis), and stone crab (Me ippe mercenaria). Only very limited information on the density distributions of these species in Tampa Bay or the water quality patterns in the Bay are available. However, species life history information from other studies can be applied to evaluate the potential for errors in I & E loss extrapolations. Below we look at the potential effect of these errors for key Tampa Bay species.

Key Species:

Bay anchovy

Bay anchovy distributions in estuaries are closely linked to salinity distributions in many estuarine systems. In Chesapeake Bay, highest egg densities were found in salinities of 13-15 ppt with a second peak observed at 17-23 ppt (Houde & Zastrow 1991). Juvenile anchovy were found to prefer salinity ranges of 9-30 ppt. In the Little Manatee River, Florida juvenile and adult bay anchovy were found in lowest densities in freshwater and polyhaline waters (> 18 ppt) and highest densities were in 0.5 — 18.0 ppt. Similar distributions have been observed in the Hudson River for juveniles and adults (Hartman 1998). However, growing evidence suggests that larval bay anchovy may recruit to areas of freshwater or low salinity in estuaries from the Hudson River to Chesapeake Bay (Dovel 1981: Kimura et al. 2000; PSEG 1999; Schmidt 1992). Low D.O. levels can also limit bay anchovy distributions. Bay anchovy eggs and yolk sac fry do not tolerate D.O. <3.0 mg/l and are less abundant in waters < 5.0 mgi/l D.O. (Houde and Zastrow 1991).

In Tampa Bay it seems that salinity levels and low D.O. make extrapolations of I&E loss estimates from Big Bend to other in-scope facilities biased. Salinity levels are less favorable for bay anchovy near the Bartow facility than in the Big Bend and other facilities. As noted above, D.O. levels are commonly < 5.0 mg/l near Hooker's Point and F. J. Gannon, while salinity levels are generally higher (28-30 ppt) at Bartow than in the Hillsborough Bay region (26-28 ppt). Only very limited distributional data for bay anchovy are available for Tampa Bay to verify patterns (TBNEP 1992). Distributional data did not include upper Hillsborough Bay, but it is believed bay anchovy densities are lower there than in the vicinity of Big Bend due to reduced D.O. in upper Hil!sborough Bay. Distributional data suggest that bay anchovy are also more abundant near Big Bend than near Bartow. During spring and fall, anchovy (juvenile and adult) appear more abundant in trawls from mid-Hillsborough Bay (near Big Bend) than near Bartow (TBNEP 1992).

Thus, available data on water quality and species requirements, and limited distributional data, suggest that extrapolation of I&E losses from Big Bend to other in-scope facilities will represent an overestimate of actual losses at these facilities. This overestimate carries over into EPA's extrapolations to the case study and waterbody type extrapolations for the national baseline estimates.

Other species

Differences in water quality (D.O. and salinity) between the in-scope facilities in Hillsborough Bay and Old Tampa Bay may lead to other errors in extrapolations from Big Bend to other in-scope facilities. Although D.O. levels appear similar between Big Bend and Bartow, the generally higher salinity at Bartow may affect the abundance of other key species such as stone crab and black drum. However, little specific life history information regarding distributions relative to salinity for these species is reported in the literature. It is not possible to assess the validity of extrapolations from Big Bend to Bartow for the other key species due to a lack of species-specific information. However, it is apparent that circulatory and freshwater inflow patterns are substantially different between the Old Tampa Bay and lower Hillsborough Bay areas. Such differences are likely important in species abundance and distributions in Tampa Bay and introduce considerable uncertainty in the EPA's estimates of losses for the Gulf Estuary case study, especially since all extrapolations are based on a single plant (Big Bend).

D. The Ohio River Watershed Case Study Extrapolations.

Background information

In many ways, the quantity of data used by EPA in the Ohio River watershed case study is greater than that used in any of the other case studies. Unlike the estuary and Great Lakes waterbody type extrapolations, where data from individual plants were used to estimate losses for the case study or entire waterbody, EPA used data from nine facilities to estimate I & E losses along the Ohio River. Data from these nine facilities were then extrapolated to 20 other facilities. However, there are several serious flaws in the EPA's Ohio River case study. First, the data used are quite outdated, having been obtained from studies at plants during 1977-1979. Changes in fisheries abundance and composition and associated vulnerabilities to CWIS have occurred during the 25 years since some of these studies were conducted. In addition, two notable potential sources of extrapolation error occur in EPA's methodology. First, EPA used an average flow-adjusted I&E for three plants in the Markland Pool (W.C. Beckjord, Miami Fort, and Tanners Creek, RM 490, 494, and 560, respectively) to extrapolate to two other in-scope facilites within a 193 mile region from RM 260 to RM 453 for which no I&E loss estimates were available. Also, EPA used I&E loss data at Clifty Creek to estimate I&E losses for at least eight other in-scope facilities between RM 540 and RM 952.

Both of these extrapolations represent potentially serious errors and bias in EPA's methodology that, in light of species-specific distributional differences and plant-specific differences in I&E losses, leads to serious overestimates in EPA's loss estimates.

Biological issues

From the EPA's analysis it appears that several key species are responsible for most of the I & E losses attributed to CWIS facilities in the Ohio River case study. Summing the mean number of age-l equivalents estimated as impinged (Table C3-7) and entrained (Table C3-1 1) provides a means of determining which species have the highest estimated age-l equivalent losses (Table 2).

[see hard copy for table]

Based on EPA's estimated age-i equivalent losses (Table 2), most of the losses appear focused on six species. These species are: bluntnose minnow (Pimephales notatus), river carpsucker (Carpiodes carpio), gizzard shad, emerald shiner, sucker spp. (presumed Moxostoma spp., Catostomus spp.), and common carp (Cyprinus carpio). In addition, smallmouth bass (Micropterus dolomieu) represent an important recreational species with high economic value in EPA's analysis. Therefore, we will use these species as the basis for evaluating how two potential errors in EPA's methodology -- use of outdated data and distributional / extrapolation issues -- may affect the I & E estimates for in-scope facilities.

Key Species:

Bluntnose minnow

Patterns in estimated losses of bluntnose minnow suggest that most losses occur in the upper half of the river as entrainment (Figure 6). Estimated losses from the W. C. Beckjord plant (RM 453) through the Clifty Creek plant (RM 560) were negligible. EPA applied average I & E losses estimated for the three facilities in the Markland Pool to the in-scope facilities between Kyger Creek and W. C. Beckjord plants (the 193 mile data gap). Estimated entrainment of bluntnose minnow at Kyger Creek was higher than in facilities downriver. Therefore, the use of the average I & E from the Markland Pool facilities to fill in the data gap may represent an underestimate of bluntnose minnow losses for those facilities.

Recent changes in the Ohio River fish community suggest that the bluntnose minnow has declined in abundance since the time of I&E estimates in the Ohio River facilities (see page 25 and Figure 15). If bluntnose minnow have declined in abundance then it is likely that the EPA's estimates of losses for this species are much higher than is presently occurring in the Ohio River watershed. This erroneously high estimate of bluntnose minnow losses inflates EPA's estimate of losses for the case study and is compounded in EPA's nationwide extrapolation of this data for the waterbody type (lakes and rivers).

River carpsucker

Patterns in estimated losses of river carpsucker suggest that most losses occur in the middle portion of the river as entrainment (Figure 7). Highest estimated losses were between the Kyger Creek and Tanner's Creek facilities. As stated earlier, EPA applied average I & E losses estimated for the three facilities in the Markland Pool to the in-scope facilities between Kyger Creek and W. C. Beckjord plants (the 193 mile data gap). Estimated entrainment of river carpsucker at the Kyger Creek plant was higher than any other plant. Therefore, the use of the average I & E from the Markland Pool facilities to fill in the data gap between RM 260 and RM 453 may represent an underestimate of river carpsucker losses for those facilities.

Emerald shiner

Emerald shiners are a pelagic species found throughout the Ohio River (Trautman 1981). EPA's estimated I&E losses for emerald shiner show several orders of magnitude difference in I & E losses among facilities (Figure 10). The differences in emerald shiner I&E among the case-study facilities likely reflects differences in sites and plant designs because fisheries surveys show this species to be abundant throughout the river. Estimated losses of emerald shiner at the nine Ohio River case study facilities occurred mostly in the form of entrainment, although estimated impingement was significant at Miami Fort. Notably, the same pattern of highest I&E occurring at the Miami Fort plant occurred for another pelagic species—gizzard shad. This suggests that site- and plant-specific designs are important factors in I&E losses. In the absence of spatial patterns in abundance and in the presence of strong site- or plant- influence on I&E for emerald shiners, extrapolations from case-study plants to other in-scope facilities are prone to error. Without plant-specific I&E data for all plants within the in-scope area it is impossible to assess the accuracy of I&E for emerald shiner, but given the wide range in I&E rates for specific plants within the case studies, EPA's methodology could be very high or very low for this species.

Recent changes in the Ohio River fish community suggest that emerald shiner may have decreased in abundance since the time of I&E estimates in the Ohio River facilities (see Figure 15). During the time of the I&E studies, emerald shiner represented 51% of all fish collected in agency rotenone surveys of the Ohio River, but during 1999-2001, emerald shiner represented only 3% of all fish collected. If emerald shiner abundance has decreased, then it is likely that the EPA's estimates of losses for this species are higher than is presently occurring in the Ohio River watershed. These potential errors would be compounded in EPA's extrapolation of this data for the entire waterbody type (lakes and rivers).

Sucker spp.

The suite of sucker species inhabiting the Ohio River is quite diverse. However, EPA's grouping of this taxa as "sucker spp." eliminates the ability to evaluate individual species distributions and the role of these distributions on I & E extrapolations. It is not clear from EPA's documentation why these species were lumped together, although we speculate this may be due to taxonomic identification problems in the original I & E estimates.

Suckers have pelagic larvae that settle to the bottom and have a benthic lifestyle after metamorphosis into juveniles. This life history is borne out in the estimated I&E losses for the grouping. In looking at EPA's estimated I & E for sucker spp., it appears that impingement is minimal for this group (Figure 11). Most estimated losses are through entrainment, with peak losses at Clifty Creek and, to a lesser extent, at Phillip Sporn. Of primary importance to the extrapolations is the use of the Clifty Creek data to estimate losses along 412 river miles. There is no reason to believe that abundance or susceptibility of young suckers increases downriver in the Ohio, nor is there reason to believe that the high entrainment estimates of sucker spp. at Clifty Creek should continue downriver (Figure 11). Therefore, extrapolation of the Clifty Creek sucker spp. entrainment data over 412 river miles likely overestimates I&E losses for this species group.

Common carp

Carp is a non-native species introduced to the United States in the late 1800's. Carp is responsible for alterations of the aquatic habitat, such as increased turbidity, that may be responsible for declines in abundance of native species. Many fisheries resources agencies have sought to eliminate this species from their waters, but have met with limited success. Due to the very limited ecological or economic utility of carp in the Ohio River, it is difficult to consider any I & E losses to this species as a particular concern. Further, carp do not appear to be integral to aquatic food webs as forage for more desirable species. If EPA considered the negative impacts of carp to native species, it would likely negate any economic costs associated with I & E losses of carp to the Ohio River.

Smallmouth bass

Smallmouth bass are distributed throughout the length of the Ohio River (Trautman 1981). The smallmouth is considered a fish of streams and rivers with a preference for moving waters. Upper areas of pools (below dams) tend to have hydrologic characteristics more similar to un-impounded waters. However, smallmouth bass tend to spawn in near-shore areas of lower velocity water and the larvae and juveniles tend to inhabit these near shore nursery areas during much of the first year of life. It is during these stages (larvae and early juvenile) that smallmouth bass are likely to be most vulnerable to CWIS. EPA's estimates of I & E losses suggest that entrainment is the major source of loss for this species.

The distribution of estimated entrainment for smallmouth bass is not homogenous along the River (Figure 12). Thus, methods used for extrapolating data from case study facilities to in-scope facilities are critical to the accuracy of EPA's estimates. Most of the entrainment is estimated to occur at two facilities (W. C. Beckjord and Miami Fort) that are located at RM 452.9 and RM 490, all within the same pool (Figure 12). Entrainment at a third plant in the pool (Tanners Creek) was nil. EPA's methodology for extrapolation called for the data from the average of these three plants in the Markland Pool to be used to estimate I & E losses for in-scope facilities at Spurlock, Stuart, Killen, New Boston Coke, Zimmer, and East Bend facilities. Among these in-scope facilities, flow is substantial only at J. M. Stuart (773.3 MGD). J. M. Stuart is located at approximately RM 390 with the next closest facility upriver at RM 260. EPA chose to use the average I & E losses at three plants in the Markland Pool (RM 436-531.5) that had elevated entrainment rates of smallmouth (relative to all other plants in the detailed study) to apply to the Stuart plant. This methodology likely overestimates losses of smallmouth bass at the Stuart facility since all other case study facilities between RM 53.9 and 260 and between RM 494 and 560 had low rates of bass entrainment. A data gap of 193 miles exists between the Kyger Creek and W. C. Beckjord plants. Given this large gap, the extrapolation to Stuart cannot be considered appropriate. A better method would have been either to use an average value based on I & E losses from the two nearest up- and down-river plants to represent Stuart, or to include only areas with sufficient and proximal data in the in-scope analysis. Large spatial extrapolations where data are lacking (such as down river of Clifty Creek) should be avoided. Unless actual entrainment of smallmouth bass at J. M. Stuart is much higher than the rates estimated at 7 of the 9 in-scope facilities, then use of the Markland Pool averages to apply to the upriver Stuart facility will result in gross overestimation of the entrainment losses and benefits for the J. M. Stuart facility, and by extrapolation, to the Ohio River watershed. EPA's use of the Clifty Creek smallmouth bass impingement estimates to apply to the 400 miles of river and facilities downriver also biases case study loss estimates. Estimated impingement losses of smallmouth bass were highest of all in-scope plants at Clifty Creek. There is no reason to believe that impingement of smallmouth bass should remain as high downriver as it is at Clifty Creek. Therefore, EPA's use of Clifty Creek impingement losses for smallmouth bass to extrapolate to all downriver facilities likely results in a very high bias in smallmouth bass losses in the case study. The errors identified above will be compounded as the Ohio River case study is used to develop national extrapolations for the rivers and lakes waterbody type.

Freshwater drum

Freshwater drum is a common species in I & E estimates for the Ohio River. They are a common fish in agency lock rotenone samples in the Ohio River both during the time of the I&E studies and recently. Estimates of I & E losses as age-i equivalents (after standardizing for operational flows) show no longitudinal patterns in drum occurrence. However, one notable observation is the presence of a peak in both impingement and entrainment estimates at RM 490 for Miami Fort (Figure 13). This suggests that either the density of drum was much higher in that region during the study, or the site- and/or design of the facility makes it more likely to encounter drum. The result of this peak in I&E for freshwater drum is that estimates of losses over the data gap area will be overestimated. As noted before, EPA used the average I & E from W.J. Beckjord, Miami Fort, and Tanners Creek plants in extrapolating losses to the in-scope facilities between RM 260 and RM 453. The averages used for extrapolation are inflated by the inclusion of Miami Fort data. This is particularly true for impingement data. A better approach would have been to average several upriver and downriver facilities for application to the data gap region. EPA's present methodology will overestimate losses of freshwater drum in the data gap region. This overestimation will result in an overestimate of freshwater drum losses for the case study and in the national extrapolation based on the case study.

Validity of Extrapolations Based On Spatial and Temporal Changes in Fish Communities

EPA's extrapolation of I & E loss estimates in the case studies may be valid if the assumptions regarding extrapolations across regions and years are accurate. However, this does not appear to be the case. There is one Ohio River dataset available with which to assess the validity of EPA's assumptions regarding continuity of fish populations in areas of data gaps and EPA's assertion that fish abundance has increased since the time of the I & E studies and hence impact estimates are conservative. The Ohio River Sanitation Commission (ORSANCO), in cooperation with fisheries resource agencies, has conducted lock chamber rotenone surveys since the late 1950's. ORSANCO maintains a database of these data. Included in the data are numbers of fish by species from the series of lock and dam structures along the Ohio River. Such data can be used to consider whether juvenile and adult fish populations have changed considerably since the time when I & E studies that serve the basis of EPA's analysis were performed. These data can also be used to examine spatial patterns in abundance that may permit verification of the appropriateness of EPA's extrapolations for case study facilities down river of Clifty Creek and in the data gap area (RM 260 — 452.9) identified above.

All chambers are not sampled every year, but by looking at (1) sets of the data that correspond to the period of I & E estimates and (2) recent collections (1999) we can evaluate EPA's assumption. In lock rotenone surveys, carp were generally more abundant upstream than downstream and this pattern has existed since the earliest samples (Figure 14). In looking at the sections of the River where data extrapolations were made, the 1978-80 chamber data suggest that carp were relatively more abundant where I & E estimates were derived (upstream of RM 260, below RM 453, and extrapolations of RM 560 to downstream areas) than the areas where data were lacking. During the 1978-80 period of the case studies, and continuing in recent years (1999), abundance of carp as indexed by lock chamber surveys was higher in the case study areas than in the in-scope areas to which it was extrapolated. This suggests that EPA's estimates of I & E losses for carp are an overestimate due to inaccurate assumptions of distributions, abundance, and associated extrapolations. Although further data examination for other key species in the Ohio River study was not conducted, it is apparent that EPA's extrapolation methodology for regions without I & E estimates is flawed and likely results in overestimates of I & E losses in the case study for other species.

The lock chamber data suggest that changes in abundance and species composition have likely occurred over time, but among the key species the incidence and percentage of all fish collected has changed little. Gizzard shad still dominate the species composition by numbers across the river and other species such as bluntnose minnow, walleye, smallmouth bass, and sucker spp. are relatively minor components of the river community (Figure 15). In fact, bluntnose minnows were not reported as caught in the ORSANCO database in 1999. These data suggest that limited changes in species composition have occurred between the case study data collection for I & E and 1999. However, bluntnose minnow are much less abundant in the 1999-2001 agency rotenone surveys (0.002%) than at the time of the I&E studies (0.2% - 1977-79) Bluntnose minnow have been reported at only six sample sites and in low densities (N ~ 15 individuals per sample) in all samples since 1989. If bluntnose minnow have declined in abundance since the I & E estimates, then I & E losses associated with that species are likely overestimated in the EPA case study.

III. Summary of Identified Concerns

After examining and evaluating EPA's case studies in light of biological and temporal patterns in the abundance and distribution of aquatic species, it is apparent that in each case study examined, there are potential violations of extrapolation assumptions.

A. Salem

Extrapolations of data from Salem to represent all in-scope facilities for the Delaware Estuary case study will result in overestimates of I & E losses for the case study because of differences in organism distributions over the estuary, perhaps related to salinity. These differences in distribution for key species like bay anchovy, Atlantic croaker, and weakfish show that abundances up-estuary from Salem are lower than at Salem. As all other in-scope facilities are located up-estuary of Salem, differences in distributional density between Salem (where the I & E estimates were generated) and the other in-scope facilities will result in lower availability of these species for possible I & E. Thus, applying the higher I& E rates to the other in-scope facilities based on flow will overestimate the true impact of CWIS in the Delaware Estuary.

Salem's I&E estimates for spot further illustrate the uncertainty in EPA's estimates of losses. In the 19-year data series for Salem, the average entrainment loss of spot is derived largely from the influence of a few years of exceptional spot abundance and most occurred over 15 years ago (1980, 1982, 1985, and 1995). Thus, if EPA had used only more recent data it would produce a much lower estimate of losses for spot than the present approach. This high year-to-year variability in I&E points out the potential for poor estimates of losses that rely on dated or limited data as is commonly the case in EPA's methodology.

B. Great Lakes

For the Great Lakes waterbody type, EPA used I&E data from the J. R. Whiting facility to represent all facilities in the Great Lakes. Available data do not appear to concur with the assumption that the J. R. Whiting plant losses are typical of any other facility in the Great Lakes. The J. R. Whiting facility is located in the most productive section of the most productive of the Great Lakes. Hence, in the absence of differences in technology or design and assuming I & E is related to species abundance, extrapolations from Whiting to other facilities will necessarily be biased towards higher losses than a similar facility located in other areas with lower productivity. The magnitude of this bias will vary from facility to facility, but there is no doubt this is a serious error that results in an overestimate of I & E losses for this waterbody type.

Further, differences in species group assemblages across the Great Lakes and changes in abundance and composition of the fish community that have occurred between the time of I & E data collection and present, increase the bias towards higher I & E losses. Production of Lake Erie and the other Great Lakes has declined since the I & E studies and changes in abundance of most fish species examined should reduce I & E unless EPA's assumption that I & E is related to flow and abundance is inaccurate.

C. Tampa Bay

The Tampa Bay Watershed Case Study was more difficult to evaluate due to a relative paucity of data on the distribution of key species in the Bay and limited water quality information. However, the key feature in EPA's Tampa Bay extrapolation was the use of Big Bend I & E estimates for extrapolation to the Hooker's Point and Gannon facilities. Available data suggest that water quality is lower (low D.O.) for the upper Hilisborough Bay where these two in-scope facilities are located. These differences in habitat quality (low D.O.) will necessarily result in lower abundances of organisms near these facilities and this will equate to lower potential I & E. Thus, extrapolation to the Hooker's Point and Gannon plants from Big Bend estimates will result in elevated estimates of I & E for the Tampa Bay Watershed Case Study and the waterbody type.

D. Ohio River

The Ohio River Watershed Case Study extrapolations are also plagued by antiquated data, spatial gaps in data, and an ill-conceived extrapolation methodology. First, the data used by EPA were collected in 1977-1979. Many changes in fisheries abundance, composition, and associated vulnerabilities to CWIS have occurred during the 25 years since the I & E studies were conducted.

Additionally, I & E data were available only downriver to RM 560, yet EPA extrapolated the estimates from Clifty Creek downriver for 404 miles to the extent of the in-scope facilities (Joppa Steam Plant, RM 952). Thus, estimates from only one plant were expanded to over 40% of the length of the river. Any errors or bias in the Clifty Creek estimates are compounded by this heavy reliance upon Clifty Creek data and extrapolation over a large area. Species abundances change along the Ohio River, as suggested by the I & E estimates for the in-scope facilities (Figures 6, 7, 9-13). Hence, extrapolations of data from Clifty Creek to facilities down-river are invalid. Very high estimates of I & E at Clifty Creek for sucker spp. results in elevated estimates of loss of this species for the facilities in the 404 miles below Clifty Creek. Estimates of smallmouth bass I & E in the case study are also biased high due to a 193 RM data gap between Kyger Creek and W C Beckjord. In this case, instead of using an average of I & E that was weighted by distance from the closest upstream and downstream plants, EPA used a weighted average from three plants located downstream. Two of these three plants had the highest estimated losses of smallmouth bass --much higher than in the other seven facilities. The use of these data to estimate losses in the data gap zone results in biased high estimates of smallmouth bass losses for the case study. These high estimates then result in overestimates for in-scope plants on the Ohio River.

E. Conclusions

Although EPA was limited by the data available to estimate I & E losses in the case studies, in every case the Agency chose to use the highest possible impact scenario for extrapolation. This is true whether it be in selecting facilities for in-depth studies that appear to be at the apex of biological activity and productivity for each waterbody type, or when ignoring biological and distributional patterns that affect the validity of the extrapolations. However, EPA made no effort to place any reasonable bounds on the I&E loss estimates. In every case, they selected the approach that would generate the highest estimate of losses. In the scientific literature it is common practice to place bounds on model estimates at all stages so as to evaluate the uncertainty in the data and provide a reasonable bound that likely encompasses the true value. A better approach for EPA's methodology would be to use both liberal and conservative bounds for estimates made in generating numbers of organisms affected by CWIS.

In general, EPA's estimates of I&E losses has ignored the scientific literature, disregarded differential distribution, composition and density of fishes across systems within a waterbody type, and mixed data of different vintages. Each of these oversights or methodological errors leads to uncertainty or bias towards higher losses in EPA's estimates. As pointed out elsewhere, evidence exists in the scientific literature that compensation does occur in fish populations (Jensen 1981; Leggett 1977; Rose et al. 1999), yet EPA chose to ignore it. EPA's methodology also lacked consistency by mixing data of different vintages across the case studies. EPA's methodology should have used only recent data for all case studies, or used only datasets with long-term data series. Given the changes in productivity, species abundances, and species invasions that have occurred in many of the case study systems in the last 20 years, a long term dataset including recent years is preferable to that employed by EPA. Further, EPA ignored differences in productivity, species assemblages, and densities across systems or sites within a case study. This has resulted in a great deal of uncertainty in EPA's estimates.

EPA Response

This comment refers to the Case Study Document (DCN # 4-0003) presented at proposal, which was been revised considerably for EPA's final analysis. Specifically, extrapolation of I&E was done on a regional basis for the final rule (see Chapter A5 of the Regional Analysis Document, DCN # 6-0003, and response to Comment 316bEFR.041.041.

EPA appreciates the commenters concerns about potential difficulties when data are extrapolated. However, the examples provided by the commenter no longer apply to EPA's 316b analysis because EPA has greatly expanded its analysis since these case studies were presented at proposal by adding many additional facilities (a total of 46). Please see response to Comment 316bEFR.041.041 for information on the regional extrapolation for the final rule.

EPA agrees that temporal, physical, and biological characteristics can be important in determining I&E rates at particular facilities. EPA considered as many of these factors as possible for a national-scale analysis. For example, extrapolations were on a regional basis, with regions defined in terms of ecological similarities. EPA also considered technologies in place and adjusted old I&E data for any technology changes subsequent to data collection that may have led to a percentage reduction in I&E.

EPA notes that careful and accurate monitoring is necessary to develop accurate estimates of I&E rates at individual facilities. Most of the factors discussed by the commenter vary depending on the time of monitoring and waterbody conditions, including life history patterns, densities of aquatic organisms, and changing salinities and other waterbody conditions that vary seasonally and year-to-year.

Contrary to the commenter's assertion that only high-impact facilities were considered, EPA notes that the magnitude of losses varied widely at the facilities evaluated. Regarding the Great Lakes extrapolation, please see response to Comment 316bEFR.207.023.

Please see response to Comment 316bEFR.041.843 for a discussion of uncertainty and confidence intervals.

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Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 8.02
Proposed standards for lakes and reservoirs

Some Reservoirs Are Contrived Artificial Ecosystems

Many reservoirs in the Southwest illustrate several of the concepts discussed in UWAG's comments on the proposed Phase II § 316(b) rule — for example, the need to look closely at site conditions and the effect of nuisance species. For example, of the 212-plus "lakes" in Texas, only one, Caddo Lake, is natural. All other Texas lakes actually are manmade reservoirs constructed for single or multiple purposes, including potable water sources, flood control, recreation (boating, swimming, skiing, sports fisheries, etc.), and industrial use. Many of these reservoirs were constructed specifically to support the operation of power plants, in recognition of the important role recirculating cooling systems play in conserving water, compared to cooling towers.

In general, the power plant reservoirs are relatively shallow (less than 30 feet in depth on average), with gently sloping bottoms over a wide variety of substrates. The water volumes are controlled by either mechanical tainter gates or passive overflow structures, and the reservoirs are subject to significant annual pool level variation due to seasonal climatic conditions. Occasionally, there is some form of continuous flow-through to maintain downstream conditions, but retention times are very long, ranging from weeks to years.

A. Southwestern Reservoirs Are Affected by Fish Stocking and Exotic Nuisance Species

With no natural "lake" flora or fauna present, many Southwestern reservoirs support a combination of introduced lacustrine and adaptive riverine species. The fisheries of the publicly accessible reservoirs in Texas, for example, usually are stocked and managed by the Parks and Wildlife Department to support sports fishing, a major recreational industry in the State. The usual fish stocking regimes include predator species, strains and hybrids (largemouth bass, catfish, crappie, etc.), and prey species/hybrids, such as sunfish, minnows, and shads. Over time, and at various locations, the State also has introduced striped bass, redfish, carp, and other non-native species. Most of the stocked sport fish species, however, must be restocked periodically, regardless of cropping by CWIS, because of high fishing pressure, low naturalization, and the need to increase genetic diversity. For example, in 1998, the Texas Parks and Wildlife Department's Inland Fisheries Division stocked over eight million Florida-strain largemouth bass and over nine million fingerlings of other species.

With little natural seed bank and no managed vegetation stocking program in many reservoirs, the aquatic flora develops slowly and can result in unbalanced and/or low-diversity plant communities. So, for example, in recent years many Texas reservoirs have become increasingly impacted by exotic nuisance plants (water hyacinth, hydrilla, giant salvinia, eurasian water milfoil, etc.). These invasive plants often have a negative effect on the fisheries by altering the available nesting/spawning areas, influencing recruitment of certain species, and decreasing the depth of light penetration and the associated dissolved oxygen levels. Heavy infestations also can alter species distribution and limit recreational access.

B. Climate and Naturally Occurring Nuisance Species Severely Affect the Aquatic Communities in

Southwestern Reservoirs

These shallow Southwestern waterbodies also are under continuous threat from exotic aquatic fauna (as indeed are waterbodies of all kinds throughout the United States). The list of exotic fauna is long and seems to grow each year. Apart from the expanding number of fish species, the list of exotics also includes invertebrates, such as clam, mussel, and snail species. Recently, a species of estuarine mud crab has been found reproducing in at least four different Texas reservoirs that are several hundred miles from the coast. Each of these uninvited exotics presents new problems and future challenges to each reservoir in which they occur.

As mentioned earlier, the climate also can have a major impact on reservoir water quality and fisheries. In Texas and other more arid states, prolonged droughts and daily high ambient temperatures of over 100°F for extended periods often result in dramatic drops in reservoir volume. This impacts the fisheries by reducing recruitment, altering nesting locations and patterns, and eliminating available habitat. It also subjects the fisheries to additional stresses, such as higher salts concentrations, which necessarily weaken the population. It can take years for fisheries to return to pre-existing levels after a drought episode. There also are floods, such as the Texas floods of July 2002, which alter water quality, redistribute or introduce populations, decrease survivability, and impact historical nesting areas.

Natural conditions also can combine to impact the fisheries negatively. A prime example is the recent occurrence of golden algae blooms in several Texas inland reservoirs. Golden algae (Prymnesium parvum) is a naturally occurring saltwater-tolerant species. When in a “bloom” or period of rampant growth, it causes water discoloration and can be toxic to fish. The toxin released from the algae and concentrated during a bloom affects the gills by reducing their oxygen intake and asphyxiating the fish. The toxin appears to affect scaled fish the most. In the golden algae blooms over the past few years, estimates of mortality of the scaled fish in each reservoir range from 60% to 95%. The effects of golden algae blooms appears to linger in some reservoirs; the length of time needed for the fish populations to recover to previous levels is not yet known.

An additional factor to consider is the gradual natural decline typical of a reservoir’s fisheries. Reservoirs typically experience an initial “boom” in fisheries during the first years following impoundment. After the initial boom, the fisheries generally begin to decline slowly over the years. The National Reservoir Research Program (administered by the U.S. Fish and Wildlife Service) has established that this cycle is related to nutrients. As the reservoir is developed, nutrient levels initially are very high because of the newly inundated soils and vegetation. In subsequent years, however, the watershed typically is not able to sustain as high a level of nutrients. As the nutrient levels decline, so do the fisheries. Since most of the cooling water reservoirs in Texas are more than 30 years old, they are all essentially in the “decline” phase.

C. Southwestern Reservoirs Have Been Managed for Human Use

From the above description, it is easy to see that many reservoirs represent a contrived ecosystem. The fisheries are created, modified, and managed for a variety of human needs, with little initial natural material or conditions to build from. Many reservoirs, such those in the Texas and other parts of the Southwest, also are subject to wide swings in fishery populations, distribution, and makeup because of their comparatively simple ecosystem. These reservoirs do, however, provide a highly valued perennial habitat where historically there may have been only an intermittent streambed. So, for example, despite the importance of sport fishing in Texas, the Texas Parks and Wildlife Department never has identified impingement or entrainment as an impact or concern on the fisheries of these power plant reservoirs.

Many power plant reservoirs nationally, including those in Texas and elsewhere in the Southwest, were built specifically to support power plants. Because of the high value of water in Texas, and the Southwest generally, recirculating cooling impoundment systems (which conserve water when compared to cooling tower systems) are preferred. In a practical sense, these reservoirs are an extension of the plant intake that was installed for multiple uses, including cooling and water storage/reuse. Most serve as classic “cooling ponds,” although changes in state regulations and interpretations have changed their designation to “waters of the State.”

D. Southwestern Reservoirs Are Different from Many Other Waters

The features of Southwestern reservoirs described above illustrate the sort of site-specific factors that affect the environmental impact of cooling water intake structures. Other than the generic term “reservoir,” Texas waterbodies share few characteristics with those on the Ohio River (cited by EPA as the case study for losses and benefits in the proposed rule). They do not share the same flows, water quality, fisheries, climate, vegetation, management objectives, or concerns it is even more difficult to equate a manmade waterbody with a natural lake. Even if a natural lake has been modified to control the water, it still has a significantly higher developed ecosystem and much different physical characteristics.

It is apparent from this discussion that a one-size-fits-all analysis would not be appropriate for all reservoirs, whether in the Southwest or other parts of the country. For instance, establishing a true “baseline” in Texas reservoirs would be virtually impossible. As proposed in the regulations, such a baseline would serve only as a “snapshot.” Dramatic changes to the fisheries, especially ones beyond the control of the power plant, can and do occur with surprising speed and can have long-term effects on the fisheries’ populations and distributions. Such changes render the “baseline” information useless. In any event, the baseline should not be a moving target.

In this regard, exotic fauna present one of the more difficult problems. Their presence should not “count against” the permittee in determining whether EPA’s performance standards are met, given that many states make it a specific priority to remove them from their waters. Their presence does, however, alter the biology of the reservoir. The situation is essentially similar for exotic flora. Their presence too alters the biology, particularly the fisheries.

In short, some reservoirs, as described above, are very different from the case studies that were conducted in support of the Phase II rule and may require special implementation considerations adapted to their characteristics and purpose.

EPA Response

EPA agrees that the biological communities in some reservoirs are not natural and are, in fact, heavily influenced by human management or by nuisance species. However, EPA remains responsible for the protection of water quality under the Clean Water Act and continues to believe that national performance standards are appropriate for these waterbodies. EPA also notes that these reservoirs likely still are considered to be waters of the United States and therefore subject to regulation under section 316(b).

With respect to nuisance species, EPA acknowledges that nuisance species are a problem in some waterbodies. EPA intends to account for these species in today's final rule by requiring that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). A site-specific compliance option might also be available. The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

ECONOMIC EVALUATION OF EPA'S PROPOSED RULES FOR COOLING WATER INTAKE STRUCTURES FOR NEW FACILITIES

David Harrison, Jr., Ph.D., S. Todd Schatzki, Ph.D.

NATIONAL ECONOMIC RESEARCH ASSOCIATES

With Contributions by: Edward P. Taft, M.S., Alden Research Labs, John M. Burns, P.E., Burns Engineering Services, Inc., Wayne C. Micheletti, M.S., Wayne C. Micheletti, Inc., F. Reed Johnson, Ph.D., Triangle Economic Research

PREPARED FOR: UTILITY WATER ACT GROUP

I. INTRODUCTION

Section 316(b) of the Clean Water Act directs the U.S. Environmental Protection Agency ("EPA" or "the EPA") to set regulations for cooling water intake structures that reflect the best technology available ("BTA") to minimize adverse environmental impact. The EPA, in 1977, issued draft guidance based upon a judgment that BTA decisions should be based upon case-by-case decisions. Case-by-case decisions are appropriate because of the enormous variability in the costs and benefits of different cooling water intake structures depending upon the location of the facility and other site-specific characteristics. The EPA's 1977 guidance indicated that the case-by-case determinations of BTA should be based upon a comparison of the costs and benefits of alternative technologies; subsequent cases have interpreted this guidance to mean that a technology could be designated as BTA for a facility if its costs were not "wholly disproportionate" to the benefits.

The EPA draft guidance has been implemented by states through conditions in the National Pollutant Discharge Effluent Standard ("NPDES") permits issued to facilities that are covered by Section 316(b). These facilities include steam electric power generators as well as manufacturing facilities that use substantial quantities of water for cooling purposes.

A. Overview of EPA Proposed Regulation

The EPA on August 10, 2000 proposed 316(b) regulations for new facilities that would constitute a major departure from the existing guidance in two major respects (65 Federal Register 49060). First, EPA proposes to change the basic approach to 316(b) determination. Rather than encourage case-by-case determinations of BTA, the proposed regulations would provide national requirements for the design, capacity, and construction of cooling water intake structures for new facilities based primarily on the location of a cooling water intake structure. Second, the proposal would change the test for determining BTA. Rather than a test that compares costs and benefits of alternative technologies, the EPA proposed test would compare costs to overall facility or company revenues. This latter standard is often referred to as an "affordability" standard, i.e., whether the facility or firm could incur the costs without abandoning the facility or going out of business.

EPA recognizes the fundamental changes that its proposal would bring to 316(b) determinations and has invited comment on a broad array of other alternatives, including— maintaining the current site-specific approach and the current method of determining BTA. In addition, EPA, in August 2000, issued an economic document entitled, Economic and Engineering Analyses of the Proposed Section 316(b) New Facility Rule (hereafter "EEA" or "The EEA"). The EEA is designed to evaluate the costs, benefits and other impacts of the proposed regulations and alternative regulatory options.

B. Objectives and Conclusions of This Report

The proposed rule represents such a fundamental break with past EPA guidance and previous 316(b) permit determinations that it is important to assess whether the new approach is superior from several perspectives, including legal, technical and economic. It is also important to determine whether the evidence presented on economic and engineering considerations in the EEA is complete and accurate.

This report has two major objectives:

1. Assess the economic wisdom of the proposed regulations in comparison to alternative means of achieving the objectives of 316(b); and

2. Assess the economic analyses contained in the EEA, including its conformity to EPA and 0MB guidelines.

Although these objectives are related, it is useful to keep them separate. The first objective relates to the wisdom of the proposed regulations, while the second relates to the accuracy and adequacy of the economic information provided by EPA on the proposed regulations.

We conclude that EPA's proposed breaks with the past interpretations of 3 16(b) are not justified from an economic perspective. Shifting to a national approach from the case-by-by-case approach would waste society's resources by increasing the cost of achieving environmental gains and/or reducing the environmental gains from the resources that are spent to modify new facilities. The Agency argues that a shift to the national approach is warranted in large part by the costs and delays due to a case-by-case approach. But concerns about administrative and delay costs can be accommodated without abandoning the site-by-site approach. A permit applicant, for example, could be given an option of installing pre-approved, highly protective technology in the interest of obtaining a speedy approval of its facility permit.

The EPA's proposed shift to an affordability standard for BTA would also not be desirable from an economic perspective. Indeed, rather than abandoning the cost-benefit approach, the EPA should strengthen this approach. The current "wholly disproportionate" cost-benefit test should be replaced with guidance that BTA technology be selected to maximize net benefits, based dollar values of the costs and benefits of alternative technologies that could be employed at individual sites. This "maximize net benefits" criterion represents the "best" approach from the perspective of economic efficiency. The "wholly disproportionate" test appears to be motivated by concerns about uncertainties related to benefit calculations. But advancements in scientific understanding of fish protection alternatives and in economic valuation in the last two decades mean that accurate forecasts of both costs and monetary benefits can be made. Uncertainties in key parameters can be dealt with directly rather than creating a potentially misleading ad hoc comparison under the "wholly disproportionate" test.

We also conclude that the economic and technical analyses in the EEA are seriously inadequate. There are many concerns regarding the accuracy of the EEA cost estimates. The EEA provides virtually no information on the benefits of the proposed rule. Moreover, the treatment of alternatives to the proposed rule is cursory. In short, the EEA does not comply with EPA or OMB guidelines for cost-benefit assessments, including Executive Order 12866. Before proceeding any further, the Agency should complete its cost-benefit analyses of the proposed rule, provide reliable information on the costs and benefits of plausible regulatory alternatives, and otherwise comply with the requirements of Executive Order 12866.

C. Outline of the Report

The remainder of the report is organized as follows. Chapter II provides an economic evaluation of alternative EPA approaches, comparing the economic advantages and disadvantages of the proposed national standards approach with those of a case-by-case approach. Chapter III considers alternative approaches to making BTA determinations. We consider the proposed EPA approach, the current approach, and a cost-benefit approach that would be more consistent with both economic principles and the principles set forth in the EEA. Chapter IV shifts the focus from the proposed regulations to the EEA. In Chapter IV we consider the adequacy of analysis of several elements in the EEA, including the assessments of costs and benefits and the treatment of alternatives. Finally, Chapter V summarizes our major conclusions and recommendations with respect both to the nature of the regulations and the adequacy of the EEA.

II. ECONOMIC EVALUATION OF ALTERNATIVE 316(B) REGULATORY APPROACHES

This chapter and the following chapter together provide an economic evaluation of EPA's proposed 316(b) regulations for new facilities. As noted, EPA's proposed approach emphasizes the development of national BTA technology-related requirements that are evaluated based upon the affordability of the technology. The EPA proposed approach can be divided into two issues:

1. General approach to setting 316(b) requirements, i.e., national requirements rather than case-by-case determinations; and

2. Criterion for BTA determination, i.e., affordability rather than cost-benefit comparisons.

This chapter analyzes the first issue, i.e, the general approach. In order to isolate our concerns about EPA's proposed general approach, the examples in this chapter assume that BTA standards—either national or case-by-case—are set on the basis of cost-benefit comparisons. The examples illustrate that EPA's proposed national approach is inferior from an economic perspective to the case-by-case approach. Chapter III then addresses the second issue, i.e., the criterion for evaluating potential BTA technologies.

A. Alternative Regulatory Approaches

EPA recognizes the substantial change their approach would mean for 316(b) determinations. They note that a large number of regulatory alternatives are possible. This section summarizes the alternatives identified by the EPA and notes the fundamental shift in approach represented by EPA's proposed approach.

1. Overview of Alternatives Identified in the Proposed Rule

The Preamble to the proposed regulations provides discussions of alternative approaches to setting requirements for new facilities. The following is a list of these alternatives. (More complete descriptions and evaluations are provided in comments provided by the Utility Water Act Group).

1. National minimum requirement based upon the type of water body, with the possibility of additional site-specific requirements (EPA proposed alternative). This approach would set national minimum technology requirements for the location, design, construction, and capacity of cooling water intake structures that would differ depending upon the type of water body. Permit writers would have the authority to implement additional measures on a case-by-case basis.

2. Case-by-case determinations, based upon EPA guidance. This approach would make technology requirements dependent upon a case-by-case review.

3. Rebuttable presumption of national minimum requirements. Under this approach, site-specific factors could be used to rebut the presumption of the national minimum technology requirements.

4. National minimum requirements equal to a zero-intake flow (or nearly zero, extremely low flow) requirement. This approach would set national minimum requirements to be consistent with the results of adding a dry cooling system.

5. National minimum requirements, with the option of trading among components of BTA. This approach would allow facilities to trade off less stringent requirements in one dimension in exchange for more stringent requirements in another dimension. Facilities, for example, would be able to reduce flow below the minimum level in exchange for the opportunity not to reduce velocity as specified by the standards.

6. National minimum requirements that would apply the most stringent requirements to all water bodies. This approach would set uniform stringent requirements for facilities in all locations.

7. Site-specific determinations of Adverse Environmental Impact (AEI) and BTA, based upon a tiered approach. This approach would supplement the site-specific method by introducing a tiered approach. EPA discusses a three-tier version that would include screening, collection of additional information, and assessment of alternatives for BTA.

2. EPA's Preferred Approach

EPA proposes to adopt the first alternative. The proposed rule would set national minimum requirements for the location, design, construction and capacity of cooling water intake structures at new facilities. While EPA does not identify precisely what the technology requirements would be, it notes that the requirements might constitute a "technology suite" that would vary depending on the type of water body in which a cooling water intake structure is located as well as the location of the cooling water intake structure within the water body (65 Federal Register 49075-76).

Although EPA mentions seven alternative approaches, the seven are variations on two major themes.

1. Site-specific approach in which information on individual sites is used to set regulatory requirements; and

2. National approach in which technology performance requirements are set for all facilities in broad classifications.

The national approach would shift decision-making from the States and individual permit writers to the federal government. Permit writers currently make site-specific determinations, sometimes with regional or federal involvement. Under the national approach, however, the EPA would set the requirements. Individual states and permit writers would have limited discretion.

This report considers the economic desirability of the proposed shift to a national approach for 316(b) determinations. We conclude that a shift to a national approach is not justified from an economic perspective. The following section discusses the economic disadvantages of EPA's proposed national standards approach. We then discuss the economic advantages of the site-specific approach. The final section of this chapter considers how the site-specific approach might be modified to take into account the administrative and delay costs of site-specific determinations

B. Economic Disadvantages of EPA's Proposed National Standards Approach

The major economic disadvantage of the national approach is that uniform requirements would be wasteful. The wastes would occur in two ways:

1. National standards would result in greater costs than necessary to achieve a given level of environmental protection; and

2. National standards would produce fewer environmental gains than possible for a given level of resource expenditures.

These disadvantages flow from the large differences in the costs and benefits across facilities that are ignored by the national approach. This section summarizes the variability in costs and benefits across sites and provides examples to illustrate the limitations of the national standard approach.

1. Sources of Variability Across Sites in the Benefits and Costs of a Given Fish Protection Technology

Comments provided in UWAG 2000 supply evidence of the variability in costs and benefits across different facilities. These differences can be summarized as follows:

a. Benefit Variability

Installing a given technology at a new facility can result in vastly different benefits at different sites because of differences in the following factors:

Waterbody Characteristics
—hydrology
—zone of influence of intake
—temperature
—turbidity
—natural debris loading
—meteorological factors, such as ice formation and storm patterns

Biological Characteristics
—life history of species affected by the CWIS
—habitat preferences
—behavioral patterns

Plant Characteristics
—operational patterns/schedule, including planned outages
—likelihood of sedimentation build-up in front of intake
—maintenance/repair needs for all parts of intake structure

Those factors may vary in importance/relevance depending on individual site factors. The net result is that the environmental benefits of installing a given fish protection technology will differ substantially across different sites.

b. Cost Variability

The costs of adopting a given technology can also differ substantially depending upon the specific facility and site. Perhaps the most straightforward example is the case of a closed-cycle cooling water system, a technology that figures prominently in EPA's proposed national approach. (New facilities in many locations would have to reduce water intake flow to a level commensurate with the closed-cycle cooling system under EPA's proposed framework, as summarized in 65 Federal Register 49077.) The costs of this technology can vary depending on cooling water requirements, site conditions for construction, local atmospheric conditions, power costs in the regional electricity system, and the plant characteristics listed above as affecting the benefits.

2. The Proposed Uniform National Approach Would Waste Resources

The national technology minimum approach proposed by EPA largely ignores the variability in both the costs and the benefits of adopting specific cooling water intake structure ("CWIS") technologies—or technology performance standards—at different locations. Although their approach provides some variability in control requirements, the requirements would be uniform for large categories of potential locations. This approach does not appropriately consider the specific costs and benefits when determining which technology to install at specific locations. The national approach leads to three inefficient results:

1. First, the proposed approach would produce smaller fish-protection and other environmental benefits for a given level of costs;

2. Second, the proposed approach would impose higher costs than are necessary to achieve a given level of fish protection and other environmental benefits; and

3. Third, the proposed approach would not provide the appropriate incentives to locate facilities in areas with fewer environmental impacts.

It is useful to illustrate the disadvantages of the uniform national approach with some examples. The first example provides a benchmark for the comparisons by illustrating how BTA technologies would be set to maximize net benefits for two plants under the assumption that both plants have the same costs and benefits. This example assumes that BTA is based upon a benefit-cost comparison. (As discussed in Chapter III, the proposed EPA approach to setting BTA is not based upon cost-benefit comparisons; thus, the economic impacts of EPA's approach would be even worse than illustrated in this chapter.) The second example illustrates the drawbacks of ignoring variability in the benefits across different sites. The third example illustrates the disadvantages of ignoring differences in the costs across sites.

a. National Uniform Technology Standards Would Not Waste Resources if the Costs and Benefits of Alternative Technologies Were the Same for All Facilities

National technology based requirements implicitly assume that the benefits of applying the technology are the same regardless of the site, within broad water body and location categories. Put another way, the uniform approach at best tends to focus on the average values for costs and benefits, rather than consider the wide range of costs and benefits dependant upon the characteristics of the individual facility.

Table 1 provides an illustration of the costs and benefits of three technologies that could be applied in one of the broad groups identified in the EPA proposed approach (e.g., estuary or tidal river). The illustrative technologies represent increasingly expensive means of reducing fish losses at two identical facilities. The table shows the cost of applying each of the three technologies as well as the fish protection (and other) benefits if each of the three technologies were employed. The table also illustrates the incremental cost and incremental benefit of each of the technologies. Incremental cost is defined as the added cost of each technology relative to the previous one. For example, the incremental cost of Technology 2 is $50 million, the difference between the total cost of Technology 2 and the total cost of Technology 1 ($75 million minus $25 million).

Table 1: Illustrative Costs and Benefits of Alternative CWIS Technologies at Two Facilities with the Same Costs and Benefits ($millions)
[see hard copy for table]

The benefit-cost criterion implies that the choice should be based upon maximizing the net benefits, i.e., benefits minus costs. Net benefits are maximized for Technology 2, which is predicted to produce a net benefit of $50 million dollars for each of the two facilities. Although the more expensive Technology 3 has benefits ($175 million) that are greater than costs ($150 million), net benefits would only be $25 million, substantially less than the net benefits of Technology 2.

The rationale for stopping at Technology 2 can also be explained in terms of the incremental costs and incremental benefits of Technology 3 relative to Technology 2. The table shows that the incremental cost is $75 million and the incremental benefit is only $50 million of adopting Technology 3 relative to Technology 2. This illustrates the general rule that a more expensive technology would increase net benefits if its incremental benefits are greater than its incremental costs.

The point of including two facilities in Table 1 is to illustrate that if the costs and benefits are the same for all facilities, the national standards approach is adequate. The following sections illustrate the disadvantages of the national approach under the more realistic cases in which the benefits and the costs differ.

b. Ignoring Variability in Benefits Would Waste Resources and Ignore Opportunities to Obtain Environmental Benefits

The disadvantages of the uniform national approach can be illustrated by considering an example in which the benefits of applying each of the technologies differs for the two facilities. As noted above, applying the same technology can have vastly different benefits depending upon a host of factors. The benefits would be much greater, for example, if the technology were applied in an area where there is a high risk of adverse environmental impact (AEI) rather than in an area with little possibility of AEI.

Table 2 shows hypothetical estimates for the two facilities when this benefit variability is taken into account. Facility A represents a “low benefit” situation. This facility might be one located in an area with little risk of AEI, and thus the benefits from applying expensive fish protection technology are relatively small. Under EPA’s uniform technology approach, Technology 2 would be required at Facility A. That requirement would waste resources. The added cost of Technology 2 relative to Technology 1, which is equal to $50 million ($75 million minus $25 million) is greater than the added benefit of applying Technology 2, which is only $40 million ($70 minus $30 million). Put another way, Facility A would be over-controlled under the uniform technology requirement.

Table 2: Illustrative Costs and Benefits of Alternative CWIS Technologies at Two Facilities with the Same Costs but Different Benefits ($millions)
[see hard copy for table]

A uniform technology requirement also would prevent the opportunity to focus greater controls in “high benefit” areas. Facility B represents a “high-benefit” situation. This facility, for example, could be located in an area with substantial risk of AEI, and thus the benefits of adding fish protection technology to the cooling water intake system would be substantial. Under EPA’s uniform technology approach, Technology 2 also would be required at Facility B. That requirement would limit opportunities. The added benefit of Technology 3 of $160 million is greater than the added cost of $75 million, yielding a change in net benefits of $85 million from technology 2 to technology 3. That net benefit is foregone under the uniform technology approach.

In sum, ignoring variations in benefits tends to waste resources by requiring the same technology at all sites within a broad geographic area. The result is that resources are not targeted where they provide the greatest environmental benefits.

-Facilities in “low benefit” areas would tend to be over-controlled; and

-Facilities in “high benefit” areas would tend to be under-controlled.

Both situations lead to wasted opportunities to maximize the net benefits of regulations on cooling water intake structures at new facilities.

c. Ignoring Variability in Costs Would Waste Resources and Ignore Opportunities to Obtain Environmental Benefits

Facilities also differ substantially in the costs of applying a given technology. Table 3 shows the results of applying the uniform technology approach at two facilities that differ in the costs of control. Facility A represents a relatively high cost situation. Requiring Technology 2 at Facility A would waste resources because the incremental costs for Technology 2 of $105 million are substantially greater than the incremental benefits for Technology 2 of $75 million.

Table 3: Illustrative Costs and Benefits of Alternative CWIS Technologies at Two Facilities with Different Costs and the Same Benefits ($millions)
[see hard copy for table]

Facility B is a relatively low cost facility. Requiring Technology 2 at Facility B would generate substantial net benefits, equal to $65 million. But the uniform requirement ignores the opportunities to exploit the low costs of control at Facility B by applying more stingent controls. Applying Technology 3 to Facility B would lead to net benefits of $85 million, $20 million more than the net benefits under Technology 2.

In sum, ignoring cost variations also tends to waste resources and avoid opportunities tc obtain environmental improvements. Resources are not targeted where they provide the greatest environmental gains.

-High-cost facilities would tend to be over-controlled; and

-Low-cost facilities would tend to be under-controlled.

As with the situation in which benefit differences are ignored, ignoring cost variations leads tc wasted opportunities to increase the net benefits from regulations on cooling water intake from new facilities.

C. Economic Advantages of Site-Specific Approach

Determining the appropriate BTA technology on a site-specific basis avoids th disadvantages of the national technology-based approach. Under a site-specific approach control resources are focused where they provide the greatest benefits. In addition opportunities to obtain cost-beneficial environmental gains can be exploited.

This section illustrates the advantages of the site-specific approach. The examples continue to assume that requirements are based upon a benefit-cost test. (As discussed in Chapter III, the test that EPA proposes for BTA is not based upon benefit-cost comparisons and, indeed, is seriously deficient from an economic perspective.)

1. By Taking Benefit Variability Into Account, the Increases the Net Benefits of Controls

We can use the previous examples to illustrate the gains from taking benefit variability into account. Table 4 illustrates the same three technologies for Facility A ("lower benefit") and Facility B ("high benefit") under the assumption that the costs are the same when a given technology is applied to either facility. Because of differences in the benefits when a technology is added to the two facilities, as noted above, the appropriate technology choice is very different. Under the site-specific approach, Facility B ("high benefit") would have the most expensive technology while Facility A ("low benefit") would have the least expensive technology. Under this hypothetical example, the technology that would be chosen as the national uniform technology would not be appropriate for either of the two facilities.

Table 4: Illustrative Costs and Benefits of Alternative CWIS Technologies at Two Facilities with the Same Costs but Different Benefits ($millions)
[see hard copy for table]

Table 4 shows the gain from the site-specific approach relative to the uniform national approach. Under the site-specific approach, the overall costs are greater than if the two plants were both subject to the uniform technology; the total cost for the two facilities would be $175 million under the site-specific approach, compared to $150 million under the national uniform approach. But the benefits of the site-specific approach would be substantially greater, leading to an increase in net benefits from $130 million under the national uniform approach to $225 million under the site-specific approach.

2. By Taking Cost Variability Into Account, the Site the Net Benefits of Controls

Differences in the cost of control across sites leads to approach. Table 5 shows the case in which benefits are the same for the two facilities but costs vary substantially between the two facilities. Under the site-specific approach, Facility A ("high cost") would have the least advanced technology while Facility B ("low cost") would have the most advanced technology.

Table 5: Illustrative Costs and Benefits of Alternative CWIS Technologies for Two Facilities with Different Costs by the Same Benefits ($millions)
[see hard copy for table]

As in the case with varying benefits at the two facilities, the cost-varying case leads to different overall costs and benefits than under the uniform approach, both overall costs and overall benefits are lower than the net benefits are much greater under the site-specific approach, compared to just $40 million under the national uniform approach.

3. Summary of Illustrative Gains of the Site-Specific Approach

The full advantages of the site-specific approach are evident when the effects of both benefit variability and cost variability are taken into account. Table 6 summarizes the effects o applying the site-specific approach and the national uniform approach. The total net benefits of the national and site-specific approaches are the same when there is no variation in costs an benefits across facilities. But the illustrative net benefits under the two approaches are substantially different when benefit variation and cost variation are taken into account.

Table 6: Illustrative Net Benefits for Two Facilities Under National and Site-Specific Approaches
[see hard copy for table]

These examples illustrate that the site-specific approach is superior to the national approach except under a case in which all facilities have identical costs and benefits. When the costs and benefits vary—as they inevitably will—the site-specific approach provides higher net benefits than the national approach. Put another way, the national “one sized fits all” approach would waste resources by not targeting control expenditures where benefits are relatively high and costs are relatively low.

4. The Site-Specific Approach Also Leads to Appropriate Incentives to Locate Facilities Where Impacts are Low

The EPA at various points in its proposal notes the importance of providing incentives for facilities to locate outside areas where there is a high risk of adverse environmental impact. The national approach sets different requirements for facilities in different locations, which would discourage new facilities from locating where standards are relatively stringent. The proposed national requirements are most stringent for facilities in tidal rivers, estuaries and the “littoral zone” of freshwater rivers, lakes and reservoirs (65 Federal Register 49083).

Although setting different standards for facilities located in different locations provides some of the advantages of the site-specific approach, the requirements are too crude in light of the large differences in benefits among facilities located within the broad areas in the proposed regulations. In contrast, a site-specific approach provides the appropriate incentive for facilities to locate outside areas of important biological activity.

Note that the feasibility of locating facilities outside areas more likely to have adverse environmental impact depends upon the importance of other factors that go into siting decisions for new facilities. As EPA acknowledges, it is sometimes not possible to locate facilities outside of areas likely to experience adverse environmental impacts (65 Federal Register 49083). Many factors enter into siting decisions, including wage scales and other aspects of local labor markets, access to raw materials, and state and local taxes. In the case of electric generating facilities, access to natural gas pipelines for input supplies and proximity to electricity transmission lines are also important siting considerations.

The potential inflexibility of the national approach also could lead to unintended effects on the electricity prices and the reliability of the electricity system. Stringent and inflexible requirements could have the effect of creating “zoning restrictions” for electric power plants and other affected facilities. Indeed, the cumulative effect of 316(b) regulations and other policies—such as wetlands restrictions—could result in significant limitations in the ability to site new electric generating facilities. Such limitations could lead to higher electric rates and possible reductions in the reliability of the overall electricity system. These electric sector impacts could in turn affect overall growth in the U.S. economy (see, e.g., National Research Council 1986).

Because siting decisions can be complicated—and because the energy and other benefits of new facilities are important—it is important that the 316(b) regulations provide sufficient siting flexibility. At the same time, the regulations should reflect the disadvantages of locating facilities where these is a high risk of adverse environmental impact. The site-specific approach would provide such a balance.

5. EPA's Criticisms of the Site-Specific Approach Are Not Justified

EPA argues that it is proposing this new approach "based in large measure on the Agency's experience in attempting to implement section 316(b) on a wholly site-specific basis" (65 Federal Register 49079). The following are the alleged difficulties of the existing case-by-case approach mentioned by EPA in the proposed rule.

-Administrative and information costs. EPA argues that considerable resources have been expended by regulatory authorities and industry to develop case-by-case information.

-Disincentive to consider new technology. EPA claims that the information costs have resulted in reluctance to reconsider permit conditions in light of new technologies.

-Inconsistency. EPA argues that the case-by-case approach "might result in permitting decisions that are less consistent than they would be if national requirements were in place." (65 Federal Register. 49079)

-Predictability. EPA argues that "[t]he case-by-case approach results in less predictability regarding what is or may be required for a particular facility, which makes planning difficult for industry and leaves regulatory agencies uncertain about the appropriate requirements for particular water bodies or facilities." (65 Federal Register.
49079)

None of these alleged difficulties provides a persuasive economic rationale for preferring EPA's proposed national approach to the site-specific approach.

a. The Administrative Costs of the Site Specific Approach Are Justified by Better 316(b) Decisions

EPA claims that the historical case-by-case approach requires significant resources on the part of both regulatory authorities and industry (65 Federal Register 49079). The Agency, however, does not provide any specific information on the administrative costs that have been incurred under the case-by-case approach. Nor does EPA compare the administrative costs of the case-by-case approach with those of the proposed national minimum standards approach (which includes the potential site-by-site evaluation of alternative and supplementary standards).

EPA's concern for administrative costs is justified. Resources spent analyzing the costs and benefits of regulatory alternatives at different sites represent real resource costs. But the objective of efficient and effective regulation is not to minimize administrative costs but rather to maximize the net benefits of regulation. Resources spent to avoid inappropriate decisions— including regulations that are inappropriately stringent in some cases and inappropriately lax in other cases—can represent money well spent. Indeed, the field of decision analysis provides guidelines for determining the value of information collection (see. e.g., Raiffa 1968). The value of information depends upon whether it would influence the decision and the significance of the decision (see Stokey and Zeckhauser 1978).

Site-specific information for 316 (b) decisions may have considerable value because of the wide range of costs for possible fish protection technologies—ranging from relatively simple screens to expensive closed-cycle cooling systems—and the equally wide range of possible benefit circumstances. Collecting information that allows the technology to be tailored to the site conditions thus will pay off in the form of higher net benefits for the decisions that are ultimately made in 316(b) permits. Later in this chapter we illustrate how the site-specific approach might be modified to take administrative costs into consideration. That section also discusses the limitations of EPA's proposed approach to including some site-specific variability in its regulations.

b. The Site-Specific Approach Would Likely Provide Greater Opportunities to Consider New Technology Over Time Than the National Approach

EPA argues that the administrative costs of the site-specific approach have made permit writers reluctant to revisit 316(b) permit conditions in light of new technology. The Agency contends that the reluctance is a "significant concern." (65 Federal Register 49079)

EPA provides no information in the Preamble to support this concern. Thus, it is difficult to assess this argument. In general, the site-specific approach should provide greater incentive to encourage new technology over time than the uniform national approach. Requirements that appear to be based on particular technologies tend to lock in particular technologies and provide little incentives to modify controls in light of improvements (see Portney 1990). Having once put in the technology required under the minimum national requirements, facilities are unlikely to look for more effective or efficient methods. The incentives for long-run innovation of BTA technologies also would be diminished, since market opportunities would be limited to all but a select few technologies.

In contrast, a site-specific approach would provide the opportunity for a periodic review of the costs and benefits of technologies. Although owners may not have incentives to search for more stringent options, the need to review literature on current control options and their costs would provide a mechanism for new developments to be evaluated and considered in the permit renewal process.

c. The Site-Specific Approach Could Provide Greater Economic Consistency Than the Uniform National Approach

EPA argues that the historical case-by-case approach may result in less consistent permitting decisions than the national requirements of the EPA proposed approach. (65 Federal Register 49079) The Agency does not specify its definition of consistency. If consistency means subjecting facilities to the same regulatory requirements regardless of their individual situations, EPA's contention is certainly true. But such consistency seems of little value and would only reflect the lack of appropriate flexibility in the national approach.

The site-specific approach would be more consistent than the national approach if consistency is measured in economic terms, i.e., as effective and efficient regulation. The site-specific approach would allow permit writers to take into account the individual circumstances of individual facilities. Although one could not be certain that all permit writers would use appropriate economic criteria—as outlined in Chapter III of this report—the site-specific approach at least offers the possibility of deciding on controls at individual facilities in an economically rational manner.

d. Any Greater Predictability of the National Uniform Approach Would Reflect Its Lack of Flexibility Compared to the Site-Specific Approach

The EPA argues that the case-by-case approach results in less predictability regarding what is required for a particular facility. This lack of predictability, according to EPA, "makes planning difficult for industry and leaves regulatory agencies uncertain about the appropriate requirements for particular water bodies and facilities." (65 Federal Register 49079)

While a national uniform approach may lead to greater predictability—because the required technologies would be identified in the national requirements—such predictability would come at the cost of flexibility. Indeed, predictability seems another term to describe the inflexibility of the national technology approach proposed by EPA for new sources. In contrast, a site-specific approach would provide appropriate flexibility to industry and permit writers, even if the specific technology requirements were not identified long in advance. Over time, both facility owners and regulatory agencies are likely to develop more accurate predictions of the types of technologies that would be appropriate at individual facilities.

6. The Site-Specific Approach Can be Modified to Deal with Administrative and Delay Costs

The EPA notes that the site-specific approach may lead to greater costs to both permit applicants and regulatory authorities that implement 316(b) requirements. These costs include the administrative costs of developing information on 3 16(b) alternatives as well as the delay costs from any additional time required for the site-specific reviews. EPA uses increased administrative and delay costs as a major rationale for rejecting the site-specific approach (although as also noted above, the Agency does not provide any specific information on the nature or size of these costs). The EPA does, however, propose to include site specific factors in regulatory determinations through proposed procedures for setting additional and alternative BTA requirements (65 Federal Register 49091).

As emphasized above, the site-specific approach allows regulatory agencies and owners of facilities to develop information on the costs and benefits (and other impacts) of alternative CWIS technologies. This information is important to determine which of the possible alternative CWIS technologies should be BTA at the particular site. As noted above, EPA's critique of the site-specific approach ignores the importance of this information to increasing the net benefits of BTA determinations. Substantial administrative or delay costs would be warranted in order to avoid costly mistakes in setting BTA requirements. These mistakes could involve requiring expensive CWIS controls where they are not justified—in which case the mistakes would involve excessive resource costs—or foregoing the possibility of environmental gains from more extensive CWIS requirements than would be set through national requirements. These considerations do not mean, however, that no accommodations should be made to deal with administrative and delay costs.

This section suggests means of taking administrative costs into account in the site-specific approach. We also discuss the disadvantages of EPA's proposed additional and alternative requirements.

a. Possible Modifications to the Site-Specific Approach

The administrative costs of the site-specific approach may not be justified in al] situations. In some cases, the costs of obtaining this information—including the disadvantage-- of the delays involved in collecting the information and developing regulator) determinations—may be greater than its value in improving the BTA determination. This possibility suggests the usefulness of a categorical approach that could be used as an alternative to the site-specific approach.

One possibility is for the 316(b) regulations to include an option in which a prospective facility could choose to install pre-approved, highly protective technology in exchange for obtaining a speedy approval of its 316(b) application. This alternative would provide the flexibility to avoid situations where the administrative and delay costs were large relative to the potential gains from a more accurate assessment. The company would voluntarily incur the higher costs of the pre-approved technology in order to reduce administrative costs and to obtain the gains from getting its project approved more quickly. These latter gains would include the gains from getting its facility in operation earlier, and thus getting its products to he market more quickly. A power producer, for example, could choose to install the pre-approved technology—and thereby reduce the administrative costs of information collection rid regulatory review—in order to enter the market more quickly.

This option would not detract from the economic advantages of the site-specific regulatory approach. The facility would always be free to choose the site-specific approach and thus incur the added administrative and delay costs if the gains from the additional information were considered to be sufficiently large. It seems appropriate to give the option to the facility owner—rather than to the regulatory agency—because the facility owner is likely to be in a good position to provide a preliminary assessment of the likely costs and potential gains of developing a detailed site-specific evaluation of BTA alternatives.

b. Disadvantages of EPA's Proposed Additional and Alternative Requirements

The EPA proposes that permit writers would require additional (i.e., more stringent) requirements where necessary to ensure attainment of water quality standards (65 Federal register 49091). The proposed regulations would also allow the EPA to set alternative (i.e., less stringent) requirements under certain circumstances.

These EPA proposals implicitly acknowledge the significance of site-specific factors. lese specific accommodations, however, are not a plausible alternative to retaining the sitepecific approach, including the modifications noted above. The requirements for determining additional alternatives are excessively vague. The specific requirements for approving alternative standards would not yield the gains from an appropriate site-specific approach.

The proposed 316(b) regulations would require that more stringent ("additional") requirements be included when they are "necessary to ensure attainment of water quality standards, including designated uses, criteria, and anti-degradation requirements." (65 Federal register 49091). This site-specific requirement is extremely vague and does not provide an indication of the circumstances under which particular 316(b) requirements would be made more stringent. Whether water quality standards are met in a particular water body will depend upon many factors unrelated to 316(b) determinations at a single facility. The proposed regulations provide no indication of how such a general mandate would be interpreted and what its likely effects would be.

In contrast, EPA is very explicit about the criterion that would be used to determine whether less stringent requirements would be allowed. The EPA proposes that

"alternative requirements that are less stringent than the requirements of Section 125.84 [the national requirements] would be approved only if compliance with the requirement at issue would result in compliance costs wholly out of proportion to the costs considered during development of the requirement at issue. . . - (65 Federal Register 49091)

This criterion would not result in decisions that obtain the economic advantages of the site-specific approach. This criterion does not allow EPA to consider the costs and benefits of alternative BTA technologies in the particular site. Instead, EPA would only consider whether the costs at the particular site were “wholly out of proportion” to the costs assumed by EPA when it set the national technology requirements. Put another way, if EPA set its national BTA requirements on the basis of costs and benefits, this criterion would address only one of the two elements—the costs and not the benefits.

EPA’s proposed approach for setting alternative BTA requirements raises the general problems with EPA’s approach to setting BTA requirements—BTA is based upon a determination of whether costs are “affordable” rather than whether costs are appropriate in light of the benefits to be obtained. The following chapter discusses the disadvantages of basing BTA requirements on “affordability” and the advantages of using a cost-benefit framework.

III. ECONOMIC EVALUATION OF ALTERNATIVE APPROACHES TO BTA DETERMINATION

This chapter evaluates the test that EPA has proposed for determining what technology constitutes BTA. As noted, EPA’s test focuses on the “affordability” of control costs to the industries covered by 316(b). This chapter discusses this and other BTA tests identified by EPA. We conclude that the affordability test would not be a sufficient test from an economic perspective and recommend that EPA adopt a true cost-benefit test to identify BTA on a site-specific basis.

A. Regulatory Alternatives Identified by EPA

EPA proposes several cost tests for evaluating cooling water intake structure (CWIS) technologies to be used in place of benefit-cost analysis (BCA). EPA claims that the tests could be used “to evaluate [if] the costs that would be associated with this proposal are reasonable in relation to the environmental benefits to be derived” (65 Federal Register 49095). Despite this claim by EPA, none of the tests proposed would serve this purpose. The only test that fulfills this stated purpose is a benefit-cost test that is not included in EPA’s list.

1. Overview of Alternatives Identified in the Proposed Rule

EPA identifies four cost tests for determining BTA.

1. Wholly disproportionate cost test. In the wholly disproportionate cost test, an alternative would not be considered BTA if the costs of implementing the alternative are “wholly disproportionate” to the environmental benefits achieved by the alternative.

2. Compliance cost to revenue test. The compliance cost to revenue test compares the cost of a BTA alternative to the revenues generated by the facility.

3. Compliance cost to construction cost test. The compliance cost to revenue test compares the cost of

a BTA alternative to the construction cost for the new facility.

4. Compliance cost to discounted cash flow test. The compliance cost to discounted cash flow test compares the cost of a BTA alternative to the discounted cash flow due to the construction of the new facility.

Of the four tests, the “wholly disproportionate” test is the only test that considers both the costs and benefits of possible BTA alternatives. As discussed below, the “wholly disproportionate” test is economically inferior to a test that would compare net benefits of BTA alternatives.

The other three tests consider the magnitude of the BTA costs in comparison to other costs or revenues. The apparent rationale for these tests is that they measure the “affordability” of the BTA alternative to facility owners or consumers.

2. EPA’s Proposed Alternative

EPA proposes to use the compliance cost/revenue test as the most appropriate test (65 Federal Register 49095). The Preamble lists several reasons for this choice, including EPA’s extensive experience using the measure, the ready availability of data for the test, and EPA’s belief that the test provides a reliable measure of whether costs are “economically practicable.”

[comment text continued in 316bEFR.041.602]

EPA Response

For a response to this comment, which was submitted with the commenter's Phase I proposal comments in November 2000, see the Phase I Comment Response Document (DCN 3-0091) beginning at comment 316bNFR.068.300.

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Author Name Hunton & Williams
Organization obo Utility Water Act Group

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[comment continued from 316bEFR.041.601]

B. Economic Disadvantages of EPA's Proposed Affordability Approach

Although "affordability" is a useful concept, it is not desirable from an economic perspective as the sole criterion for selecting BTA technology. The "affordability" test proposed by EPA for BTA determination provides only a partial assessment of the economic factors and issues relevant to the determination of BTA. The EPA's approach has several disadvantages compared to a true benefit-cost test:

-Affordability ignores consideration of costs and benefits of BTA alternatives.

-Affordability ignores consideration of the incremental effects of increasingly stringent (and expensive) alternatives.

-Affordability ignores the indirect effects of the BTA requirements. The following subsections address these disadvantages.

1. EPA's Proposed BTA Test Ignores Consideration of Costs and Benefits

EPA's "affordability" test does not compare the costs and benefits of alternative BTA requirements. This inadequacy is contrary to well-established economic principles as well as EPA/OMB Guidelines and, indeed, the principles outlined in the EEA for this regulation.

a. Economic Principles Behind Environmental Regulation

As EPA notes in the EEA, environmental regulations are developed to correct market imperfections resulting from externalities (e.g., pollution) associated with the production or consumption of services and goods. Although externalities impose costs on individuals, these costs are not reflected in the prices of goods and services. As a result, the level of these externalities is "too high" relative to the situation in which prices reflect these costs. When prices reflect external costs, the external effects are said to be "internalized" into individual's decisions, thus leading to individual decisions that properly reflect the social costs.

Viewed from this perspective, the development of environmental regulations is an effort to ensure that the production and consumption of goods and services reflect the unpriced costs of these decisions on the environment. This perspective is consistent with the view taken by EPA in the EEA:

The goals of environmental legislation and subsequent implementing actions, such as the 316(b) regulation that is subject to this analysis, is to correct environmental externalities by requiring the responsible parties to reduce their actions causing environmental damage... These actions result in a supply of goods and services that more nearly approximates the mix and level of goods and services that would occur if the industries impinging and entraining organisms fully accounted for the costs of their AEI-generating activities. (EPA 2000, p. 2-6)

Regulations provide a means of internalizing the cost of externalities in the production and consumption decisions of individual producers and consumers.

b. EPA and OMB Guidelines

The importance of cost-benefit analysis as a tool to developing appropriate regulatory requirements is indicated in both EPA and OMB guidelines. The EPA, for example, provides the following recommendations for any economic analysis:

For most practical applications, therefore, a complete economic analysis comprises a benefit-cost analysis, an economic impacts analysis, and an equity assessment. (EPA 1999)

Guidelines by OMB are consistent with this perspective, suggesting that an economic analysis should provide information allowing decision-makers to determine whether, [t]he potential benefits to society justify the potential costs, recognizing that not all benefits and costs can be described in monetary or even quantitative terms, unless a statute requires another approach. (OMB 1996)

The economic test proposed by EPA fails to compare costs and benefits. Thus, the approach fails to provide any assurance that BTA determinations would result in positive net benefits.

c. EPA’s Engineering and Economic Analysis

The lack of a cost-benefit test for BTA is particularly surprising given statements by the EPA in the EEA that appear to support the cost-benefit approach. In justifying regulatory interventions in environmental problems, the EEA states that:

This approach to addressing the problem of environmental externalities will generally result in improved economic efficiency and net welfare gains for society if the cost of reducing the activities causing environmental harm is less than the value of benefits to society from the reduced AEI. (EPA 2000)

While EPA appears to recognize the importance of costs and benefits in describing the rationale for regulatory intervention, the Agency does not follow through with the implications of this position in developing the proposed BTA rule.

By failing to consider benefits, EPA’s proposed BTA test would not determine whether a given BTA alternative produced net social benefits. Failure to consider benefits in BTA determination represents a significant contradiction with the Agency’s position on the proper approach to address externalities.

2. Failure to Consider Costs and Benefits May Lead to Perverse Policy Outcomes

The three economic “affordability” tests fail to account either for the environmental benefits provided by CWIS investments or any adverse environmental impacts associated with CWIS investments. These tests contain no information about whether or not these compliance costs yield commensurate or even any reductions in net adverse environmental impacts.

Table 7 shows an example of how the proposed EPA test for BTA could lead to an economically-incorrect policy decision. Consider an electricity company with two plants facing an “affordability” test. For this example, assume that compliance costs are the same for both plants. Plant A is a high revenue plant, while Plant B is a lower revenue plant. The characteristics of the natural resources affected by these plants differ dramatically.

Using the economic-affordability test, the proposed BTA would pass the test at Plant A and would fail the test at Plant B. Thus, environmental-protection resources would be expended to protect the lake at Plant A, rather than protecting the lake at Plant B.

A BTA test that compares costs with benefits would reach a different conclusion. For this example, we focus on recreational benefits for the sake of simplicity. Plant A uses water from a lake with relatively little recreational value because of its location, characteristics, and substitutes. In contrast, Plant B uses water from a high-value lake. Using EPA’s economic affordability tests, therefore, would expend environmental-protection funds to protect a low-value lake while allowing a high-value lake to go unprotected.

This example uses the compliance cost/revenue test. A similar example could illustrate the problem with the other two affordability tests, based on construction cost and discounted cash flow. If Plant A is a larger plant with higher construction costs or discounted cash flow relative to Plant B, then Plant A would receive the increased environmental protection and Plant B would not. Again, the decision would have nothing to do with the relative value of the environmental resources to be protected.

Table 7: Example of Failure of Economic "Affordability" Tests
[see hard copy for table]

This example illustrates the regulatory mistakes that would arise if decisions are evaluated without careful attention to benefits. Benefits can be difficult to measure and express in dollar terms. It can be difficult to predict the level of actual environmental protection (i.e., reduction in entrained fish) that will be realized. It can also be difficult to determine what resource services are enhanced by the environmental protection and to put a dollar value on those services. Indeed, EPA and OMB both have established methods for evaluating benefits in the face of those difficulties, rather than just ignoring benefits completely. If benefits information is developed for alternatives, decision makers can use the relative levels of benefits to inform the BTA decision. Note that the benefits information would include judgments on the benefits (and costs) that might be omitted in the quantified information. Relying only on the affordability tests, in contrast, means that no information on benefits can inform these determinations.

3. The “Wholly Disproportionate” Test Improperly Compares Costs and Benefits

The cost-benefit perspective also provides important insights into the proper balancing of costs and benefits for a BTA test. The cost-benefit perspective indicates that incremental benefits and incremental costs should be balanced so that net social welfare is maximized. The “wholly disproportionate test” developed by EPA twenty years ago is not consistent with this perspective. The wholly disproportionate approach appears to be motivated by the unsubstantiated assumption that measured benefits are consistently and significantly understated relative to costs. Both costs and benefits include components that are difficult to measure and thus involve some degree of uncertainty. For example, cooling-tower costs are not limited to construction, operation, and maintenance costs. The reduction in operating efficiency will reduce electric power generation, whose value is highly variable in competitive electric power markets.

A careful benefit-cost analysis of BTA alternatives could evaluate uncertainties in the cost and benefit components. EPA's approach of overcorrecting for perceived relative biases in estimates of costs and benefits is incompatible with the economic guidelines. The economic tools available for understanding and quantifying both benefits and costs have improved substantially over the past twenty years. By promoting an unbalanced comparison of costs and benefits, the "wholly disproportionate" test encourages BTA choices that, by definition, could impose social costs potentially much greater than social benefits.

4. EPA's Alternative Ignores Considerations of Incremental Effects

An important element of a complete BTA assessment is the consideration of the costs and benefits of all feasible technologies or operational requirements to achieving 316(b) goals. EPA's recommended BTA test does not appear to incorporate evaluation of multiple BTA alternatives. Failure to examine alternatives seriously limits the usefulness of information derived from the economic analysis by failing to provide any information on the incremental costs and benefits of alternative requirements.

There are a large number of technology and operational requirements that are for BTA candidates. These alternatives include the following:

-Changing/altering intake location;
-Operational requirements (e.g., seasonal flow reductions);
-Technologies to reduce intake velocity (e.g., passive screens); and
-Technologies to reduce impingement and entrainment (e.g., traveling screens, fish baskets, Gunderboom, fish deterrents (strobe lights, air bubble curtains, and sound)).

As noted in Chapter II, the costs and benefits of these alternatives vary significantly depending on a large number of factors, including the following:

-Local aquatic species. The effectiveness of various alternatives at reducing impingement and entrainment varies widely by species.
-Intake design. The feasibility of installing different technologies on existing CWIS varies widely with the type of facility and its intake design.
-Intake location. The impact of a BTA alternative on aquatic species depends greatly on the intake location and the species in the vicinity.
-Seasonal Conditions. Seasonal weather, turbidity and debris affect both the costs of alternatives and their effectiveness.
-River Conditions. River flow and geography affect the ability to site various

Because of the many factors affecting the costs and benefits of BTA alternatives at different locations, the cost-benefit analysis should include all alternatives that are feasible and likely to be effective at the site. Variations in costs and benefits due to these factors will lead to different cost-benefit ordering of BTA alternatives for different facilities. A cost-benefit analysis of alternatives therefore will be the most effective approach for identifying technologies that are most advantageous in terms of the benefits produced and the costs incurred.

Evaluation of the costs and benefits of feasible alternatives provides the information that is necessary to identify the most appropriate technologies at a particular location. This evaluation can provide two types of information on feasible alternatives:

1. Dominated Alternatives. An evaluation of alternatives can identify which alternatives are "dominated" by others. One alternative dominates another if it provides greater benefits at a lower cost.

2. Incremental Costs and Benefits. The incremental costs and benefits of an alternative are the costs and benefits of the alternative relative to the next less stringent alternative.

Chapter II provided an example of the use of incremental analysis. Evaluation of the incremental costs and benefits of alternatives allows permit writers to assess whether the benefits gained by requiring a more costly technology justify the additional costs.

The importance of evaluating alternatives is recognized in EPA's Guidelines for Preparing Economic Analyses, which states that:

In addition to considering a wide variety of possible approaches for environmental protection, analysts and policy makers should also examine other characteristics of regulatory and non-regulatory policies that affect their costs and effectiveness. For example, evaluating the benefits, costs and other effects at different levels of stringency for a given policy can help to determine setting that provide the greatest net benefits to society (EPA 1999).

Thus, EPA's own guidance recognizes the importance of evaluating alternatives to identify appropriate requirements.

5. EPA's Alternative Ignores Important Electric Power Costs

EPA's approach to BTA appears to involve assessing only the construction and operating costs of the proposed requirements. For many facilities, these costs will account for the bulk of the relevant costs. In the case of electric power facilities, however, this approach is seriously incomplete.

Some CWIS alternatives reduce the performance of electric power generation facilities, thus reducing the quantity of power that can be generated. Reasons for these various performance penalties include the following:

- Reductions inflow or velocity. Reductions in flow or velocity reduce the effectiveness of the cooling system. As a result, the quantity of power that can be generated by the electric generation facility declines.

- Reductions in cooling efficiency. Some technologies reduce the efficiency of the cooling water system to condense the steam turbines. Close-cycle cooling systems, for example, generate turbine backpressure due to the reduced efficiency of the cooling system, which reduce power generation performance.

- Auxiliary power requirements. Many CWIS technologies require electricity. These auxiliary power requirements reduce the net electricity generation produced by the facility.

These power costs should be included in an assessment of the costs of CWIS alternatives.

Reductions in power plant performance can also adversely impact the reliability of the electric power system, potentially increasing the risk of brownout, blackouts, or curtailments in load provided to particular users. These reliability impacts should be considered in a full assessment of the impacts of alternative BTA requirements. BTA alternatives that require reduced water flows during active biological periods may particularly exacerbate reliability problems, since these important biological periods often coincide with periods when electric power is in greatest demand.

C. Economic Advantages of the Appropriate Cost-Benefit Test for BTA

The methodology for determining BTA should rely on a procedure that considers alternative feasible technologies and operational requirements for reducing impingement and entrainment. The costs and benefits of alternatives should be estimated to identify the "best" alternative available to achieve 316(b) goals. The "best" alternative is the one that maximizes the net benefits (i.e. benefits minus costs). This section describes an economically-sound process to determine BTA in individual cases.

1. A Cost-Benefit Procedure for BTA Determination

Determination of BTA for CWIS at new facilities requires a reliable and effective approach considers the costs and benefits of alternative technologies and operational requirements for reducing AEI. Economists and other analysts have developed well established procedures to evaluate the benefits and costs of alternatives. The net benefits are maximized by adopting increasingly expensive alternatives only if the incremental benefits exceed (or equal) the incremental costs.

The proper cost-benefit procedure can be summarized in the following process.

1. Identification of alternatives. Identify alternatives for the specific site, including technology combinations.

2. Cost and benefit valuation. Develop information on the expected costs and expected benefits of each alternative, putting the elements into dollar values to the extent feasible.

3. Organization of alternatives. Array the alternatives in terms of increasing expected costs.

4. Incremental analyses. Calculate the incremental costs and incremental benefits of each alternative.

5. Identification of most efficient alternative. Identify the alternative — which could include a combination of technologies — that has the greatest net benefits (i.e., benefits minus expected costs).

6. Uncertainty analyses. Identify uncertainties and elements that cannot be put in dollar terms and the

range of uncertainty in the estimates. Determine the affects of these uncertainties on BTA choice.

This cost-benefit analysis can be supplemented by other assessments as part of a full analysis of BTA alternatives. Two factors may be particularly relevant:

-Affordability constraints. The alternative that maximizes net social benefits may not be financially feasible for the affected plant. This consideration is particularly relevant now as the electric generation sector becomes subject to increasing competitive pressures.

-Distributional equity considerations. The geographic or socioeconomic distribution of benefits and costs for the alternative that maximizes net benefits may be socially unacceptable. For example, the choice of an expensive technology could impose unacceptable job losses in a region of already high unemployment.

2. Specific Issues in Cost and Benefit Estimation

Cost-benefit analyses require the careful enumeration of the monetary value of different impacts resulting from BTA alternatives. These impacts are typically separated into costs negative impacts) and benefits (positive effects), although the two categories are closely elated. Methodologies have been developed to value different impacts using well-established procedures, including the use of procedures to deal with limitations on the availability of sitepecific information. The following sections provide brief discussions of the procedures to valuate costs and benefits.

a. Evaluation of Social Costs

The costs included in cost-benefit assessments should reflect costs to society as a whole. The cost values should not include effects that represent transfers from one group to another. The current EPA Cost-Benefit Guidelines define social cost as follows:

The total social cost of pollution control are the opportunity costs incurred by society because of regulation. They are the value of goods and services lost by society resulting from the use of resources to comply with and implement a regulation, and from reductions in output. (U.S. Environmental Protection 1983, Appendix B, p. 3).

The most significant component of the total costs for regulatory requirements typically is the value of the private resources required by the regulation. The EPA Cost-Benefit Guidelines, for example, state: "The principal component of total social costs is private real-resource costs. These are pretax compliance costs net of any transfers, such as emissions fees, licensing fees, or subsidies."(U.S. Environmental Protection Agency 1983, Appendix B, p.3). Other components of social costs noted in the EPA Cost-Benefit Guidelines include unpriced resources as well as governmental regulatory costs, deadweight welfare losses, and adjustment costs (U.S. Environmental Protection Agency 1983, Appendix B, p. 4).

The most important social costs of BTA alternatives for electric power facility can generally be organized into the following four categories:

1. Capital costs. Capital costs are the one-time costs of constructing and installing the CWIS

technology.

2. Operating and maintenance cost. Operating and maintenance costs are the annual costs to operate and maintain the CWIS technology.

3. Power costs. Implementation of BTA alternatives may lead to power losses due to plant shut-down during construction or impacts of BTA alternatives on plant performance. These power losses lead to social costs.

4. Other Environmental costs. These include the environmental costs that result from the installation of the CWIS technology. They include, for example, potential air pollution increases.

The first two cost categories capital costs and operations and maintenance costs are conceptually simple and will not be discussed further.

Power costs may occur during the following two periods of plant operations:

-Power Costs during Construction Delay. If the alternative would delay the opening of the plant, then the power output (generation and capacity) would be lost during that period. The costs of replacing the lost power represent real costs.

-Power Costs during Continuing Operations. BTA alternatives may lead to reductions in plant performance due to auxiliary power requirements, turbine inefficiencies (heat or performance penalties), and reductions in maximum generation capacity. Each of these impacts results in power costs.

Note that power losses include both the loss in available capacity as well as the loss in expected energy output. The traditional way of calculating these costs is to determine what additional costs would be incurred in the utility's system to make up the loss internally. With increasing competition in wholesale electric power markets, these costs can be increasingly determined from market prices, both for capacity and energy output.

Environmental costs reflect the cost of environmental externalities that can result from implementation of BTA alternatives. These costs can sometimes be difficult to if they are not priced through market exchanges. In a growing number of situations, however, markets for environmental externalities can provide information on the cost of these externalities. The following are examples of potential environmental costs:

- Water contamination. A potential BTA technology might require that a water body be dredged, requiring disposal of potentially hazardous material and possibly releasing that hazardous material into the environment.

-Air emissions. The auxiliary power requirements and performance penalties resulting from cooling towers typically result in power costs. Increased generation from other power sources is necessary to offset the power losses. Replacement power may increase overall electricity air emissions or increase the cost of achieving emissions targets.

-Visibility and wildlife impacts. Implementation of cooling towers, for example, may result in visibility impacts due to the siting of large cooling towers, and wildlife impacts, (e.g. birds that collide with cooling towers).

Markets are sometimes available to price these environmental costs. The prices of emissions permits in cap-and-trade programs for NOx and SO2, for example, provide reliable sources of information on the costs of changes in air emissions. <FN1> When markets are not available for these costs, they should not, however, be ignored. These costs should be included in a quantitative or qualitative fashion as part of the overall cost of CWIS technology alternatives.

b. Evaluation of Benefits

The benefits included in the cost-benefit assessments should reflect benefits to society. Estimates of environmental benefits reflect social benefits when they are based on the willingness to pay (WTP) of individuals who receive the increased environmental services (e.g. recreational fishing services). WTP represents the value of a good or service in monetary terms (i.e., the amount the individual is "willing-to-pay" in dollar terms). The current EPA Cost-Benefit Guidelines for benefits assessment summarize this approach as follows:

The satisfaction that individuals experience because of the environmental improvement is a measure of the benefits of the regulation. Assuming that people are aware of the effects of pollution, these benefits can be expressed in monetary terms by identifying individuals' willingness to pay for an environmental improvement. (U.S. Environmental Protection Agency 1983, Appendix A, p. 2, emphasis in original)

This approach to measuring benefits is consistent with Office of Management and Budget Guidelines (1996) and standard economic texts (e.g., Stokey and Zeckhauser 1978, Tietenberg 1996 and Nau 1997).

The EPA cost-benefit guidelines provide indications of the types of analyses involved in determining benefits from alternative CWIS alternatives. The EPA cost-benefit guidelines identify two components of ecosystem benefits (U.S. Environmental Protection Agency 1983, Appendix A, p. 30). <FN 2>

1. Benefits from Changes in Commercial Species. Regulatory requirements leading to changes in the stock of species used commercially (e.g. commercial fishery stocks) can lead to changes in yields or total production. Under these circumstances, the guidelines state that "[In] the special case of output changes that do not affect market prices, the appropriate measure of producer's surplus is simply the expected change in output multiplied by market price per unit."

2. Benefits from Changes in Recreational Species. Regulatory requirements leading to changes in the stock of species used recreationally (e.g., recreational fishery stocks) can lead to changes in recreational benefits. Under these circumstances, the guidelines suggest using methods that capture individuals' willingness-to-pay for recreational services.

Both commercial and recreational fishing benefits can be estimated using methodologies and specific empirical studies in the economic literature. This information can be used to develop reliable estimates of the benefits to society from CWIS changes.

3. Advantages of the Cost-Benefit Approach

The cost-benefit approach to BTA determination has several important strengths:

-Appropriate BTA standards for individual units. Consideration of the incremental costs and benefits of alternative CWIS technologies allows BTA decisions to properly reflect the trade-off between the costs of BTA requirements and the benefits that would be achieved by those requirements.

-Organizes information. It organizes important information about the large number of potential BTA choices in a logical manner.

-Accounting for uncertainty. The cost-benefit framework provides an explicit approach to accounting for uncertainty about both costs and benefits. In particular, the cost-benefit approach provides a more reliable approach than the “wholly disproportionate” tests discussed by EPA.

a. Appropriate BTA Requirements for Individual Facilities

Comparison of the costs and benefits of alternative CWIS requirements allows the best” technology to be selected in individual cases. Failure to consider the benefits at individual facilities may result in the choice of a CWIS alternative that involves costs not warranted by the resulting benefits (i.e., incremental costs greater than incremental benefits) or that is dominated by another CWIS alternative (i.e., generates fewer benefits at greater costs).

b. Organizes Information

The cost benefit approach provides a clear framework for organizing the many costs, benefits, and other impacts of CWIS alternatives. The approach allows for effects to be assessed through both qualitative and quantitative analysis. The cost-benefit approach provides a framework for organizing information on all of the positive and negative effects of various BTA alternatives.

c. Proper Accounting for Uncertainty

This framework provides a better means of dealing with uncertainty than a “wholly disproportionate” test. A “wholly disproportionate” test would mandate CWIS investments whose measured costs exceed measured benefits by some substantial margin. Such a test is arbitrary and tends to obscure rather than clarify policy choices. The net effect of the “wholly disproportionate” test would be to waste scarce public and private resources.

IV. EVALUATION OF EPA’S ECONOMIC AND ENGINEERING ANALYSES

This chapter shifts from an evaluation of EPA’s proposed regulatory approach to an evaluation of EPA’s economic and engineering analyses. As noted, EPA’s analyses of the costs and benefits of the proposed 316(b) regulations for new facilities are contained in the EEA.

The EEA provides useful information on the industries covered by 316(b) regulations for new facilities—notably electric power generators, chemical facilities, and primary metals facilities—and on the need for regulation. The document also provides EPA's assessments of the numbers of new facilities in each industry that would be affected by the new source rule, the costs that these facilities would incur under EPA's proposed approach, some information on the likely benefits, and some discussion of regulatory alternatives.

This chapter provides a review of some of the technical and economic analyses in the EEA. We begin with summaries of the methodologies used in the EEA to estimate the overall costs and benefits of the proposed rule and an overview of our concerns with the EEA.

A. Overview of EPA's Cost and Benefit Analyses

1. EPA's Cost Analysis.

The EPA's Engineering and Economic Analyses develops an estimate of the national cost of the proposed 316(b) New Facility Rule. This estimate is developed using the following three step process:

1. Step 1: Baseline Projections of New Facilities (Chapter 5). The EPA estimates the number of new facilities that would be affected by the 316(b) New Facility Rule over the period 2001 to 2020.

2. Step 2: Facility Compliance Costs (Chapter 6). In this step, the EPA estimates the total facility compliance costs (including permit renewal costs) for different types of facilities affected by the 316(b) New Facility Rule. Costs are estimated only for additional modifications and technologies to comply with the proposed rule beyond the facility's baseline technologies.

3. Step 3: Social Cost Estimates (Chapter 6 and Chapter 8.2). The EPA develops an estimate of the aggregate social cost of the 316(b) New Facility Rule. This estimate is 2020. The EPA adds state and federal implementation costs.

EPA's analysis concludes that the total annualized costs of the proposed rule are $12.21 million (1999 dollars). This estimate includes $12.13 million in direct compliance costs for facilities, and about $80,000 in state and federal implementation costs. The EPA also performs an "affordability" test of the proposed rule by comparing facility compliance costs to revenues for each affected facility. For electric generation facilities, the EPA also uses an affordability test based on the ratio of facility compliance costs to facility construction costs.

2. EPA's Benefit Analysis

EPA's analysis of the benefits of the proposed 3 16(b) New Facilities Rule does nol develop estimates of the dollar benefits of the proposed rule. The EPA states that "time and data constraints do not permit a quantified assessment of the economic benefits of the proposed rule" (EPA 2000, p 11-16). Instead, the EPA performs an assessment of "potential" benefits that includes the following two elements:

1. Benefits Taxonomy. The EPA provides a qualitative description of the types of benefits that would be generated by the proposed rule. These include market, nonmarket direct use, non-market indirect use, and nonmarket nonuse values.

2. Anecdotal Assessment of Benefits at Existing Sites. The EPA reviews estimates of the benefits of alternative BTA technologies for five existing facilities based on published papers or reports.

The EPA also evaluates the magnitude of the potential impingement and entrainment losses from CWIS. This biological analysis is not discussed in this report.

3. Overview of Concerns with the EEA

We conclude that the EEA suffers from some important inadequacies. These include thc following:

-The EEA's projections may understate the numbers of new facilities affected by th proposed rule.

-The EEA appears to understate the costs of closed-cycle cooling systems.

-The EEA appears to understate the total costs of the proposed rule.

-The EEA has an inadequate evaluation of the benefits of the proposed rule.

-The EEA does not provide an adequate evaluation of regulatory alternatives.

These concerns are important both for an adequate evaluation of this proposed rule and for the precedents they provide for future regulatory decisions and rulemakings. The procedures to estimate benefits, for example, would be critical to a proper implementation of the benefit-cost approach. Moreover, the procedures developed to analyze the engineering and economic effects of proposed 316(b) regulations on new facilities might be used to analyze effects for the forthcoming proposed regulations for existing facilities.

B. Limitations of EPA's Projections of New Facilities

The EEA develops estimates of the number and type of facilities to be affected by the proposed 316(b) New Facility Rule. This section summarizes the methodology used to develop these estimates and lists concerns with the accuracy of these estimates.

1. Overview of EPA Methodology

EPA estimates the number of electric generation facilities affected by the 316(b) New Facility Rule over the period 2001 to 2020. These estimates rely on data from the NEWGen Database of planned electric facilities developed by Resource Data International, Inc. and the Annual Energy Outlook 2000 (AEO2000) published by the Energy Information Administration.

EPA's methodology follows the following four steps:

1. Identify facilities in the NEWGen database relevant to 316(b) rule. The NEWGen database provides information on new electric generation facilities under development. EPA excluded facilities that were: (1) not in the U.S.; (2) had been "cancelled" or "tabled"; (3) are to be complete after August 13, 2001 (the assumed promulgation date); (4) use steam as a prime mover; and (5) provide

insufficient information on the facility's source of cooling water. These criteria eliminated 410 of the 466 facilities in the NEWGen database.

2. Identify "in-scope "facilities within the NEWGen database. Facilities that fall within the scope of the proposed 316(b) New Facility Rule are identified. EPA uses the following criteria to identify "in-scope" facilities: (1) withdraws from U.S. waters (i.e, not municipal water or "gray water"); (2) does not have an existing CWIS; (3) must require or possess an NPDES permit; (4) has an intake flow greater than 2 million gallons per day; (5) more than 25 percent of the water used is for cooling purposes. Of the 56 new facilities identified by EPA as relevant to the proposed rule, 7 were in-scope and 49 were out-of-scope.

3. Estimate the number of in-scope facilities over the period 2001 and 2020. EPA estimates the total number of facilities affected by the proposed 316(b) rule based on projections of total capacity additions from one most recent.

- Projected Number of Facilities from 2001 to 2010. EPA estimates the number of new generation facilities over the period 2001 to 2010 by dividing total capacity additions over this period from the AEO2000 by an estimate of average plant size. The ratio of in-scope facilities to total new facilities from the NEWGen data is used to scale up the total number of in-scope plants. The resulting estimate is that there would be 13 in-scope plants over the period 2001 to 2010, with 7 identified in the NEWGen database.

- Projected Number of Facilities from 2011 to 2020. A similar methodology is used to estimate the number of in-scope facilities over the period 2011 to 2020, resulting in an estimate of 27 in-scope facilities over the period 2010 to 2020. Of these 27 in-scope facilities, 16 are anticipated to be coal-fired and 11 are anticipated to be natural gas combined cycle units.

2. EPA May Understate the Electric Generation Facilities Subject to this Proposed Rule

EPA's analysis of the number of facilities affected by proposed 316(b) regulations relies on the accuracy of the NewGen database, many assumptions regarding future conditions in the electricity sector, and the reasonableness of extrapolation procedures. A recent study by OnLocation and the EOP Group (OnLocation/EOP Group 2000) assesses the various elements of the EPA projections of the number of new facilities subject to the proposed regulations. Thai study raises concerns with the following elements of EPA's analysis.

- EPA's Sampling Procedure. EPA should undertake additional measures to ensure that data from the NEWGen database provides an unbiased sample of future capacity additions, and that EPA's use of the NEWGen data does not introduce biases. An evaluation of the NEWGen data by OnLocation/EOP suggests that such biases may exist. For example, EPA excludes information on the 38 facilities that provided inadequate or incomplete information on CWIS. Simply excluding these facilities may, however, bias the results. A subsequent, independent sampling of these facilities suggests, in fact, that a large percentage of these facilities would be affected by the rule. The OnLocation/EOP analysis finds that 50 percent of the facilities in this group of excluded facilities would need to comply with the proposed rules. In comparison, EPA finds that only 12.5 percent of facilities providing information would be affected. More accurate estimates could be developed by the EPA by surveying facilities with incomplete information, rather than simply excluding them.

- Energy Sector Projections. The EPA's methodology is based on projections for generating capacity additions developed by the EIA. The projections, however, are based on fairly conservative assumptions regarding anticipated growth in demand for electricity. While demand for electricity has grown by 2.4 percent annually over the period 1994 to 1999, the EIA projections assume only 1.4 percent growth in electricity demand through 2020. Even EIA's high economic growth scenario, which assumes 1.7 percent growth in demand, is less than recent growth trends. The EPA's appear to potentially understate actual growth over the next two decades, thus understating the number of facilities that would be affected. The uncertainty in future conditions and alternative assumptions about future growth in demand should be more fully examined in EPA's analysis.

- Geographic Sample. Geographic biases may be present in the NewGen since reporting requirements for facilities under development differ substantially across states. Facilities in states with more stringent reporting requirements may be more likely to be included in the NewGen data base (OnLocation/EOP 2000). EPA should take steps to ensure that its analysis accurately reflects national conditions, rather than those of particular regions.

-Facility Size. EPA assessment of the average size of future facilities may be overstated. Overstating facility size would lead to an understatement of the number of facilities affected. Data from the NEWGen data base and other sources suggests that the size of combined-cycle gas generation and coal generation units may be smaller than assumed by EPA (OnLocation/EOP 2000).

These issues could have a substantial effect on the number of facilities subject to the proposed regulations. OnLocation/EOP (2000) finds that 209 facilities would be affected by the proposed rules, in contrast to EPA's estimate of 40 facilities. The five-fold difference in results between two estimates suggests the importance of an expanded assessment of the number of facilities likely to be affected by 316(b) rules that takes into account the concerns raised in OnLocation/EOP report (2000).

C. Limitations of EPA's Estimates of Facility Compliance Costs

1. Overview of EPA's Methodology

For new electric generators, EPA develops estimates of the costs of several different technologies or modifications that facilities could be required to implement:

1.Changing location of the CWIS in the water body
-Extending the intake pipe.
-Deepening the intake canal.

2.Reducing the intake flow
-Switching to a recirculating system (cooling towers).
-Using a water other than those of the U.S.

3.Reducing intake velocities
-Passive screens (cylindrical wedge wire screens).
-Velocity caps.

4.Other design and construction technologies to reduce impingement and entrainment
-Traveling screens with fish baskets.
-Adding fish baskets to existing traveling screens.

The EPA develops costs estimates for each of these technologies or modifications. These cost estimates include capital and operating costs, and vary across a range of parameters representing local conditions and facility characteristics, such as water depth, water flow, and intake size. EPA also develops estimates of the administrative costs to obtain and renew NDPES permits, and the costs to comply with monitoring, recording, and reporting requirements of the proposed rule.

The following sections of this report focus on EPA's estimates of closed-cycle costs. Comments on EPA's assessments of technologies other than closed-cycle cooling systems are included in UWAG (2000).

2. EPA Understates the Cost of Closed-Cycle Cooling Systems

The EEA's assessment of the cost of closed-cycle cooling systems appears to reflect a failure to consider fully the technical complexity and details of the design of these facilities. As a result, the EEA makes several inaccurate or incompletely documented assumptions, leading to cost estimates that significantly understate the likely costs of these systems. The following are among the flaws in the EEA cost estimates:

1. Capital Costs. EPA understates equipment and capital costs of cooling system construction due to both flawed assumptions and methods. These include the following:

- EPA fails to account for many capital cost components; and
- EPA's assumes design criteria that understate costs.

2. Operations and Maintenance Costs. EPA underestimates operating and maintenance costs of cooling systems:

- EPA assumes inaccurate cost components for operating and maintenance.
- EPA's assumptions understate makeup water costs.

3. Dry Cooling Costs. EPA does not document the capital and operating costs of dry cooling systems.

a. EPA Understates the Capital Costs of Cooling Towers

(1) EPA Fails to Account for Many Capital Cost Components

EPA's methodology for estimating capital costs is to multiply the cooling system capacity (in gallons per minute, or gpm) by a "rule of thumb" cost factor (in dollars per gpm). Used correctly, these "rule of thumb" cost factors provide a good approximation of the furnished and erected costs of a wet cooling tower. The proper use of such factors has been outlined in many engineering reference books (CEH 1969, Guthrie 1974).

The "rule of thumb" factors used by EPA provide an estimate of the cost of cooling tower. These estimates do not, however, include many essential components of the cooling system, such as wiring, foundations, condenser pumps, noise attenuation treatment, the cost of other equipment, or the cost of construction. These costs of these components and their installation would not be incurred were cooling towers not installed. To account for construction costs, EPA has multiplied the tower equipment costs by a factor of 1.8 (i.e., EPA has marked up the equipment cost by 80 percent) to reflect the costs of erecting cooling towers. However, EPA has not made any additional adjustments to account for the costs of any of the other necessary cooling system equipment noted above. Cost factors that include these costs are typically many times larger than cost factors of the tower alone. For example, in a wet cooling vs. dry cooling comparison study recently completed for UWAG, the capital cost (including construction costs) of a newly built cooling tower for a 250 MW steam turbine-generator in a combined cycle plant was roughly 15 percent of the total capital cost for the entire cooling system (Burns & Micheletti 2000). By estimating only the costs of the cooling tower and ignoring the additional costs associated with the other necessary components of the entire cooling system, EPA significantly understates the costs of these systems.

(2) EPA Assumes Design Criteria that Understate Costs

The cost of a closed-cycle cooling system depends on design criteria for the particular system being considered. Some of the assumptions regarding system design made by EPA when developing its costs estimates lead to an underestimate of the true costs of these systems. One example is EPA's assumptions regarding the "approach" value used in plant cooling systems. <FN 3> As the approach value decreases, the cooling tower size increases, resulting in higher costs. EPA suggests that the approach value should be set between 5-10°F. EPA's cost factors, however, assume an approach value of 10°F, resulting in a smaller cooling system. In practice, however, an 8°F approach value is typically used for cooling towers. <FN 4> Since the system with an 8°F approach would be larger and therefore more costly, EPA understates the likely costs oi closed-cycle cooling system.

b. EPA Understates Operations and Maintenance Costs for Cooling Towers

(1) EPA's Assumptions for Chemical Treatment and other Cost Components are Inaccurate

The EEA report assumes that the operations and maintenance costs associated with cooling towers decline from 5 percent of capital costs for the smallest towers to 2 percent of capital costs for the largest towers (pages 6-4 and A-20). EPA implies that this is the appropriate way to treat presumed economies of scale associated with cooling tower operations and maintenance costs, but provides little justification for these values. An examination of operations and maintenance costs for existing cooling towers suggests that the EEA assumptions are inaccurate and reflect in inadequate technical assessment of operations and maintenance costs.

The major operations and maintenance costs for cooling systems are: (1) makeup water to replace evaporation and blowdown losses; (2) power for fans and pumps; (3) labor and materials, primarily for maintenance; and (4) cooling water chemical treatment for scale, corrosion, and biofouling control. The cost of makeup water is negligible unless the water must be purchased from a municipality. Assuming that the cost of makeup water is minimal, only the final three costs are significant. Of these three items, EEA only discusses its rationale for "economies of scale" with respect to chemical treatment.

Cooling water chemical treatment costs are extremely site-specific. Variations in the availability and quality of makeup water, construction materials, and cooling system operating practices make it difficult to generalize about cooling water chemical treatment programs and costs. Empirical data from a recent EPRI study suggests that actual operations costs differ significantly from EPA's assumptions (EPRI 1999). Figure 1 presents data on annual chemical treatment costs from almost two dozen power plant recirculated cooling systems (represented by the solid diamonds). This data shows that costs increase with recirculating flow. In contrast, EPA's data (represented by the open circles), suggests that costs decrease as recirculating flow increases. Since EPA fails to provide any background on the source of its data and the conclusion that total costs decrease with size is somewhat suspect, these assumptions raise concerns about the methodological approaches and empirical values EPA has used to developed its component costs for closed-cycle cooling system operating costs.

Figure 1. Annual Cooling System Chemical Treatment Cost vs. Recirculating Cooling Water Flow
[see hard copy for figure]

(2) EPA's Makeup Water Assumptions Understate Costs

Based on EPA's estimates, a closed-cycle cooling system would operate at or below 2 cycles of concentration. This means that the quantity of makeup water <FN 5> would be twice the blowdown (i.e., the quantity of cooling water periodically discharged into the water body). In practice, however, most power plant cooling systems operate at about 5 cycles of concentration, resulting in significantly less frequent discharge of water into the water body. EPA's assumptions reflects a misunderstanding of the actual design and operation of closed-cycle cooling systems.

The EPA also fails to make facility design consistent with these assumptions. At the lower cycles EPA suggests, more makeup water would be required to operate the plant. Although the costs of additional makeup water itself would be minimal (as noted above), the higher makeup requirements would necessitate larger water pumps as well as higher power use. EPA has failed to account for these cost impacts in its analysis. In addition, the higher makeup water requirements under 2 cycles would increase the cost of CWIS equipment, which must designed and operated to minimize intake water velocity. These cost impacts have not been adequately accounted for either.

c. EPA's Cost Estimates for Dry Cooling are Not Well Substantiated

In addition to the above criticisms, which apply to EPA's estimates of the costs of wet cooling systems, there are a number of additional criticisms that apply specifically to EPA's analysis of dry cooling systems. EPA's estimates of the costs of these systems are not well substantiated. Although dry cooling systems would not be required under the proposed 316(b) rule, they would be required in the "zero flow" regulatory alternatives considered by EPA.

(1) The EEA Does Not Provide a Foundation for Dry Cooling Capital Costs

EPA suggests in the proposed rule that dry cooling is a viable alternative to wet cooling systems (10-2), but does not provide cost equations or curves for dry cooling. The EEA implies that the methodology used to calculate dry cooling costs is based on curves similar to those developed for wet cooling towers. The EEA, however, presents no discussion of the specific calculations or equations used to estimate the costs of dry cooling.

The EEA's methodology suggests that there is a close engineering and cost relationship between wet and dry cooling systems. There are, however, many engineering distinctions that suggest that the methodology used to estimate costs should be very different between wet and dry cooling systems. In particular, it is inappropriate to use a "rule of thumb" (i.e., dollar per gpm) cost factor based on cooling water flow to estimate dry cooling costs, since the most prevalent dry cooling systems (based on a direct, non-contact, air-cooled steam condenser) have no cooling water flow. Consequently, use of a dollar per gpm rule of thumb is completely inappropriate.

EPA has failed to provide a complete and detailed description of its cost methodology for dry cooling capital costs As a result, it is impossible to assess whether its methodology and data appropriately represent the true costs of dry cooling systems. Development of costs estimates for dry cooling systems requires more detailed cost and engineering assessment than is presented by EPA in the EEA.

(2) The EEA Provides No Foundation for Dry Cooling Operating Costs

EPA bases the operations of dry cooling systems on those of wet cooling systems. As with capital costs, the analysis thus assumes an underlying relationship between dry tower Operations and Maintenance costs and wet tower operations and maintenance costs. The operations and maintenance activities required for a dry cooling systems, however, are very different from those required for a wet cooling systems. There is no technical reason to think dry tower operations and maintenance would be related to wet tower operations and maintenance by some common factor, yet EPA has taken that approach.

In fact, there are many significant differences between the operations and maintenance of dry and wet cooling systems. For example, the operation of a dry cooling systems during the winter is significantly more complicated than the winter operation of a wet cooling tower. As a result, the costs of dry cooling systems are significantly greater. During extremely cold periods, operators of dry cooling towers must run the turbine at a higher backpressure than they would normally to prevent the tubes from freezing. Operating this way leads to inefficient plant use. To avoid such measures, dry towers would require special winterization measures and would probably involve a more complex winter-time operation. In addition, the auxiliary cooling system of a dry cooling tower would also be more prone to winter operational problems. The complications associated with winter operation of dry cooling towers would increase the likelihood of forced outages.

These examples suggest that EPA has failed to provide an adequate technical and cosi assessment of dry closed-cycle cooling systems. The EPA should develop a more complete assessment of operations and maintenance costs based on a more detailed engineering assessment.

3. EPA Fails to Consider All Closed-Cycle Cooling Costs

The EEA's analysis of the cost of closed-cycle cooling systems considers only their capital costs and the annual operations and maintenance costs. The analysis fails, however, to consider other important costs resulting from implementation of cooling towers. In particular, the following costs are not considered by EPA:

1. Power Costs. Closed-cycle cooling towers reduce the performance of generation facilities by increasing auxiliary power loads and reducing the efficiency of the steam turbines through turbine backpressure (“performance penalties”). These impacts results in two sorts of impacts that produce social costs:

- Replacement Power Costs. Both auxiliary power requirements and performance penalties may result in reductions to quantity of energy or capacity provided to end-users. Replacing this power from other higher-cost sources will result in social costs.

- Fuel Costs. As a result of performance penalties which reduce effective heat rates, the quantity of fuel required to generate the same quantity of energy increases.

2. Air and other Environmental Costs. Through performance penalties and auxiliary power requirements, closed cycle cooling towers result in reduced net power generation with no commensurate reduction in fuel use. As a result, air emissions from sources replacing lost power will increase. In addition, cooling towers may result in the following additional environmental impacts:

-visibility impacts from cooling towers;
-local climate change from wet cooling tower plumes;
-wildlife losses (e.g., birds colliding with towers);
-fish losses due to loss of heated aquatic plumes to over-wintering habitats; and
-increased impediments to waterway navigation due to icing in northern regions.

Power costs include both energy and capacity costs. Cooling towers reduce the quantity of energy that can be delivered to end-users and also reduce the quantity of generation capacity available to ensure the reliability of the electric power system. Both of these impacts result in social costs as other resources must be used to replace these lost resources. As noted in Chapter III, these costs can be modeled using data on the market price of energy and capacity from competitive wholesale power markets.

Concern for the power costs and impacts for cooling towers is particularly significant since many of these power impacts are greatest during the summer when demand for energy and capacity is greatest. Performance penalties due to turbine backpressure, for example, will be greatest during periods of high temperatures, also the periods of highest demand. These performance penalties potentially exacerbate current reliability concerns in many regions.

Although these costs are important components of the cost of cooling towers and have been incorporated into cost-benefit analyses of 316(b) alternatives for existing facilities, EPA fails to consider these costs when evaluating cooling tower costs. The EPA only acknowledgement of the issue is in the last sentence of its chapter on facility compliance costs (EPA 2000, p.6-24):

Finally, estimated costs do not account for reduced energy efficiencies that may result from switching to the use of cooling towers from a once-through cooling system. This energy “penalty” may be considerable and is dependent on specific site characteristics, such as plant type.

While acknowledging that these penalties may be “significant”, the EEA relegates this issue to qualification to its cost assessment, rather than making any attempt to integrate these costs into the analysis.

[comment text continued in 316bEFR.041.603]

Footnotes

1 Under the Title IV SO_2 trading program and NOx SIP Call, the overall quantity of emissions does not change if emissions go up in some facilities, but the distribution of emissions across facilities may change. As a result, changes in air emissions due to SWIS technologies would lead to changes in the cost of achieving emissions caps.

2 These guidelines apply in cases in which the ecosystem is not in jeopardy.

3 Approach value is the difference between the lowest water temperature in the cooling towers and the “wet bulb’ temperature, which is a measure of the outside ambient air temperature with a wet rather than dry bulb. (The difference between wet and dry temperatures is a measure of the atmospheric humidity.)

4 One source suggests that the increase in cost for a system with an 8°F approach relative to a 10°F approach is at least 15 percent (Cherimisinoff and Cherimisinoff 1981).

5 Makeup water is the quantity of water drawn into the close cycle system. Water leaves the system primarily through either blowdown or evaporation.

EPA Response

For a response to this comment, which was submitted with the commenter's Phase I proposal comments in November 2000, see the Phase I Comment Response Document (DCN 3-0091) beginning at comment 316bNFR.068.300.

Comment ID 316bEFR.041.603

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code NEW
Comment on new (Phase I) facility rule

[comment continued from 316bEFR.041.602]

D. Limitations of EPA's Benefits Analysis

EPA has recently updated their 1983 guidance for conducting benefit-cost analysis (EPA 1999). EPA ignores both their own guidance and good professional practice in assessing benefits in the proposed rule. This section summarizes the analytical requirements specified in the guidance and describes how the proposed rule deviates from these requirements.

1. EPA's Assessment of the Expected Benefits Does not Conform to EPA's Own Guidance

EPA's guidance describes benefits analysis as a process to develop monetary values to inform the policy-making process (EPA 1999, p. 7-1). EPA's benefit-cost guidance relies primarily on techniques that transfer existing benefit estimates to new regulatory situations. Specifically, the guidance requires analysts to rank significant sources of benefits, to assess the quality of published studies, and to account for uncertainty (EPA 1999, p.7-l, 7-6, 7-8). The benefits estimates in the proposed rule meet none of these requirements. Furthermore, the guidance states that benefit values are important in helping policy-makers make direct comparisons to the costs (EPA 1999, p. 7-1). The proposed rule ignores the fundamental purpose of the analysis because it never compares estimated benefits to costs. Thus, the benefits analysis in the proposed rule has no relevance for assessing whether the rule is good policy.

The general approach for assessing the benefits of environmental policies, as stated in the guidance, requires three steps: (EPA 1999, p. 7-5)

1. Identify potentially affected benefits categories.

2. Quantify significant physical effects to the extent possible, working with risk assessors, ecologists, physical scientists, and other experts.

3. Estimate the values of these effects, using studies that focus on the effects of concern or transferring estimates from studies of similar impacts.

The EEA ignores the guidance requirements for each of these steps.

a. Step 1: Identify Potentially Affected Benefits Categories

EPA's guidance requires first evaluating which effects are likely to be significant in the overall benefit analysis. The purpose of this step is to focus analytical resources on the most important categories of potential benefits. The guidance defines significant benefits category as whether there are likely to be observable changes in the benefits category as a result of implementing a policy option (EPA 1999, p.7-6).

The EEA fails to provide any rationale for the benefit categories that are included and excluded or to establish links between identifiable environmental outcomes of the policy and monetary benefits. Because the proposed rule provides no documentation for how decreased biological losses increase commercial and recreational fish catch, it is impossible to assess the benefits claimed.

b. Step 2: Quantify Significant Physical Effects

EPA's guidance requires economists to communicate with other experts to ensure that the information provided is both adequate to support the benefits analysis and includes a discussion of the uncertainty of the estimates of physical effects (EPA 1999, p. 7-7). One of the most important pieces of information required to document aquatic benefits is the relationship between decreased losses from impingement and entrainment and increases in angler catch. It is not sufficient just to document an increase in mortality. There must be a link between the increase in fish mortality and a decrease in services from the fishery. An obvious link between fish mortality and decreased resource services is a change in fishery catch. If there is no significant change in catch, then the change in mortality is not relevant to recreational fishing and does not cause a change in the value of the fishery. EPA's analysis does not discuss the critical link between environmental effects and angling benefits. Rather, the proposed rule merely cites estimated physical effects from five studies for the sites in those studies.

EPA's guidance notes that baseline conditions can have a profound influence on the measurement and interpretation of results (EPA 1999, p. 5-3). Suppose the study site has excellent baseline water quality, excellent fish habitat, and healthy fish populations of highly valued fish species. Conversely, suppose the policy site has poor baseline water quality and fish populations. Any benefits estimated for the policy must be defined in relation to changes from the actual baseline conditions at the policy site, not the study site. Thus, using unadjusted benefits estimates from the study site will overstate benefits. In fact, as we note below, differences in baseline conditions between the sites may make the original study an inappropriate source of benefit-transfer estimates for the policy site. At a minimum, analysts would have to modify the original study estimates to reflect differences in the two situations. EPA's benefits analysis fails to discuss how either the baseline conditions or policy-induced changes at the study sites differ from those of the policy sites.

Baseline CWIS technologies also will have a large impact on the magnitude of quantifiable benefits. The additional benefits of technologies and modifications typically decline as more stringent controls are added onto CWIS with existing fish protection technologies. Thus, an analysis of the costs and benefits of alternative BTA requirements must be performed relative to the same technological baseline. EPA's cost analysis assumes that almost all future electric generating facilities would install closed-cycle cooling even in the absence of the proposed rule. In contrast, EPA's benefits assessment is performed using studies based on CWIS with a wide range of baseline technologies. Thus, EPA's assessments of the 'potential" benefits of the rule, as well as its estimates of the potential impingement and entrainment losses of new facilities, are grossly overstated since they are based on facilities with much less stringent technologies.

c. Step 3: Estimate the Value of the Effects

EPA's guidance requires analysts to assess the quality of studies used to transfer benefit estimates to expected policy outcomes (EPA 1999, p. 7-1). The guidance provides specific information to assist in evaluating the methods used in existing studies (EPA 1999, p. 7-15 to 7-34). The guidance also describes the attributes necessary to assess the applicability of a study. (EPA 1999, p.7-33). Finally, the guidance requires that benefits analysts clearly describe the sources of all values used and assess the uncertainty associated with value estimates (EPA 1999, p. 7-8). It is evident that the proposed rule does not comply with the guidance requirements in assessing or using existing benefits studies.

According to EPA's guidance, an important step in transferring benefits is to identify relevant studies after reviewing candidates in the available literature for applicability and quality (EPA 1999, p.7-33). To determine the applicability of the original study for transfer, analysts should compare resource characteristics that effect value. Specifically, physical characteristics, services provided, and number and quality of available substitute sites are important determinants of benefits. For example, suppose a site is located on a typical warm-water river and there are numerous comparable fishing opportunities on five similar rivers located within 20 miles of the site. In contrast, suppose an alternative site is located on a well-managed trout stream and the only other comparable fishing opportunity is located 50 miles away. A decrease in catch at the site with many substitute recreational alternatives will have a much smaller effect on anglers than a similar decrease in catch at the site with few recreational substitutes. Thus, a study that estimates benefits from increased catch at one of these sites may not provide sufficiently comparable values to transfer to increased catch benefits at the other site.

The guidance requires that analysts assess not only the comparability of the resources involved, but the quality of published studies, as well (EPA 1999, p. 7-1 .). Several economists (Smith, 1992; Brookshire, 1992; Desvousges, Naughton, and Parsons, 1992; McConnell, 1992; and Boyle and Bergstrom, 1992) recommend reviewing existing studies for their scientific soundness because existing studies have varying levels of quality. In transferring value estimates from a previous study to a different site, the analyst also transfers the assumptions and flaws of the methodology in the original study.

In some cases, a study cannot be used for benefits transfer simply because not enough information is available to properly evaluate it. Analysts must be able to assess the quality of the data and the suitability of the statistical analysis used in the study. This appraisal is the basis for determining the implications for uncertainty in transferring the results to a new context. The poorer the comparability in resources between study sites and policy sites and the poorer the empirical basis for estimates in the original study, the greater the uncertainty in the imputed benefit estimates for the policy site. EPA follows none of these requirements in their discussion of the studies that provide benefits estimates in the rule.

2. EPA's Anecdotal Information on Benefits is Incomplete and Misleading

The studies included in the proposed rule fail to satisfy the agency's own standards for benefits transfer. The proposed rule cites only five studies that estimate the physical effects of CWI5 (Rule, p. 49104). .EPA's was of benefits studies does not follow procedures specified in their own guidance. In particular:

-EPA fails to evaluate the quality of the analysis and reliability of methods used in the reference studies.

-EPA fails to show that the studies cited in the proposed rule are relevant to the facilities that will be affected by the policy or how estimates should be modified to account for] differences with policy sites.

-EPA fails to document reported values, citing values that do not exist in the studies themselves.

-EPA fails to evaluate sensitivity of results to assumptions and to provide decision makers with an assessment of uncertainty in the estimates.

There are numerous published studies providing angling values for a variety of species, locations, and types of water bodies. The proposed rule provides no motivation for choosing the particular studies selected from the large literature on aquatic benefits. Appendix A provides a detailed assessment of each of the studies used by EPA to evaluate the benefits of the proposed 316(b) rule. The Appendix A assessment raises many concerns with the studies chosen by EPA to consider the benefits of the proposed rule. EPA should develop a more thorough assessment of benefits based on its own benefits evaluation guidelines.

3. EPA's Suggestion That Nonuse Values are 50 Percent of Use Values is Based on Dated Studies and an Overly Simplistic Assessment of Nonuse Values.

EPA's proposed rule reports sample calculations of total consumer surplus that could be generated by improvements in CWIS technology (65 Federal Regulation 49105). In these calculations EPA assumes that nonuse benefits would amount to 50 percent of use-value benefits (a so-called "50 percent" rule). EPA bases this assumption on two studies that have evaluated the results of studies that have estimated both user and non-user benefits deriving from water resources (Freeman 1979; Fisher and Raucher 1984).

The estimation of non-user values is an important and particularly controversial issue. There is significant debate on the appropriate techniques for measuring such values, whether existing methodologies can measure such values, and the contexts in which such values exist. EPA assessment of nonuse benefits, however, fails to discuss these considerations. The EPA should perform a more complete and thorough assessment of whether non-user benefits should be considered in the context of 316(b) BTA evaluations, and, if so, what methods should be used to evaluate non-user benefits.

EPA's use of the so-called "50 percent" rule approach to non-user benefits relies on studies that are over 20 years old and were only intended to provide rough estimates. The studies clearly note the limitations of the ad hoc estimate. Freeman (1979), for example, states that assuming non-user benefits are 50 percent of use benefits "is a very tenuous basis from which to estimate national nonuser benefits." The EPA acknowledges the limitations of the 50 percent rule, stating that "the overall reliability and credibility of this type of approach is, as for any benefits transfer approach, dependent on the credibility of the underlying study and the comparability in resources and changes in conditions between the research survey and the 316(b) rule's impact on selected site" (EPA 2000, p.11 -20). The EEA, however, fails to assess the applicability of the studies underlying the Freeman (1979), and Fisher and Raucher (1984) studies, and fails to develop methods to consider resource comparability in the benefit transfer process.

Given the significant debate over non-user valuation methods, significant advances in contingent valuation methodologies over the past 20 years, and significant advances in developing benefit transfers that account for site-specific factors affecting benefits levels, EPA's reliance on the so-called "50 percent" rule is inadequate. EPA should perform a more thorough assessment of the applicability and magnitude of non-user benefits than was presented in the EEA.

E. Limitations of EPA's Evaluation of Alternatives

The EEA considers three alternative BTA requirements:

1. Proposed BTA requirements. The proposed requirements include flow, velocity and technology requirements specific to the location of the CWIS.

2. Require Estuary and Tidal River BTA for All Locations. This alternatives would require that CWIS sites in any location meet the BTA requirements for CWIS in estuaries and tidal rivers. These requirements are the most stringent of all BTA requirements.

3. "Zero Flow" Requirements. This BTA requirement would require flow levels commensurate with those achieved through dry cooling systems.

1. EPA's Analysis of Alternatives is Too Limited

The range of BTA alternatives considered in the EEA is too limited. In a three-page chapter, the EEA sketches two alternatives to the proposed BTA requirements that would both result in significantly more stringent requirements. One alternative applies the most stringent set of BTA requirements to all facilities regardless of their location. The other alternative imposes a more stringent "zero flow" requirement on the electric generation facilities, which would require flow levels commensurate with those achieved through dry cooling systems. As a result of the increased stringency, both alternatives would result in costs that are significantly greater than the costs of the proposed alternative.

The EPA fails to consider any alternatives that would achieve the AEI goals of 316(b) rule through less stringent requirements or more flexible means of compliance. Such alternatives could include the following:

1. Alternative Technologies. Many technologies are available to significantly reduce impingement and entrainment at significantly lower costs than EPA's proposed BTA requirement. Evaluation of the incremental costs and benefits of these technologies relative to cooling towers may reveal that these technologies provide significant biological benefits at a fraction of the social cost of cooling towers.

2. Case-by-case BTA. Allowing facilities the flexibility to make a case-by-case BTA determination would lead to the selection of BTA technologies that provide a proper balancing of the costs and benefits of alternative technologies.

The EPA thus considers on two alternatives to its proposed requirements. This assessment of alternatives is too limited to provide useful information on whether the proposed rules are the jest regulatory alternative. In addition, EPA's approach fails to comply with EPA and OMB guidelines, as discussed below.

2. EPA's Analysis of Alternatives Does Not Comply with EPA and OMB Guidelines

The EPA's analysis of the economic impact of 316(b) regulatory alternative does not comply with the basic guidelines for regulatory assessments developed by both EPA and OMB. The Administration has enshrined careful incremental analysis of well-chosen regulatory alternatives in Executive Order 12866 and in guidance documents issued by the 0MB advising agencies how to conduct economic analysis of regulations. About one-third of OMB's 1996 'Best Practices Guidance" on economic analysis addresses how to assess alternatives. To comply with Section 638 of the Fiscal Year 1999 Omnibus Appropriations Act and Section 628 of the Fiscal Year 2000 Treasury and General Government Appropriations Act, OMB released guidelines in March 2000 standardizing the measurement of costs and benefits. These guidelines state that agencies "should especially consider all appropriate alternatives for the key aittributes or provisions of the rule." (Lew 2000, p. 3).

Analysis of regulatory alternatives is critical to a proper evaluation of the proposed regulations. Even if the overall net benefits of the proposed regulations were positive—that is, significant elements of the proposed regulations pass a benefit-cost test. That is, for any given provision, the costs of that provision may outweigh the benefits. In this context, it would be important to consider the alternative regulatory approaches to achieving the AEI goals of 316(b) aside from EPA's proposed regulations.

As discussed above, the economic analysis in support of the 316(b) regulations has virtually no discussion or analysis of alternatives. The EPA's neglect of other alternatives ignores the letter and spirit of Administration policy. President Clinton's Executive Order 12866 states that regulatory agencies "shall provide" to the Office of Information and Regulatory Affairs:

"an assessment, including the underlying analysis, of costs and benefits of potentially effective and reasonably feasible alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable nonregulatory actions), and an explanation why the planned regulatory action is preferable to the identified potential alternatives." <FN 6>

The EPA should analyze "potentially effective and reasonably feasible alternatives,' particularly less stringent alternatives than those proposed.

The EPA's analysis is also inconsistent with OMB's recent directive on benefit-cost analysis, which states, "You should analyze the benefits and costs of different regulatory provisions separately when a rule includes a number of distinct provisions. If the existence of one provision affects the benefits or costs arising from another provision, the analysis becomes more complicated, but the need to examine provisions separately remains [emphasis added]." <FN 7> The EPA's assessment has not analyzed costs and benefits of individual provisions separately. Examination of the costs and benefits of the flow requirements, velocity requirements, and technology requirements of the EPA's proposed 316(b) regulations on an individual basis may reveal important differences in the cost-effectiveness of these individual requirements.

The EPA's approach is also not consistent with the recently updated Economic Guidelines, which state that (EPA 1999, p.10-4):

The incremental benefits, costs and net benefits of moving from one regulatory alternative to more stringent ones should also be presented. This should include a discussion of incremental changes in quantified and qualitatively described benefits and costs. It is sometimes necessary to evaluate all combinations of options and alternatives when key sources of benefits and costs of a policy are affected by more than one option.

These guidelines provide important guidance in the determination of the appropriate level and design of 316(b) requirements in order to achieve net welfare gains to society. The process of maximizing net welfare gains to society, as well as ensuring that those gains are positive, requires a full consideration of alternative regulatory requirements and the development of estimated costs and benefits for each alternative. EPA's failure to incorporate a complete analysis of alternatives in the EEA is a significant omission.

V. CONCLUSIONS AND RECOMMENDATIONS

This chapter provides a brief summary of the conclusions and recommendations of our review of EPA's proposed 316(b) regulations for new facilities and economic and technical analyses in the EEA

A. Regulatory Alternatives

1. The Regulatory Approach Should Allow Site-Specific Comparisons

EPA has proposed a major shift in the approach to establishing 316(b) determinations. Rather than provide 316(b) determinations on a site-specific basis, the proposed rule would require national minimum technology-based requirements.

The national technology minimum approach largely ignores the substantial variability in the costs and benefits of adopting specific technologies at different locations. Although the proposal would provide some variability in control requirements, the requirements would be uniform for large categories of potential locations. This approach does not appropriately consider costs and benefits when determining which technology to install at specific locations.

We conclude that allowing 316(b) determinations to be made on the basis of site-specific evaluations would produce more desirable results in three principal respects:

1. First, the site-specific approach would produce greater fish-protection and other environmental benefits for a given level of costs.

2. Second, the site-specific approach would impose lower costs to achieve a given level of fish protection and other environmental benefits.

3. Third, the site-specific approach would provide appropriate incentives for new facilities to locate outside environmentally-sensitive areas.

2. The Site-Specific Approach Should Allow an Option to Install Pre-Approved Technology to Reduce Administrative Costs

The cost of developing and implementing a site-specific approach—including the costs of delay in getting facilities constructed—may not be justified in all situations. It would be useful to include an option to allow a facility to install pre-approved highly protective CWIS technology in the interest of reducing administrative costs and reducing the delay in obtaining a permit. Such a provision would not detract from the gains from the site-specific approach— which the facility owner could select—and would have the advantage of providing greater flexibility. It is appropriate to give the facility owners the option because they would be in the best position to judge whether the added costs of developing site-specific information justify the added gains from a tailored site-specific determination.

3. BTA Determinations Should be Based upon the Criterion of Maximizing the Net Benefits of Fish Protection Alternatives

EPA also has proposed a major shift in the criterion for determining BTA. EPA proposes to change from a criterion based upon comparison of costs and benefits to a criterion that compares costs to the revenues from the facilities. This "affordability" test is not a sufficient test from an economic perspective for determining what technology should be BTA.

-Affordability does not provide a way of systematically evaluating the environmental benefits and costs of alternative technologies.

-Affordability ignores consideration of the costs and benefits of BTA alternatives.

-Affordability ignores consideration of the incremental benefits and incremental costs of increasingly stringent (and expensive) alternatives.

-Affordability ignores other impacts of cooling water intake technologies.

We conclude that BTA determinations should be based upon a benefit-cost test. This test would involve determining the applicable fish protection alternatives, assessing their incremental costs and benefits in dollar terms to the extent feasible, determining major uncertainties in the analysis, assessing whether relevant costs or benefits have not been quantified, and developing a BTA choice that is likely to maximize net benefits in the particular case. This cost-benefit test would identify the best technology from an overall societal perspective.

This cost-benefit test is superior to the current "wholly disproportionate" test for BTA determinations that were developed more than twenty years ago. The "wholly disproportionate" test is not consistent with the economic objective of maximizing the net benefits from BTA determinations. The test appears to be motivated by an unsubstantiated assumption that measured benefits are consistently and significantly understated relative to costs, perhaps based upon limitations in benefit assessment methodology. Whatever the motivation, advancements in benefit assessment methodologies and empirical studies in the last two decades provide ample basis for using an appropriate cost-benefit test.

B. EPA's Engineering and Economic Analyses

1. EPA Should Reevaluate Its Cost Analyses in Light of Various Concerns

The EEA provides estimates of the potential costs of the proposed regulations that appear to suffer from several major concerns. These concerns include an understatement of the number of facilities subject to the regulation, understatement of the full costs of closed-cycle cooling water systems, and disregard for some potential options that would be more cost-effective.

We recommend that EPA reevaluate its cost analysis in light of these concerns. The objective should be to develop a reliable methodology for estimating the costs of the proposed alternative as well as the costs of regulatory alternatives.

2. EPA Should Complete Its Benefits Analyses

The EEA does not provide an analysis of the potential benefits of the proposed regulations. Indeed, EPA's benefits analysis does not conform to the Agency's guidance for preparing benefit assessments. Although EPA's guidance indicates that the analysis should include assessments of the physical effects of the proposed regulation on recreational and commercial catch, for example, the EEA does not include such estimates. The EEA also does not provide monetary values for benefits.

The EPA should complete its benefits analyses. The complete analysis should conform to the Agency's guidelines. The objective of the benefits assessment is to provide the basis for evaluating the benefits of the proposed alternative as well as the benefits of regulatory alternatives.

3. EPA Should Prepare an Appropriate Evaluation of Alternatives

The EEA considers three alternatives: (1) the proposed national BTA standards that differ somewhat by location; (2) National BTA standards equal to the most stringent that would apply at all locations; and (3) "Zero flow" requirement. These represent too limited a set of alternatives. Neither of the two alternatives is less stringent than the proposed regulations. Moreover, the discussion of even these limited alternatives is cursory. The analysis of alternatives does not comply with Agency guidelines.

The EPA should expand its evaluation of alternatives for the proposed rule. The EPA requests comments on a wide range of regulatory alternatives. EPA's analysis should provide information on a sufficiently large number of these alternatives so that it is able to make (or explain) its choices. At the very least, the analyses should include assessments of the costs, benefits, and other effects of the site-specific approach as an alternative to the national minimum technology-based approach.

4. EPA Should Comply with the Requirements of Executive Order 12866

Executive Order 12866 requires agencies to prepare economic analyses of potential regulations. The EEA does not conform to the requirements of Executive Order 12866 for reasons that include the following:

-The EEA does not document that the potential benefits to society justify the potential costs.

-The EEA does not document that the proposed regulations would maximize net benefits to society.

-The EEA does not show that the EPA has considered the most important alternative approaches.

The EEA should be completed and revised to comply with these and other requirements of Executive

Order 12866.

APPENDIX A — ASSESSMENT OF EPA'S ANALYSES OF BENEFITS STUDIES

This appendix provides a detailed assessment of the benefits studies referenced by EPA in the Engineering and Economic Analyses of the Proposed 316(b) New Facility Rule. Section A provides an overview of various valuation methods. This section provides background for interpreting the specific studies. Section B provides a detailed assessment of EPA's use of specific benefits studies.

A. Alternative Benefits Valuation Methods

This section summarizes the advantages and disadvantages of alternative valuation methods. The methods considered include the single site travel-cost method (TCM), the Random Utility Model (RUM) approach, and contingent valuation (CV).

1. Travel Cost Method

The logic underlying the TCM is simple. Recreators at a particular site pay an implicit price for using a site's services through the travel and time costs associated with visiting that site. Recreators will choose to visit a site if the enjoyment or value of going to the site is at least as great as the travel expense and the opportunity cost of the time spent traveling. The major limitations of this approach are its inability to adequately account for substitution among recreation sites and its inability to value marginal changes in site characteristics. An increase in travel costs or reduction in quality at one site induces some people to visit a substitute site rather than choose not to recreate. This substitution means that the total value of the trip is not lost, it is only reduced because recreators visit a second-choice site.

EPA's guidance emphasizes that the TCM cannot model recreators' choice among sites, and thus does not account for the effect of substitute alternatives on values (EPA 1999, p. 7-18). Ignoring substitutes biases value estimates upward (Freeman 1993, p. 453—454). The single-site TCM also cannot estimate recreators' value for changes in site characteristics (Cameron and James (1987), Morey, Shaw, and Rowe (1988), Smith and Desvousges (1986), and Samples and Bishop (1985)). Instead, this approach can only estimate a value for site visitation as a whole, not the value for an improvement in a site characteristic. To value a marginal change in a resource, such as a change in the fish population, estimates for several sites with different characteristics must be obtained. Differences in consumer surplus among the sites are then explained by differences in the site attributes among sites.

2. Random Utility Model Method

RUMs represent a significant methodological improvement over the simple TCM. This approach takes a more realistic view of the decision-making process involved in choosing a recreation site. A RUM estimates the probability that a recreator will choose to visit a given recreation site. This probability depends on the characteristics of the site, the characteristics of available substitutes, and the travel costs to all the sites in recreators' choice sets. The RUM can accommodate the fact that different people have different choice sets of recreation opportunities. These choice sets are based on factors such as the individual's income, free time, and place of residence. To the extent that the individual trades off these factors against the quality of recreation opportunities, researchers can model the relative value of these variables as revealed by recreators' decisions. The better the characteristics of a site, the higher the probability that an individual will choose that site, and thus the higher the value of that site will be. RUMs thus combine observed variation in travel behavior with observed variation in site characteristics to estimate the value of marginal changes in site characteristics.

3. Contingent Valuation Method

The CV method for estimating the value of natural resource services involves a direct survey of individuals to elicit their willingness to pay (WTP) for different levels of services. For example, the survey may ask respondents a question such as, "What is the maximum amount you would pay for a 25% increase in fish catch at this site?" The responses are analyzed to determine the incremental WTP for the resource. This method requires that individuals be able to express their value for marginal changes in fishery services and, that their responses to such hypothetical questions indicate their actual valuations of the changes described in the questions. EPA's guidance warns analysts of concerns about CV value estimates because of various forms of bias that may affect the validity and reliability of such values (EPA 1999, p.7-29). The guidance reminds analysts that there are tests that can enhance the credibility of CV studies and that surveys without these tests should be suspect (EPA 1999, p.7-29).

B. EPA's Selection and Use of Reference Studies

This section reviews three of the five benefits studies discussed by EPA in its benefits assessment. (We do not review the other two studies because one does not provide specific benefits estimates and the other does not contain the benefit estimates reported by EPA.) The final subsection provides an overview of concerns with EPA's selection and use of these studies.

1. Rowe et al. (1995)

EPA's first reference study is Rowe, et al. (1995). This study transfers values from existing studies to calculate damages to commercial and recreational fishing on the Hudson River from CWIS. Rowe, et al. (1995) reference Norton, Smith, and Strand's (1983) TCM of the recreational value of striped bass. Because the TCM cannot estimate marginal values for changes in catch, Norton, Smith, and Strand derive the value for catching one fish by dividing the total value by the number of fish. This value is not the benefit of catching one more fish but rather the average value of catching a fish. The value of catching one more fish will be less than the average because of the economic principle of decreasing marginal value. For example, an angler generally will value the tenth fish caught much less than the second fish caught. Thus, the average value of catching a fish overstates the marginal benefit associated with increased catch to an unknown degree. For example, if the relationship between marginal value and catch is linear, marginal value declines to zero at the point where average value is half the value of the first fish caught. EPA's analysis does not comment on or modify these TCM estimates for these obvious sources of upward bias.

Rowe, et al. reference Englin, et al. (1991) for the value of increased catch for other species. Englin et al. use a RUM to estimate the value of catching one additional fish from lakes in New York, New

Hampshire, and Vermont during the summer of 1989. Rowe et al.'s transfer of estimates from this study includes an arithmetic error that more than doubles the benefits estimate. EPA's evaluation of this study fails to detect this error. Rowe et al. inflates the estimate to 1992 dollars, the year of their study. Although Rowe's description of the inflation is correct in the text, the accompanying table uses an estimate inflated from 1976 dollars rather than 1989 dollars. Consequently, rather than using $0.27 to $1.25 as the range of values for increasing catch by one fish, the study uses $0.59 to $2.71. As a result, estimates are more than doubled.

In addition, the proposed rule misrepresents the Rowe, et al. estimates. Rowe, et al. warn that their damage estimates include considerable uncertainty and potential biases. In particular, the authors caution that the site-specific estimates could overstate values for other sites and that future damages may be overstated because mitigation measures may improve over time. Furthermore, fish-population dynamics could entirely offset mortality from impingement and entrainment which would result in zero damages. Thus, the authors report a lower-bound estimate of zero losses. Without explanation, the proposed rule reports the midpoint of the Rowe, et al. range as the lower bound loss estimate rather than reporting zero as the authors suggest.

The proposed rule fails to assess the applicability of either Rowe, et al.'s recreational or commercial benefit estimates to sites affected by the new-facilities rule. The appropriate measure for recreational benefits is the change in consumer surplus, while the appropriate measure for commercial benefits is the change in producer surplus. The rule suggests measuring benefits from commercial fishing using increased revenues as an indication of producer surplus (Rule, p.491 04). Economists agree, however, that incentives, for exploiting common property resources, like fisheries, result in producers' increasing effort until economic rents are zero (Tietenburg, 1988, p.266). Thus, producers drive any potential producer surplus to zero unless the fishery is regulated.

Producer surplus is greater than zero in the Rowe et al. study because there is a quota system for striped bass in the studied fishery. However, the study results are not directly transferable to sites that are unregulated or regulated differently, involve different species, use different catch technologies, etc. EPA does not explain how the study site differs from policy sites, how differences would affect value estimates, or how characteristics of the study combined with differences between the study site and policy sites would affect uncertainty in either the commercial or recreational benefit estimates. The rule does not demonstrate that circumstances in their case study would lead to positive producer surplus, much less whether it is appropriate to measure producer surplus using gross revenues rather than net revenues.

2. Huppert (1989)

EPA' s second reference study, Huppert (1989), also uses the TCM to estimate the value of angling for anadromous species in Central California. Huppert's estimates are overstated because TCM does not account for substitute alternatives. Furthermore, Huppert also misrepresents travel costs, which play a central role in deriving reliable estimates of recreators' WTP for access to a site. The TCM relies on the cost of travel to estimate the value of a recreation site. EPA's guidance explains that part of the cost of travel is the angler's opportunity cost of time, which varies with angler's income and work schedules (EPA 1999, p. 7-19). The guidance indicates that most studies use some fraction of the wage rate in calculating these costs. However, Huppert uses the full wage rate, which overstates the cost of travel and thus overstates the value of the trip.

More significantly, EPA departs from its own guidance in not documenting how the Huppert analysis was used to derive value estimates. The proposed rule reports an increase in consumer surplus from catching an additional striped bass as a range from $8.87 to $13.77 (Rule p. 49104). However, Huppert does not report this number, and the proposed rule does not explain how EPA's estimate is derived. According to the guidance, a benefits transfer often requires that analysts use judgment to adjust point estimates from a study to the relevant policy being considered (EPA 1999, p.7-33). The guidance requires that this judgment be based on economic theory, empirical evidence, and experience (EPA 1999, p.7-33). Because the proposed rule does not clearly present this information, there is no means for assessing the appropriateness of various assumptions or potential uncertainty introduced by such adjustments.

Huppert also compares TCM estimates with corresponding CV estimates, but does not report reliability tests for the CV estimates as suggested by the guidance. In the absence of documentation on the rule's value estimates, it is impossible to determine whether EPA derived their estimates from the CV or TCM values. In either case, using Huppert violates the guidance's procedures for selecting reliable transfer studies.

3. Jones and Sung (1993)

Jones and Sung (1993) is the third study used in the proposed rule. Jones and Sung use a RUM to estimate the recreational benefits of closing a facility. One of the most important pieces of information required to document aquatic benefits is the relationship between decreased losses from I&E and increases in angler catch. It is not sufficient simply to document an increase in mortality. Analysts must also document the link between the increase in fish mortality and a decrease in services from the fishery. As EPA's second cited study, Rowe, et a!., indicates, the lower bound of the range of possible effects may be zero. Jones and Sung's estimates of the value of increased catch assume that reduced I&E not only decrease losses of angler-targeted species, but also decrease losses in forage species. Without explanation, Jones and Sung assume that a 1.1—3.2% decrease in losses of forage species results in increases in catch of 10% for chinook salmon, 3.3% for coho salmon, 13.7% for lake trout, and 8.6% for rainbow trout. It is impossible to determine what confidence analysts should have in these assumptions or how sensitive benefits estimates are to variations in these assumptions. Using Jones and Sung without documenting the required links or evaluating the uncertainty of these assumptions violates the guidance requirement that analysts provide adequate information to facilitate appropriate interpretation of results (EPA 1999, p. 7-7).

Jones and Sung also use the full wage rate to value the opportunity cost of time, which, according to the guidance, biases benefits estimates upwards. Moreover, Jones and Sung violate guidance procedures for treating multiple-site or multiple-purpose trips. EPA's guidance clearly states that visits to multiple sites or trips with multiple purposes confound attempts to measure changes in values (EPA 1999, p. 7-19). Because travel costs determine benefits, anglers who travel long distances for trips lasting multiple days imply a large value for the trip. However, when such trips include visits to relatives, visits to theme parks, and other non-angling activities, it is impossible to identify what part of the total trip value should be assigned to fishing. Jones and Sung attribute the full value of multiple-day, multiple-purpose trips to fishing, which overstates benefits.

EPA's analysis again violates guidance procedures for evaluating the applicability of the transfer study to affected policy sites. Jones and Sung estimate the benefits from closing the Ludington Pumped-Storage plant on Lake Michigan. At the time of the study, this plant was the largest hydropower facility of its kind in the country. It is not clear how this example relates to new thermal plants located on quite different water bodies than Lake Michigan and involving very different species. Furthermore, estimates from this study assume plant operations that lack fish-protection measures. The Jones and Sung estimates clearly overstate benefits for the types of water bodies, species, and control technologies relevant for policy sites. Contrary to guidance requirements, the proposed rule does not evaluate the applicability of these values to assess benefits, how the estimates should be adjusted to account for differences between study and policy sites, or what the implications of such differences are for uncertainty in the estimates.

4. Summary

These comments suggest that EPA's use of individual benefits studies in the EEA does not conform to the Agency guidance. Moreover, the basis for selecting the studies is unnecessarily restrictive. The studies appear to be chosen because they estimate benefits from changes in cooling water intake structures. Many other studies develop estimates of recreational and commercial fishing values that could be used to assess the benefits of the proposed rule.

In sum, EPA should complete its benefit assessment of the proposed rule. The complete assessment should include an evaluation of benefits valuation results from a larger number of relevant studies.

Footnotes

6 See E.O. 12866, Section 6(a)(3)(C). Note that BLM acknowledges that the regulation is "significant" in the meaning of section 3(f) of the E.O. See BLM Proposed Rule, p. 6449.

7 See Jacob Lew (2000, Section 1(A)2)).

EPA Response

For a response to this comment, which was submitted with the commenter's Phase I proposal comments in November 2000, see the Phase I Comment Response Document (DCN 3-0091) beginning at comment 316bNFR.068.300.

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Author Name Hunton & Williams

Organization obo Utility Water Act Group

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Costs

Review of the Technical Development Document and the Economic and Benefits Analysis Document on Costs of Intake Technologies

Thomas C. Cook and E. P. Taft
Alden Research Laboratory, Inc.

Introduction

Alden Research Laboratory, Inc. (Alden) has reviewed two documents prepared in support of the EPA's Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities:

Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule. 2002. USEPA. EPA-821-R-02-003 (the "TDD").

Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule. 2002. USEPA. EPA-821-R-02-001 (the "EBA").

Our review focused primarily on the TDD <FN 1> and only generally on the EBA. The TDD explains how EPA (1) estimated costs associated with retrofitting certain cooling water intake structure (CWIS) technologies at existing facilities and (2) used those generic costs to develop estimates of CWIS technology retrofitting costs for all in-scope Phase II facilities. Because the EBA analyzes the economic impacts on facilities, firms, and the industry as a whole using that cost data, our comments also are relevant to the EBA. The results of our review are summarized in the following discussion.

Overview of EPA's Methodology and Assumptions for Estimating Costs

EPA's cost estimates are very general and focus on a few selected technologies and associated design criteria, using data it developed for new facilities. TDD pp. 2.15, 2.28. EPA apparently chose to focus on retrofitting fine mesh screens and/or fish handling/return systems because it had concluded in the course of the § 316(b) rulemaking for new facilities that the costs of such technologies would, as a general matter, be higher than costs for other CWIS technology options. TDD p. 2.15.

For each technology it examined, EPA estimated capital and O&M costs for a "typical" retrofit, then applied a "capital cost inflation" or "retrofit" factor to "account for activities outside the scope of cost estimates" that it developed for new, greenfield facilities. EPA does not provide any data supporting this retrofit cost factor, although EPA does list some of the activities the factor might cover. <FN 2> The Agency does not provide any clue as to how each of those activities might affect cost or contribute to the factor selected. EPA also applies "regional cost factors" based on the RS Means database. TDD p. 2.27. For purposes of its analysis, EPA applied the "weighted average factor category for total costs" by state.

Impingement Mortality Reduction

For impingement mortality reduction, EPA assumed a facility would:

-retrofit “fish handling panels,” spray systems (without a differential control system and installation, or spraywash pumps), fish troughs, housing and transitions, and convert from intermittent to continuous operation; <FN3> and

-operate at a through-screen velocity of 1.5 feet per second (ft/s) (which EPA says (TDD p. 2.3) is the “median facility value” from the data it collected).

With respect to the velocity metric of 1.5 ft/s, EPA says it used this value only to size the fish handling/return system for which it developed cost factors and that the metric is not intended as a performance standard. TDD p. 2.3. Therefore, for purposes of our review, we assumed that existing CWIS with higher through-screen velocities would not be required to increase their size to achieve a lower, 1.5 ft/s velocity.

To calculate fish handling/return equipment costs, EPA used data it had collected for new facilities. Compare TDD pp. 2.6,2.14 with Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities (New Facility TDD), p. 2-47. To the calculated equipment costs, EPA applied a factor of 20% to account for upgrading existing equipment to convert from intermittent to continuous screen operation. EPA does not provide a reference for this factor.

To account for the cost of installing the fish handling/return equipment on existing traveling screens, EPA assumed that such costs would be “75% of the cost of installing a traveling screen (based on BPJ).” TDD p. 2.15.

Entrainment Reduction

For entrainment reduction, EPA assumed that a facility would:

-in lieu of larger mesh screens, retrofit fine mesh screening with a “screening efficiency” (by which we assume EPA means an overall “open area”) of 50% (TDD p. 2.2);

-account for the lower cross-sectional open area provided by fine-mesh screens, by expanding the existing intake structure (i.e., “fanning” it), which EPA assumed would entail demolishing one side wall of the structure and constructing a new wall, including one additional concrete pillar (TDD pp. 2.2-2.3);

-account for “the operational requirements of the screen and.. . balance the impingement reduction benefits of lower velocities with the physical constraints of velocity reduction for existing intake structures” (TDD p. 2.1) by reducing, where necessary, through-screen intake velocity to 1.0 ft/s. <FN 4>

As it does for impingement, EPA stresses that the 1.0 ft/s through-screen velocity metric is not intended as a performance standard. TDD p. 2.1. EPA recognized, however, that use of that metric would have a substantial effect on the retrofit cost for facilities with velocities over l.0 ft/s. TDDp.2.2.

To estimate the equipment costs of retrofitting fine mesh screens, EPA apparently used information it collected from one or more sources (most likely equipment vendors but EPA does not say which source or sources it used) during the new facility § 316(b) rulemaking. Because they were developed for new facilities, for which EPA chose to require closed-cycle cooling with much lower intake flow rates, the data provide cost estimates for flows up to 204,000 gallons per minute (455 cfs, or 294 MGD) at a through-screen velocity of 1.0 ft/s. TDD pp. 2.5-2.6. As EPA notes, at higher flows, additional screen assemblies or custom designs would be necessary. TDD p. 2.4. EPA used the new facility data to develop equations from which it derived equipment costs for the flow rates at those in-scope plants which EPA identified as likely to retrofit fine mesh. See TDD p. 2.2; 2.4-2.8; Appendix B. The only independent variable in those equations is flow. See TDD pp. 2.11.

To estimate installation costs, EPA again relied on estimates it developed for the new facility rulemaking. According to the TDD pp. 2.7-2.10, EPA took estimated costs for on-shore site preparation/excavation work <FN 5> for installing conventional traveling screens at a 10-foot well depth, and then scaled them up for screen wells of greater depths (up to 100 feet). EPA based its scaling factor on the assumption that such site preparation costs increase at a rate of an additional 25 percent per depth factor (calculated as the ratio of the well depth to the base well depth of 10 feet). EPA also took the costs it had developed for a hypothetical scenario for the underwater installation of twelve t-24 passive (not traveling) screens 75 yards offshore, via barge. Those installation costs essentially reflect the costs of positioning the intake screens and bolting them onto the inlet flange. <FN 6>

Separately, EPA appears to have calculated the demolition, excavation, and construction costs associated with its “fanning” scenario (that is, the “intake modification construction costs” described at TDD pp. 2.2-2.3) and compared those costs to its estimate of the costs of constructing an intake structure for a new facility (which it derived from equations developed for that purpose during the new facility § 316(b) rulemaking, and which included site-preparation and installation costs). TDD p. 2.2. EPA used the results of that comparison to develop “construction ratios” that vary depending on whether the plant is nuclear or non-nuclear and whether the retrofit involves installation of both fine mesh screens and fish handling/return systems, or only fine mesh screens. <FN 7> TDD p. 2.2, Table 2-1. (For facilities required to install only fish handling/return systems, EPA did not develop any construction factor; rather, it assumed that only the installation costs described above would be incurred.) Id.

Analysis of EPA CWIS Technology Cost Estimates

As noted above, EPA limited its cost analysis to two technology alternatives — retrofit of fine mesh traveling screens and/or fish handling/return systems because it says that data from the new facility rule indicate those are likely to be higher than other options. We do not believe that the cost data for new facilities, which were developed under the much lower flow conditions EPA imposed on such facilities, are particularly relevant for existing facilities with once-through cooling. Indeed, EPA itself concluded as much during the new facility rulemaking, suggesting that facilities with higher flows would not use such technologies at all, for economic and practical reasons. New Facility Rule TDD at 2-23. UWAG’s comments on the new facility rule disagreed strongly with EPA’s conclusion that using other technologies, such as passive screens and fabric filter barriers, would not be feasible and showed that they were in use at higher flow facilities. UWAG 2000 Phase I Rule Comments, pp. 173-202. But UWAG found that the costs for such technologies would be higher than EPA's estimates suggested and would not necessarily increase in a simple linear fashion with increased flow. Thus, it is important for EPA to state clearly in any final rule that its characterization of the costs of other technologies at new facilities (the principal basis for the cost data and resulting equations provided in the TDD) does not necessarily reflect the site-specific costs of applying such technologies at existing once-through facilities.

As for the two technologies EPA did examine, the Agency recognizes that the through-screen velocity design metric used has a significant effect on its cost estimate, because for any given flow rate, the desired velocity and total open area are the factors that determine both the number of screen assemblies needed and the total size of the intake structure needed to contain those screens. A simple pair of examples illustrates this point.

Assume three existing CWISs have traveling screens, each of which has a design flow rate of 500 &/s and incorporates 3/8-in, square mesh with an open area of 65% (similar to many such meshes). However, the design through-screen velocity differs due to differences in screen width and depth, as follows:

[see hard copy for table and equations]

Similarly, velocities for Facilities B and C would be 1.5 and 1.1 ft/s, respectively. If a designer needs to reduce velocity to meet performance requirements (i.e., 1.5 ft's through-screen for impingement and 1.0 ft/s through-screen for entrainment), the degree of modifications needed will vary greatly even though the total flow rate for all three hypothetical facilities is the same. Since flow and velocity are now specified in this example, the only way to reduce velocity would be to increase area. Thus, to achieve a through-screen velocity of 1.5 ft/s, facilities B and C would not have to be expanded or fanned since they already have velocities of 1.5 ft/s or less. However, Facility A would require an increase of 60% in area to reduce the velocity from 2.4 to 1.5 ft/s. The costs for this facility would be substantially higher than for Facilities B and C.

To achieve a velocity of 1.0 ft/s through-screen, as specified by EPA for fine mesh screens, the screening area of all three facilities would have to be increased. Assuming EPA's screen open area of 50%, the formula for calculating required through-screen area would be as follows for Facility A:

[see hard copy for equation]

The existing through-screen area is 208 ft^2 (8 ft wide by 40 ft deep by open area of 0.65%). Therefore, the screen area would have to increase nearly 2.4 times. Similarly, the existing through-screen area for Facilities B and C would be 325 and 468 ft^2, respectively. The screen area for Facility B would have to be increased by only about 1.5 times, while Facility C would require little, if any, change in screen area.

Clearly, for all three facilities, the equipment costs (that is, the number of screens and, possibly, the layout) and the size of the intake structure will differ dramatically. EPA correctly recognizes that, above the flow rates for which it collected cost equipment cost data , multiple screens or customs designs would be necessary. TDD p. 2.4. EPA's equations may account for the cost of multiple screens, but they do not account for custom designs, the cost for which would need to be estimated on a site-specific basis.

It also is not clear whether the 1.0 ft/s velocity metric EPA used to size its retrofit represents a maximum velocity that accounts for the non-uniform velocity distribution that occurs in many CWISs. Velocities at CWISs are determined by factors such as the presence or absence of skimmer walls and the direction and magnitude of ambient currents approaching the CWIS (which are not only site-specific but also seasonally specific). If EPA assumes that the value to be used in sizing a retrofit or otherwise applying technologies is the maximum value that cannot be exceeded at any single point in a CWIS or through a screen, such a design criterion would impart greater variability in costs across all facilities.

Most important, the actual cost of the expansion for any given site will be determined by the existing site layout, the type of excavation required (e.g., rock versus soil), the availability of space in which to expand, and the degree to which existing piping and pumps can be used as opposed to replaced. For example, sheet piling is not possible in many locations; more expensive cofferdams will be required at these sites. Similarly, the amount of concrete demolition and additional concrete needed depends on the design and layout of the existing CWIS (e.g., availability of space and navigational impacts). Modifications could be as simple as adding columns, as EPA assumes. Alternatively, it may be necessary to construct major new intake elements (concrete, steel, piping, pumps). For example, to achieve a uniform distribution of flow through screens (existing and new) at some facilities, pumps and/or piping may need to be rearranged, relocated, and/or replaced. Such a distribution also could be achieved by placing a new screen array immediately upstream of the existing screenwell structure and constructing cut-off walls to channel the flow through the screens. The costs associated with each of these examples will vary substantially depending on site-specific requirements.

As another example, the effort and cost of retrofitting screens with fish baskets, low-pressure sprays, and fish troughs is dependent on the existing screen design. Some existing screens are of the front-wash design (debris is rinsed into a debris trough from the ascending, front screen face). To convert such screens to a back-wash design compatible with the current Ristroph screen basket design, it often will be necessary to raise the head shaft/sprocket to make room for additional, low-pressure spray wash headers and a fish trough. Alternatively, it may be more cost-effective to simply replace the entire screen and associated troughs with new components designed specifically to protect fish.

While EPA does include a retrofit cost factor, we have no way of assessing EPA's development of that factor, nor does it appear to fully account for all site-specific factors that may arise. As noted above, EPA does not tell us what each activity might cost, how site-specific variables would affect the cost of each activity, and how those activities contribute to the retrofit factor(s) EPA selected.

Equally important, EPA says that a "capital cost inflation" factor of either 20% (in the case of conversion of cooling systems, as would occur with installation of a cooling tower) or 30% (in the case of retrofitting/upgrading water intake structures and screens) appropriately adjusts its new facility costs for use as existing facility retrofit costs. TDD p. 2.28. While admitting that retrofit activities are "site-specific [and] may vary between sites," EPA nonetheless applies generic adjustment factors that cannot be accurate for every site. For example, at some facilities foundations for cooling towers would be extremely expensive to construct because of unstable soil conditions. At such sites, EPA's 20% adjustment would be inadequate.

Likewise, the 30% adjustment for retrofitting screens will be too low to capture the costs at some sites. This is particularly true for CWIS technologies, given the many site-specific factors that determine the ultimate cost, which a percentage adjustment factor tied to capital costs cannot capture. Indeed, in some cases, the factors that drive up the costs of retrofitting CWIS technologies may be largely unrelated to the costs of the retrofitted technologies. For example,
to secure necessary permitting for the retrofit construction activities, environmental assessments (e.g., freshwater mussel surveys) or other information may need to be generated. Unusual demolition or construction requirements (i.e., relocation of existing barge loading facilities to allow space for screening technologies) also may be unrelated to capital costs. Therefore, EPA's retrofit cost factor methodology, by its relationship to capital costs, likely will underestimate retrofitting costs at some sites. Thus, EPA's final rule should caution against reliance on such simplistic factors to estimate site-specific retrofitting costs.

In short, a construction factor reflecting a simple "fanning" scenario, the use of installation costs for passive screens (not traveling screens, which EPA apparently assumes will have similar costs), and a retrofit factor that is simply a percentage of those costs will not capture the full extent of retrofit costs for some sites. In practice, costs will vary widely, so that EPA's general estimate may not — in fact, likely will not — be "typical" for any given site. Thus, it is very important for EPA to acknowledge that site-specific factors not captured by its general analysis may work to increase (or possibly, in some cases, decrease) costs.

Conclusion

Based on its 30 years of experience designing CWISs at a wide variety of sites, Alden believes it is clear that the costs of retrofitting fish protection technologies at CWISs are highly site-specific. Site-specific requirements will result in costs that span a wide range that has not been completely and accurately captured in EPA's national estimates. EPA should make clear that such factors must be considered when any final rule is applied.

Footnotes

1 Our review of the TDD did not include reviewing any of EPA's assessment of the engineering attributes or costs of retrofitting closed-cycle cooling at existing facilities.

2 EPA says that the retrofit cost factor covers: branching or diversion of cooling water delivery systems, reinforcement of retrofitted conduit system connections, partial or full demolition of conduit systems and/or intake structures, additional excavation activities, temporary delays in construction schedules, expedited construction schedules, potential small land acquisitions, hiring of additional (beyond those typical for the "greenfield" cost estimates) equipment and personnel for subsurface construction, administrative and construction related safety precautions, and potential additional cooling water (recirculating or make-up) delivery needs. TDD p. 2.28.

3 It is not clear from the TDD whether EPA considered any energy penalty stemming from the increased auxiliary power needed to run screening systems continuously and to run the fish return system, or for system down- time during CWIS retrofit construction/installation/reconnection. A more detailed evaluation of this issue is beyond the scope of this report. EPA says it estimated annual O&M costs for traveling screens with and without fish handling/return systems based on "discussions with industry representatives" whom it does not identify. EPA then expressed those costs as a percentage of capital costs. But EPA does not explain what cost elements it considered as part of O&M. TDD p. 2.12.

4 EPA also considered possible costs for a design through-screen velocity of 0.5 ft/s but apparently decided not to develop national estimates based on that metric. See TDD pp. 2.1, 2.4-2.5.

5 According to EPA, this includes clearing and grubbing, earthwork, paving and surfacing, and structural concrete. TDD p. 2.7. For structural concrete, EPA assumed use of four 12-by-12 inch reinforced columns with depths varying between 1.5 and 3 yards. Id.

6 Bolting the screens to the inlet flange is only a minor part of the total installation process. It is not clear how EPA has accounted for the other installation procedures.

7 It is unclear why, in Table 2-1 of the TDD, p. 2.2, EPA shows a “construction factor” for fine mesh screens alone (65%) that is greater than the factor for fine mesh screens with fish handling (30%).

EPA Response

The Agency notes that it dramatically revised its cost estimation approach for fish protection technologies to account for greater recognition of site-specific conditions. The Agency presented this analysis in the Notice of Data Availability and received comments from this same commenter (i.e., Alden labs) regarding the revised methodology. See responses to comments 316b.EFR.306.042 through 316b.EFR.306.053.

Comment ID 316bEFR.041.701

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 7.02
Performance standards

The Performance of Intake Technologies in Light of EPA's Proposed Performance Standards

E. P. Taft, Alden Research Laboratory, Inc.

In Chapter 3 of its Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA 2002) and Attachment A thereto, EPA presents information that it compiled on the "performance of the range of technologies currently used to minimize impingement and entrainment (I&E) at power plants nationwide." Despite EPA's stated limitations of the data, it is clear that there exists a variety of cooling water intake structure (CWIS) technologies that, when used alone or in combination, act to reduce I&E. Further, ongoing research with a number of promising technologies may lead to improvements in their performance in the future. Therefore, UWAG generally concurs with EPA's assertion that "significant general performance expectations can be implied for the range of technologies and that one or more technologies (or groups of technologies) can provide significant I&E protection at most sites." However, as discussed below, UWAG questions whether the available data support the adoption of a performance standard that can be applied across-the-board at all existing sites with all species and life stages of fish and shellfish.

In Chapter Al of its Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA 2002), EPA characterizes technologies as follows:

"technologies that minimize impingement and entrainment"

-Exclusion systems such as wet cooling towers, fine mesh screens, intake traveling screens, and aquatic filter barriers

-Passive systems such as wedge wire screens, perforated pipes, porous dikes and artificial filter beds

-Diversion/avoidance systems

"technologies that maximize survival of impinged organisms"

-Fish handling systems such as bypass systems, fish buckets, fish baskets, fish troughs, fish elevators, fish pumps, spray wash systems and fish sills

"operational measures that minimize I&E"

-Seasonal flow reductions

-Variable speed pumps

There exists a relatively large database on the biological effectiveness of technologies in reducing I&E. Some technologies, such as modified traveling (Ristroph) screens, have been studied in-depth with a wide variety of species in most, if not all, waterbody types. Others, such as aquatic filter barriers (AFB), are relatively new and have been evaluated for use at CWIS in only one waterbody with fewer species. (See Attachment A to this Appendix for a summary of ongoing research on AFBs and other intake technologies.) Therefore, the data available to estimate the potential effectiveness of a technology, as applied to a given site, will vary by technology.

In some cases, the existing data may not be sufficient to determine whether the technology could meet EPA's proposed performance standard. Regardless, EPA has selectively presented the data in a way that supports its proposed performance standard. In that sense, EPA's selection of target values for the performance standard (80-95 percent reduction in impingement mortality; 60-90 percent reduction in entrainment) is somewhat arbitrary. While available technologies may "maximize" impingement survival and "minimize" entrainment, EPA's presentation of the information ignores much of the variability in the data related to species- and site-specific issues. A thorough knowledge of the data points to the fact that currently available technologies cannot meet the performance standard across all species/life stages at all sites.

Further, EPA's proposed performance standards are measured against a calculation baseline that may not be quantifiable with precision in some instances. If the existing CWIS at the site under evaluation is not on a shoreline, it may be difficult to estimate existing I&E for a hypothetical shoreline intake representing the baseline. EPA suggests that this baseline "could be estimated by evaluating existing data from a facility nearby without impingement and/or entrainment control technology (if relevant) or by evaluating the abundance of organisms in the source waterbody in the vicinity of the intake structure that may be susceptible to impingement and/or entrainment" (p. 17,176, col. 2). As discussed elsewhere (e.g., Appendix 4, Narrative Factors Report), many biological, engineering, and hydrologic/hydraulic factors influence whether an organism will interact with a CWIS and whether or not the organism will survive that interaction. EPA's simplistic approach ignores many of the points that were made in the Narrative Factors report.

Assuming that a reasonable baseline can be calculated, the next step is to determine the effectiveness of a technology in reducing impingement mortality and entrainment. Where adequate data exist to estimate potential effectiveness of a technology at a given site, it is important to consider site-, species- and life stage-specific factors that influence whether an organism will be protected to the level of the performance standard. These factors are discussed below.

Site-specific factors influence both (1) where the technology can be located and (2) whether it can be operated in such a way as to maximize biological benefits (or even meet the performance standard). As such, these factors determine how effective a technology will be in protecting organisms.

Consider, for example, the potential retrofit of wedge wire screens to achieve optimum hydraulic conditions for fish protection at an existing, shoreline CWIS on a river. To protect the earliest life stages, such screens need to be located in an area where ambient currents exist to carry organisms and debris away from the screens. At one site, this might be easily achieved. At another site (even nearby), this area may not be available due to navigational or other site-specific constraints. If adequate area for installation is not available within the bulkhead line, it may be necessary to locate the screens in another area with less desirable hydraulic conditions. This adjustment could jeopardize the ability to meet the performance standards for certain species and life stages.

Species- and life stage-specific factors relate mainly to the size, swimming capabilities and relative hardiness of different species and life stages. These factors also can be closely interrelated to site-specific factors. The size of an organism determines whether its movement will be blocked by a technology designed to collect it (e.g., fine mesh screens) or passively divert it (e.g., wedge wire screens). Thus, the opening size of a screen (e.g., screen mesh size) determines whether an organism will be entrained or impinged. In turn, the minimum pore size that can be installed at a given site is related to the type and amount of silt and debris in the water. Therefore, the pore size that will protect a given species at one site may not be practicable to install and operate at another site to protect the same species.

The swimming capability of the species and life stages requiring protection at a given site influences both what technologies might be considered for reducing impingement mortality and entrainment and the ability of a selected technology to meet the performance standard. Accordingly, older fish (juveniles and adults) with strong swimming capabilities can be protected relatively easily with a variety of technologies. Early life stages (e.g., eggs and early larvae) with little or no mobility must be protected with passive devices (e.g., wedge wire screens and aquatic filter barriers) or collection systems that handle fish gently (e.g., fine mesh screens). See Appendix 4, Narrative Factors Report.

Hardiness relates mainly to the ability of an organism to survive interaction with a technology. Survival of impinged fish and macroinvertebrates varies widely among species and between life stages of a given species. Some species (e.g., blue crab, flounder, catfish) are very hardy and show very high survival rates following impingement on, and removal from, traveling screens. Other species (e.g., menhaden, bay anchovy, herring) are sensitive to impingement stress and suffer higher mortality under the best of conditions. In addition, impingement survival of individual species has been observed to vary widely at different times of year. Reduced survival may be related to seasonal increases in debris loading and the presence of organisms with hard exoskeletons (e.g., crabs) which appear to cause an increase in injury and a reduction in survival of other impinged species. Occurrence of debris and its blockage of intake screens is a highly site-specific factor. The physiological state of organisms at the time of impingement may also affect their survival. In particular, seasonal water temperatures near the upper or lower temperature tolerance limit of the species may increase their sensitivity to the subsequent stress of impingement, thereby lowering impingement survival relative to that observed at other times of the year.

In summary:

-Technologies are available that can reduce impingement mortality and entrainment;

-Some promising technologies have not been evaluated to the point where their ability to meet a performance standard is understood;

-Through the selective presentation of available data, EPA has overstated the ability of existing technologies to meet the performance standard for all species/life stages at all sites;

-Site-specific, species-specific, and life stage-specific factors all interact to influence the ability of a technology to meet the proposed performance standard at a given site.

Attachment A

Recent CWIS Technology Research and Applications

Alden Research Laboratory, Inc.

In Chapter 3 of its Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA 2002) and Attachment A thereto, EPA draws heavily on a 1999 EPRI report for much of its information on the ability of existing cooling water intake structure (CWIS) technologies to meet its proposed performance standards for reducing impingement survival and entrainment. Alden Research Laboratory, Inc. (Alden) is currently performing a due diligence review of EPA's information for the Electric Power Research Institute (EPRI) to determine the accuracy of the data used.

The review points to the fact that considerable research is ongoing, particularly with regard to two technologies that EPA endorses: wedge wire screens and artificial filter barriers. Based on the history of emerging fish protection technologies, several years of laboratory and pilot-scale study typically are needed to develop baseline information on a technology's potential. When a technology eventually is tested on a CWIS for the first time, it is reasonable to assume that several years of fine tuning will be needed to optimize the design for site-specific conditions (e.g., species and life stages and debris loading). Following the first full-scale application at one site, further experience will be needed at other sites with different design and operational features and species/life stages. Only after this multi-year investigation process will the full data available to predict the technology's level of performance at a given CWIS.

Two examples support the need to take emerging technologies through a development process. At Tampa Electric Company's Big Bend Station in Florida, the results of laboratory studies were followed by one year of small-scale and two years of prototype-scale studies at the site. Only with the combined information from these studies did EPA determine that fine mesh screens would be BTA for Units 3 and 4. At Mirant's Lovett Generating Station in New York, the first full-scale application of an aquatic filter barrier (AFB) at a CWIS has undergone over four years of design development and testing. Additional laboratory and field evaluations of the AFB are currently underway. It is clear that the industry is years away from understanding the full potential of this promising technology.

[see hard copy for table]

EPA Response

EPA has discussed the range of technologies used to establish the performance standards (see Sections VII.B.2 and B.3 of the preamble to today's rule). Available data indicate that, when considered as a suite of technologies, barrier, and fish handling technologies are available on a national basis for use by Phase II existing facilities. These technologies exist and are in use at various Phase II facilities and, thus, EPA considers them collectively technologically achievable. For example, currently, 14 percent of Phase II existing facilities potentially subject to this final rule already have a closed-cycle recirculating cooling water system. In addition, 50 percent of the remaining potentially regulated facilities have some other technology in place that reduces impingement or entrainment. Thirty-three percent of these facilities have fish handling or return systems that reduce the mortality of impinged organisms. The fact that these technologies are collectively available means that one or more technologies within the suite is available to each Phase II facility. Economic practicability is discussed in Sections VII.B and XI.B of the preamble to today's final rule.

EPA finds that the design and construction technologies necessary to meet the requirements are commercially available and economically practicable, because facilities can and have installed many of these technologies years after a facility began operation. Typically, additional design and construction technologies such as fine mesh screens, wedgewire screens, fish handling and return systems, and aquatic filter fabric barrier systems can be installed during a scheduled outage (operational shutdown

Overall, the performance standards that reflect best technology available under today's final rule are not based on a single technology but, rather, are based on consideration of a range of technologies that EPA has determined to be commercially available and economically practicable for the industries affected as a whole and have negligible non-water quality environmental impacts, including energy impacts. Because the requirements implementing section 316(b) are applied in a variety of settings and to Phase II existing facilities of different types and sizes, no single technology is most effective at all existing facilities, and a range of available technologies has been used to derive the performance standards. In addition, while these technologies may be available and practicable for the category of existing facilities as a whole, EPA recognizes that this will not be the case for some individual facilities. EPA has codified a site-specific compliance alternative to account for these situations. In addition, EPA has authorized compliance to be demonstrated pursuant to a Technology Installation and Operation Plan in order to account for the fact that biological variability and other factors may interfere with the consistent achievement of the national performance standards even when the model technologies are installed and properly operated.

EPA has based the performance standards for impingement mortality reduction, compared with conventional once-through systems, on the following technologies: (1) design and construction technologies such as fine and wide-mesh wedgewire screens, as well as aquatic filter barrier systems, that can reduce mortality from impingement by up to 99 percent or greater compared with conventional once-through systems; (2) barrier nets that may achieve reductions of 80 to 90 percent; and (3) modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems that have achieved reductions in impingement mortality ranging from 60 to 90 percent as compared to conventional once-through systems.

Available performance data for entrainment reduction are not as comprehensive as impingement data. However, aquatic filter barrier systems, fine mesh wedgewire screens, and fine mesh traveling screens with fish return systems have been shown to achieve 80 to 90 percent greater reduction in entrainment compared with conventional once-through systems. EPA notes that screening to prevent organism entrainment may cause impingement of those organisms instead. Questions regarding impingement survival of relatively delicate fish, larvae, and eggs should be considered by the Director and the facility in evaluating the efficacy of the technology. In addition, all of these screening-and-return technologies should be evaluated on a case-by-case basis to determine if they are capable of screening and protecting the specific species of fish, larvae and eggs that are of concern at a particular facility.

See Chapter 3 of the Phase II Existing Facility Technical Development Document and DCN 5-4420.

Comment ID 316bEFR.041.751

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Initial Analysis Of Cooling Tower Retrofit Costs

January, 2002

To help inform EPA's current rulemaking on how § 316(b) of the Clean Water Act applies to existing (i.e., already-built) facilities that withdraw cooling water, the Utility Water Act Group has sought information on what it would cost to abandon open-cycle cooling systems at existing facilities nationwide and install wet cooling towers instead. We made a number of simplifying assumptions, as required by the large scope of' the study and the fact that many costs are heavily affected by individual site features. The limitations of this sort of study need to be kept in mind, lest these numbers be viewed, incorrectly, as UWAG's final and best estimate of costs.

UWAG's current rough estimate of the nationwide cost of retrofitting cooling towers on electric generating facilities is about $40 billion. By comparison, the total electric power industry revenues from sales to ultimate customers for 1999 was $217 billion. Hence the cost of retrofitting cooling towers calculated here is some 18% of the industry's yearly revenues.

The estimated costs calculated here are very large, but real-world costs might be even higher. Some of UWAG's consultants feel that the total cost could be in the range of $44 to $66 billion dollars. In part this is because many construction and design problems might have to be solved, depending on the specific sites. For example, a retrofit must reflect the engineering and construction to:

-Modify existing once-through pump bays to accept the return cold water piping from the tower to the condenser.

-Modify the once-through discharge piping or canal to convey the heated water back to the cooling towe

-Substantially upgrade the mechanical integrity of the condenser (such as the cooling water expansion joint hold-down tie rods, the inlet and outlet waterboxes,' anchor bolts, tubesheets and peripheral tube restraints) to accommodate the much higher hydraulic pump head of a recirculated system.

-Substantially upgrade the cooling water piping already inside the turbine hail to handle the hydraulic pump pressures.

-Add a pumphouse at the tower with all of the facilities (overhead cranes, etc.) needed to operate and maintain large cooling water pumps.

-Add electrical wiring. Compared to other plant systems, cooling towers are isolated components which usually require extensive electrical service connections including high-voltage load centers, motor control centers, cable, switchgear, etc. There are also considerable wiring and electrical costs with co.

-Provide noise abatement. Depending upon location (which may be constrained on existing plant sites), many retrofit towers will require some type of noise attenuation (low-noise fans) to avoid community complaints at or near the property line.

-Construct cooling tower basins. The cost factor for the saltwater cooling tower basin should be greater than the freshwater basin to reflect the need for specialized, sulfate-resistant concrete.

-Provide foundation support. Some piling may be necessary for the new cooling water system components.

-Make provisions for demolition or abandonment-in-place for the old cooling water intake and discharge structures and piping, since these items may eventually become hazards without ongoing operation and maintenance.

Step 1: The WGI Modeling Run

UWAG began by asking the Washington Group International (WGI) to take the Utility Data Institute's Database of North American Power Plants (June 2000 Update) and, using the powerplant data in that base, use the WGI proprietary cost model to calculate the capital cost of cooling towers for all the plants withdrawing more than 2 million gallons of cooling water a day. As this was intended to be only a initial analysis, and the information was needed quickly, UWAG did not ask WGI to undertake the complex task of estimating total retrofit costs, which would include incremental increases in operating and maintenance (O&M) costs, as well as the often substantial costs associated with buying replacement power during cooling system conversion and absorbing any energy penalties associated with increased auxiliary power needs or turbine backpressure effects.

As with any study of this kind, WGI also had to make certain simplifying assumptions. WGI assumed:

-Space is available on each plant site for locating the new cooling tower(s).

-Replacement circulating water pumps are included in the estimates to reflect the static height differential of lifting water to the top of the tower(s).

-An allowance of 1000 linear feet of circulating water pipe is made for interconnection between the existing system and the cooling tower location.

-A material cost differential for saline/brackish versus fresh water is considered.

-Cost estimates are based on 0.0005% maximum drift loss from the cooling tower.

-Cooling tower estimates include sound attenuation measures to limit noise to 60 dBA at 400 feet.

-No allowance is included for permitting costs.

-Treatment of blowdown from the cooling tower system is not considered except for de-chlorination.

WGI was not asked to consider costs such as the following:

-Plant emissions relative to allowable permit discharge levels.

-The costs of purchasing replacement power during cooling system conversion

-Plant output (kW) and heat rate (BTU/kW-br) due to potential changes in turbine backpressure with conversion to cooling towers.

-Plant HV electrical systems due primarily to new circulating water pumps, auxiliary transformers, and cooling tower fans

-Increased O&M costs.

The WGI model calculated, under these assumptions, that the nationwide cost of cooling towers retrofitted to existing facilities would be $22.234 billion. The WGI report and accompanying spreadsheet are attached to this paper.

Step 2: Adjusting the WGI numbers in accordance with case studies

WGI, as requested by UWAG, based its numbers only on the cost of installing towers and did not include certain other cost items. UWAG then performed a rough adjustment of the WGI numbers based on several plant-specific studies of cooling tower retrofit costs that were available to us. In particular, § 316(b) studies for the Salem, Mercer, and Hudson plants, on file with the New Jersey Department of Environmental Protection, were examined.

We used a very simple approach of station-to-station comparisons using the data provided for the above three plants (note that the following numbers for those plants were escalated to 2001 using an annual rate of 0.0265, so that a three-year escalation would be

(1.0265)E3 = 1.082), as follows:

	Retrofit Cost ($/kW)		Factor
Plant Type	PSE&G	WGI	PSE&G/WGI
Salem Nuclear, saltwater	268	95.91	2.8
Hudson Fossil, saltwater	115	66.55	1.8
Mercer Fossil, freshwater	81	57.80	1.4

These factors can be used to adjust the national estimates generated by WGI. Multiplying the nuclear costs (both saltwater and freshwater) by 2.8, the fossil saltwater by 1.8, and the fossil freshwater plants by 1.4, we arrive at the following estimate:

69 nuclear units (fresh and salt) = $4.799 billio x 2.8 = $13.44 billion
294 fossil saltwater plants = $5.506 billion x 1.8 = $9.91 billion

905 fossil freshwater plants = $11.829 billion x 1.4 =$16.56 billion
1204 other plants, mostly cogeneration facilities = $0.14 billion (WGI's "upper bound")

Adding these four numbers together, we reach a sum of $40.05 billion.

Be cautioned that our adjustment is superficial and does not address many of the cost items that would be encountered in actual construction projects. Consequently, the resulting "adjusted" estimates should be considered very preliminary.

ESTIMATED CAPITAL COST OF RETROFITTING COOLING TOWERS AT EXISTING FACILITIES WITH OPEN CYCLE COOLING

WASHINGTON GROUP INTERNATIONAL
December 2001

FINDINGS

Washington Group International (WGI) has performed an analysis to determine (1) which existing steam electric power plants/units included in the Utility Data Institute's Database of North American Power Plants (UDI Database) are likely to be subject to rules that the Environmental Protection Agency (EPA) is developing under § 316(b) of the Clean Water Act; and (2) for the subset of those plants that currently use open-cycle (or "once-through") cooling systems, the likely capital costs of retrofitting mechanical draft cooling towers. The analysis indicates that 69 nuclear units and 1199 fossil units, comprising 57,343 MW and 276,641 MW respectively of installed capacity, could be subject to the rules. An additional 38,884 MW are undefined relative to their condensing mode or condensing steam and may not be totally subject to the regulations. These are discussed separately below. The combined cost impact, utilizing the assumptions identified below, would be on the order of approximately $ 22.134 billion in present-day US dollars. The findings above reflect only those units/plants currently installed and operating. Washington Group International (WGI) has assumed that all plants, indicated as indefinitely deferred, planned or under construction in the source database, will use some form of cooling towers or air-cooled condensers.

The above once-through systems are reflective of units/plants utilizing more than 2 MGD each of cooling water (the threshold EPA has adopted for new facilities) and only consider the steam actually condensed in cogeneration and combined cycle facilities. Units designated as combined cycle single shaft configuration (abbreviated CCSS in the source database) are handled in the same manner as other combined cycle units.

The findings further indicate that of the 69 nuclear units that employ once-through cooling systems, 25 units (25,161 MW) are in saltwater or brackish water applications. These units would require an investment of approximately $ 2.437 billion to retrofit mechanical draft cooling towers; the balance of 34 utilizing fresh, ground or gray water (32,182 MW) for cooling, would require approximately $ 2.362 billion to provide the same. Similarly, the sample of existing once-through fossil-fueled plants consist of 294 units (72,805 MW) in salt or brackish water applications will have an estimated retrofit of approximately $ 5.506 billion while the 905 units (203,836 MW) in fresh water installations would require an investment of approximately $ 11.829 billion.

Simplifying assumptions, detailed below, were necessary in order to proceed with the cost analysis due to the large number of units and the extent of possible site arrangements involved in retrofitting cooling tower.

An additional 1,204 units, comprising 38,884 MW of power plants with unknown or undesignated cooling systems were also found in the database. These plants utilize fossil, biomass or other fuels to generate steam. Most of these plants are cogeneration plants exporting some or all of their steam to a host instead of a condenser and many have cooling towers or air-cooled condensers; thus, it is impossible to estimate the cost to retrofit mechanical draft cooling tower systems to these plants with any degree of accuracy.

An upper bound was estimated by assuming that the proportion of plants having air-cooled condensers, hyperbolic towers, or forced draft towers is the same as the plants we analyzed in the study (73 11(731 + 1199) = 38%. On the basis of this and utilizing a simplifying cost factor per MW and investment cost potential of approximately $ 140 million was developed. This could be anticipated as an upper bound.

Issues not addressed in this report include impacts on:
-Plant emissions relative to allowable permit discharge levels.
-The costs of purchasing replacement power during cooling systems conversion
-Plant output (kW) and heat rate (BTU/kW-hr) due to potential changes in turbine backpressure with conversion to cooling towers.
-Plant HV electrical systems due primarily to new circulating water pumps, auxiliary transformers, and cooling tower fans.
-Increased O&M costs.

INTRODUCTION

Washington Group International (WGI) was engaged by the Utility Water Act Group (UWAG) to provide a cost estimate for the conversion of US power generating units currently operating with once-through cooling systems to closed cycle cooling. For study purposes, mechanical draft cooling towers were assumed to be the closed cooling system of choice.'

UWAG commissioned this analysis in order to get a preliminary estimate of the costs that might be imposed on the industry if EPA were to require cooling tower retrofits for existing facilities (an option EPA has said it was considering) in rules EPA is developing under § 316(b) of the Clean Water Act (CWA). In rules EPA recently adopted for new facilities, EPA exempted from coverage units with water withdrawal rates less than 2 MGD. This report focuses on units/plants exceeding that threshold.

The estimate of implementation costs are categorized as fossil or nuclear and, in addition, are broken down into brackish/saline and fresh water applications.

METHODOLOGY

1. Report Database

WGI utilized the UDI Database, June 2000 Update, as a starting point for identifying units affected by the new EPA rules. This database contains in excess of 25,000 power generating units. Data contained in this report were screened to delete non-applicable units and reduce the database down to only those units to be considered in this program. This effort included:

-deletion of units below the 2 MGD threshold
-elimination of non-US generating units
-deletion of retired or standby units, not subject to the new regulation
-deletion of all non-condensing steam turbines
-deletion of all simple cycle gas turbines
-deletion of units indefinitely-deferred, planned or under-construction, which were assumed either to be new facilities or would have cooling towers.

Based on the above data reduction, the field of over 25,000 generating plants was reduced to slightly under 2,500 that would be subject to the regulations.

The database was then sorted into fossil-fueled versus nuclear-fueled units. The remaining units were sorted further to separate saline water applications from fresh water applications for each fuel type. The resulting database is organized into the four requested reporting categories.

As indicated, some 1,204 units of the database of operating units lack an entry in the "COOL" (cooling system type) column. These units represent too large a sample to be ignored. As a result, WGI reviewed the entire database of non-nuclear units to determine the proportions of known once-through cooling and cooling tower applications as well as saline and fresh water sectors. These same proportions were then applied to the sample without cooling system identification to arrive at an allocation of these units into the four considered categories.

2. Cost Basis

Do to time constraints and the available unit details, WGI has made certain simplifying assumptions as a basis for developing the cost models for the various applications. These assumptions can be summarized as follows:

-Space is available on each plant site for locating the new cooling tower(s).
-Replacement Circulating Water Pumps are included in the estimates to reflect the static height differential of lifting water to the top of the tower(s).
-An allowance of 1000 linear feet of circulating water pipe is made for interconnection between the existing system and the cooling tower location.
-A material cost differential for saline/brackish versus fresh water is considered.
-Cost estimates are based on 0.0005% maximum drift loss from the cooling tower.
-Cooling tower estimates include sound attenuation measures to limit noise to 60 CIBA at 400 feet.
-No allowance is included for permitting costs.
-Treatment of blowdown from the cooling tower system is not considered except for de-chlorination.

These assumptions are considered reasonable in the absence of more definitive data or the ability to study/develop more specific solutions.

3. Cost Modeling

Modeling for this study did not consider impacts of the tower conversion on the unit/plant such as:

-Limits on particulate and other emissions in unit/plant air permits
-Icing effects on other plant equipment due to tower drift
-Reduction in net unit power output due to increases in steam turbine exhaust pressure or in circulating water pump and cooling tower fan power
-Costs of purchasing replacement power during cooling system conversion
-Operating limitations imposed by existing equipment/conditions
-Increased O&M costs
-Other impacts not specifically addressed below

These types of considerations would have a significant impact on actual cost and require a more in-depth site-specific study.

The modeling methods applied in developing the cost estimates for cooling tower retrofits have utilized the following approach:

3.1 Estimate of Condenser Heat Duty

WGI has grouped all the units in the report database by thermal cycle and steam conditions and size (output). Condenser heat duties, in millions of Btus per hour (MMBtu/hr), were based on heat balances, each representative of a specific grouping. Factors for turbine exhaust flows and turbine exhaust enthalpy change were developed for each grouping. Factors include consideration of heat from feedpump turbine exhaust, heater drains or other sources, as appropriate. Condenser duties were then calculated from factored turbine exhaust flow and enthalpy change.

3.2 Estimate of Cooling Water Flow versus Steam Turbine Output

Based on WGI experience with once-through cooling systems, the temperature rise of the cooling water traveling through the condenser was assumed to be 12°F for all generating units. When the heat duty is divided by the temperature rise and then by 500 the result is the cooling water flow through the condenser in gallons per minute (gpm). We then applied a multiplier of 1.05 to account for auxiliary cooling water flow requirements. This number is the total cooling water flow.

For the purposes of the study, it was assumed that the total cooling water flow will not change when retrofitting a cooling tower. We believe that this approach is reasonable since the condenser will be reused and the velocity through the condenser tubes cannot be significantly increased without the potential for erosion in the tubes.

Having obtained the total cooling water flow, the cooling water flow per unit output (gpm/kW) factor is calculated by dividing the steam turbine output (kW) into the total cooling water flow (gpm). Following this procedure, a cooling water flow per unit output factor is calculated for each representative heat balance.

3.3 Verification of Condenser Pressure (Turbine Backpressure)

Condenser pressure is likely to increase when converting a generating unit from a once-through system to a wet cooling tower application. This will likely result in a concomitant reduction in output. WGI set a limit on condenser pressure of four inches of mercury absolute (4.00 in. HgA) as a result of a conversion. Pressures above this limit might preclude reuse of an existing steam turbine or result in additional cost due to an increased surface area in the cooling tower.

Figure 9.5.2 1 in Mark's Standard Handbook for Mechanical Engineers, Tenth Edition, is a map of the US with wet bulb isolines for a five percent level of annual cumulative frequency of occurrence. This figure was used to determine the highest ambient wet bulb temperature in the country of 80°F, which occurs in Louisiana. To this maximum ambient wet bulb WGI added a 1°F increase to account for recirculation from the cooling tower fan discharge to the air inlet. We then selected an approach of 7°F, which along with the temperature rise of 12°F and an 81°F wet bulb, produces a cooling tower Rating Factor of 1.0. (The Rating Factor comes from a technical report, Managing Waste Heat with the Water Cooling Tower, 3rd Edition by the Marley Cooling Tower Company.)

Adding the range of 7°F, the rise of 12°F and 8°F for the Terminal Temperature Difference (TTD) across the condenser to the wet bulb temperature of 81°F, we estimated the condenser saturation temperature at 108°F. This saturation temperature yields an corresponding saturation pressure of 2.45in.HgA. Since this saturation pressure is produced at the highest ambient wet bulb in the US and is below the 4.0 in. HgA limit established above, we can conclude that a cooling tower in any US location with a rating factor of 1.0 will result in an acceptable condenser pressure.

3.4 Estimation of Cost per Unit Cooling Water Flow

A cost estimate was developed for a simplified scheme associated with each thermal cycle/steam conditions grouping. Each scheme included circulating water pipes, mechanical draft cooling tower, circulating water pumps, and all make-up and circulating water treatment systems. The cost estimate did not include the condenser, since it was assumed that the existing condenser would be reused. Each scheme had a different circulating water pipe diameter, varying from three feet to ten feet. All schemes use the same temperature rise of 12°F, and a pipe velocity of 9 ft/sec. Capacity of the schemes ranged from approximately 29,000 gpm for the scheme with a three-foot pipe to 317,000 gpm, for the scheme with a ten-foot pipe. This range of cooling tower flows was large enough to be cover most power plants considered in this study with some extrapolation for the largest plants.

Separate cost estimates were developed for each scheme using saline water and fresh water as make-up. From these cost data for saline and fresh water, WGI fit two exponential curves by plotting cost per unit cooling water flow versus cooling water flow.

Assumptions used in developing costs are given below:

Cooling Tower Structure Costs: The structure costs represent the scope typically quoted by a cooling tower vendor, and include fans/motors/gearboxes, fill, distribution headers, etc., and field erection costs. Structure costs assume a fiberglass mechanical draft tower with standard noise and drift abatement and no plume abatement. These costs were estimated by scaling cooling tower costs provided by cooling tower vendors for fresh water make-up cooling towers. Costs were determined by using a constant US dollar per tower unit ($/TU) cost and multiplying it by the number of tower units (TU). (A tower unit is a measurement to the Marley Cooling Tower Company method in the technical paper cited above.) The number of tower units for a particular application is obtained by multiplying the cooling water flow in gpm by the cooling tower Ratin Factor. As explained above, WGI has set the Rating Factor equal to 1.0 for all freshwater units.

WGI determined costs for saline make-up towers by making two adjustments to freshwater tower costs. First, we increased the number of tower units by to account for the lower cooling tower efficiency when cooling with saline water. Then, the costs (based on the higher tower units) were increased to account for the changes in materials required due to the higher salinity of the cooling water.

Cooling Tower Basin Costs: Cooling tower basin costs are essentially proportional to the cubic yards of concrete in the basin and circulating water pump pit. As it would be difficult to estimate the sizes of these structures for every plant in the report database, we have multiplied the cooling water flow in gpm by a cost factor to obtain an all-in-one cost for the cooling tower basin. This cost factor is based on costs developed for some recent projects with large cooling tower basins and has been normalized to the same scheme considerations as other cost factors developed for this report. The same cost factor will be used for both fresh and saline make-up units.

Circulating Water Pump Costs: Circulating Water Pump costs have been calculating as a function of pump brake horsepower (BHP). When calculating BHP, it was assumed all pumps would impart 70 feet of total head at an efficiency of 75%. Different cost factors have been used for saline and fresh water pumps due to the need for more corrosion resistant materials in saline applications. The cost per unit brake horsepower ($/BHP) factor was based on qoutes from a pump vendor. When calculating the total cost of pumps for a generating unit, WGI assumed two (2) 50% capacity pumps at lower flow rates and three (3) to six (6) pumps at higher flow rates. No spare capacity was included for any pumps.

Circulating Water Pipe Costs : Costs for circulating water piping were based on "all-in" costs, which include pipe, excavation in average soil and application of an engineered backfill. Based on WGI experience, a constant cost per diamater (ft) per linear foot (lf), US$/(ft-lf), facor was developed. This factor was found to be constant across a wide range of pipe diameters. Pipe costs were calculated assuming 500 linear feet of pipe in each direction, suply and return. This total length of 1000 linear feet is higher than typically seen in new construction projects, but was considered justified since the cooling towers will most likely be located at a larger distance from the condenser in these retrofit applications. The developed costs also considered the riser piping and distrubition header alongside each tower.

Make-up Water Treatment System: Both fresh and seawater are assumed to require clarification before entering the heat cycle. These costs are awwumed proportional to make-up water flow in gpm, with the cost factor for saline clarifiers higher than the cost factor for freshwater clarifiers. Make-up water quantity is a function of cooling water flow, range and cycles of concentration. When calculating make-up flow, two cycles of concentration have been used for saline systems and five cycles of concentration for fresh water systems.

Circulating Water Chemical Treatment System: This system includes all equipment needed to inject chemicals into the circulating water system for chlorination and de-chlorination. No allowance has been included for any existing systems. The chemical feed system cost is assumed to be constant for all plants since this equipment tends to be relatively constant from plant to plant due to the small quantities of chemicals injected.

Make-up Water Pump Costs: Costs for Make-up Water Pumps are also a function of pump brake horsepower (BHP). BHP for all pumps was calculated assuming a total head of 75ft and pump efficiency of 75%. WGI assumed two 100% capacity pumps were installed for each unit. Since the horsepower of the pumps vary over a narrow range, WGI have used a constant cost per unit brake horsepower ($/BHP) factor based on our experience. Similarly, a constant, but higher, factor was also applied for saline make-up service.

Electrical costs: Electrical costs have been assumed to be a fixed fraction of mechanical and civil costs, based on WGI experience in constructing power plants and in estimating costs.

Additional Cost Multipliers: Additional project costs were accounted for by assuming that they are proportional to installed equipment costs, i.e., direct construction costs. Indirect construction costs include costs for mobilization and other miscellaneous field costs. Engineering, construction management, and startup costs were lumped into another multiplier as was construction interest, a contingency and fees.

Cost factors used in this report are summarized in the table below.

Table 1: Cost Factors
[see hard copy for table]

3.5 Grouping of Units in Report Database

The four categories in the report database described above (saline/nuclear, freshwater/nuclear, saline/fossil and freshwater/fossil) were each further sorted into reheat and non-reheat units. Each of the resulting lists were then sorted by steam turbine throttle pressure, throttle temperature, and size (output). At this point, all of the units can be grouped around the representative heat balances described in Section 3.1 above. WGI then assigned the cooling water flow per unit output ($/kW) cost factor developed for each representative heat balance to all the units in a particular grouping.

3.6 Calculation of Retrofit Costs

Four columns were added to the database. The first contains the cooling water flow per unit output (gpm/kW) factor. The second contains total cooling water flow (gpm), calculated by multiplying the gpm/kW factor by the steam turbine output (kW). The third column is cost per unit cooling water flow ($/gpm), an exponential function of cooling water flow. The last column contains the total cost of the cooling tower retrofit.

4.0 Plant Groupings with Estimated Cooling Tower Retrofit Costs

The complete listings of the plants in each of the grouping requested, namely

Nuclear Fueled
-Once Through Using Sea/Brackish Water
-Once Through Using Fresh Water

Fossil Fueled
-Once Through Using Sea/Brackish Water
-Once Through Using Fresh Water

Are included in Appendices A through D to this report.

[see hard copy for appendices/tables]

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.041.802

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 21
EBA Chapter C3
Table C3-3

Please provide a spreadsheet that lists all in-scope facilities; and for each in-scope facility that did not claim operational flow was CBI, lists: (1) the operational flow (used to compute the flow index for the facility), (2) the flow index value and (3) the waterbody type of the facility.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

For its regional extrapolations, EPA used the average annual operating flow as provided in response to EPA's survey of the industry. The survey ("Section 316(b) Survey Questionnaire Database") is DCN# 4-0016D, which is CBI, so we cannot provide the requested flow information to the commenter.

Comment ID 316bEFR.041.803

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 22
EBA Chapter C3
Page C3-2

EPA stated that: "Since this flow index is a value between 0 and 1, dividing the baseline loss at the case study site by the flow index yields an estimate of the total baseline loss at all facilities drawing cooling from the same type of waterbody." However, the baseline loss estimate for Salem (Table C3-3) divided by the Salem flow index (Table C3-1) does not produce the total baseline loss estimate (Table C3-3) for the Estuary – Non Gulf waterbody type. Please provide an explanation for this discrepancy.

EPA's response does not answer the question. EPA's response discusses derivation of values for the Pittsburg and Contra Costa plants, rather than the problems with the Salem data that we raise in this comment.

EPA Response

This question refers to the loss and benefits estimates presented in the analysis for the proposed rule. EPA did not extrapolate loss and benefit estimates for Contra Costa and Pittsburgh at proposal. The loss estimates for these facilities were included directly in the analysis.

For the final rule, EPA estimated I&E losses and benefits for all facilities in Northern California. Thus, no extrapolation was needed for Pittsburgh or Contra Costa in the final analysis.

Please refer to EPA's response to comment 316bEFR.041.041 for a further discussion of issues related to extrapolation.

Comment ID 316bEFR.041.804

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 23
EBA Chapter C3
Table C3-3

Please provide complete documentation (including equations and assumptions) for EPA's method of estimating national baseline losses based on its flow index.

EPA's response does not answer the question. As EPA knows, DCN4-2070 and DCN4-2213 are listed as being contained in the CBI docket and therefore are unavailable to UWAG. DCN4-2212 is a spreadsheet that apparently is unusable without a link to the CBI docket.

EPA Response

In the cost-benefit analysis for the final 316(b) Phase II rule, baseline losses are extrapolated (by flow) to estimate losses at facilities for which EPA did not have I&E data:

(total loss estimate at facilities with data / % of flow at facilities without data) * (% of flow at facilities without data)

Note that this is mathematically equivalent to:

(total loss estimate at facilities with data / flow at facilities with data) * (flow at flow at facilities without data)

This value was summed with the estimated losses at facilities with data to calculate the total for the region.

A very similar method was used at proposal, but the extrapolation was done by waterbody type rather than by region. EPA also based the final regional extrapolation on many additional facilities (a total of 46). See also Chapter A10 of the Regional Analysis Document (DCN #6-0003) concerning EPA's commercial fishing benefits methods.

Comment ID 316bEFR.041.805

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 24
EBA Chapter C3
Table C3-4
Please provide complete documentation (including equations and assumptions) for EPA's method of estimating national baseline losses based on its angling index.

EPA's response does not answer the question. As EPA knows, DCN4-2070 and DCN4-2213 are listed as being contained in the CBI docket and therefore are unavailable to UWAG. DCN4-2212 is a spreadsheet that apparently is unusable without a link to the CBI docket.

EPA Response

EPA did not use the angling index in its final analysis for the 316b Phase II rule. For a discussion of the flow index, please see response to Comment 316bEFR.041.804.

Comment ID 316bEFR.041.806

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 26
EBA Chapter C3
Table C3-4
Please list the conditions under which EPA's angling index method would produce unbiased estimates of national baseline losses, and list the conditions under which the angling index method would produce biased estimates.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not use the angling index in its final analysis for the 316b Phase II rule. For a discussion of the flow index, please see response to Comment 316bEFR.041.804.

Comment ID 316bEFR.041.807

Subject Matter Code 23.01

EBA related comments

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Question 27
EBA Chapter C3
Table C3-4

For each of the waterbody types please provide a map that depicts all in-scope facilities and depicts a 120 mile radius circle centered at each in-scope facility.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not use the angling index in its final analysis for the 316b Phase II rule. For a discussion of the flow index, please see response to Comment 316bEFR.041.804.

Comment ID 316bEFR.041.808

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 28
EBA Chapter C3
Table C3-4

Please provide a spreadsheet that lists all in-scope facilities, and for each facility lists: (1) the counties included in EPA's estimate of angler days for the facility, (2) the estimated number of angler days for each identified county, and (3) the waterbody type of the facility.

EPA's response does not answer the question. EPA does not provide the requested spreadsheet and says it did not save county estimates and so cannot provide them. As EPA knows, DCN4-2070 and DCN4-2213 are listed as being contained in the CBI docket and therefore are unavailable to UWAG. DCN4-2212 is a spreadsheet that apparently is un-usable without a link to the CBI docket.

EPA Response

This question relates to the angling index used in the case studies presented at proposal. EPA did not use the angling index in its final analysis for the 316b Phase II rule. For a discussion of the flow index used for the final analysis, please see response to Comment 316bEFR.041.804.

Comment ID 316bEFR.041.809

Subject Matter Code 23.01

EBA related comments

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Question 1

We request an explanation of the development and implementation of the aggregate benefits estimates from the case studies using both the angling index and the flow method.

EPA's response does not answer the question. As EPA knows, DCN4-2070 and DCN4-2213 are listed as being contained in the CBI docket and therefore are unavailable to UWAG. DCN4-2212 is a spreadsheet that apparently is unusable without a link to the CBI docket.

EPA Response

This question relates to the angling index used in the case studies presented at proposal. EPA did not use the angling index in its final analysis for the 316b Phase II rule. For a discussion of the flow index, please see response to Comment 316bEFR.041.804.

Comment ID 316bEFR.041.810

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 3

We request an explanation of the rationale for nonuse losses with these types of ecological effects and how the Fisher/Raucher adjustment is appropriate in this instance.

EPA's response does not answer the question but rather makes only an unsupported assertion.

EPA Response

EPA did not use the Fisher/Raucher 50% rule-of-thumb to estimate non-use benefits for the final 316b Phase II rule. Please see response to Comment 316bEFR.005.034.

Comment ID 316bEFR.041.811

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 5

We request an explanation of the procedure of estimating commercial fishing losses based on the cited communications and studies.

EPA's response does not answer the question, because it (1) offers no analysis of the papers cited to show how they support the conclusions EPA has drawn, and (2) continues to rely on an unpublished paper by Bishop (2002). Both of these points go to the crux of the question posed.

EPA Response

The Bishop (2002) paper is no longer used in the cost-benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on commercial fishing, please refer to the response to 316bEFR.005.029.

For details on the revised methods used to estimate commercial fishing losses and benefits, please refer to the regional study document for the final rule. See especially Chapter A10: Methods for Estimating Commercial Fishing Benefits (DCN #6-0003).

Comment ID 316bEFR.041.812

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 6

We request an explanation of how you can combine benefits estimates based on values with benefits estimates based on costs and the theoretical support for combining such measures.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

This comment refers to three methodologies used for proposal: the Habitat Replacement Cost (HRC) method, the Societal Revealed Preference (SRP) method, and the forage fish replacement cost method. None of these methods was used in EPA's analysis of benefits for the final rule.

For additional information on the HRC, please see the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003) and EPA's response to Comment 316bEFR.005.006. For additional information on the SRP method, please see EPA's response to Comment 316bEFR.005.035.

Comment ID 316bEFR.041.813

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 7

We request an explanation of how "fish services" are produced in the habitat replacement cost method and how these services are aggregated without producing double counting.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not use the habitat-based replacement cost (HRC) method for estimating benefits in its final analysis. For additional information on the HRC, please see EPA's response to Comment 316bEFR.005.035 and the document entitled "Habitat Based Replacement Cost Method" (Docket #6-1003).

Comment ID 316bEFR.041.814

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 8

We request an explanation of the other environmental consequences (beyond fish) that are offset by the habitat replacement cost method.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not use the habitat-based replacement cost (HRC) method for estimating benefits for its final analysis. For additional information on the HRC, please see EPA's response to Comment 316bEFR.005.035 and the document entitled "Habitat Based Replacement Cost Method" (Docket #6-1003).

Comment ID 316bEFR.041.815

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 9

We request an explanation of how the use of ranges obviates the need to perform sensitivity analyses on key assumptions/estimates.

EPA's response does not answer the question and, if anything, suggests that EPA's analysis lacks any credible statistical foundation.

EPA Response

The most important part of the cost-benefit analysis is the I&E modeling because this clearly drives the results for the evaluation of commercial, recreational, and nonuse benefits. Please refer to Chapter A6 of Part A of the Phase II Regional Study Document (DCN #6-0003) for a discussion of uncertainty in relation to EPA's analysis of I&E for the analysis of the final rule.

For the final rule, the commercial and recreational benefits comprise a relatively small portion of the total benefits of the rule. Thus, ranges of the values should be sufficient to convey uncertainty. Additional analyses will offer little new information. Several basic sensitivity analyses were prepared for the various non-use valuation methods. Please refer to Part A of the Phase II Regional Study Document (DCN #6-0003). See especially chapters A9, A12, and A13.

Comment ID 316bEFR.041.816

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.01

Delaware

Question 10

With regard to the electronic files for the Delaware Case Study (DCN 4-1000 to DCN 4-1042), DCN 4-1000 lists the set of SAS/LIMDEP/ArcView programs and datasets used to generate RUM models and recreational benefits. Please provide all program files in a text file format rather than a portable document format (PDF). Please provide all SAS datasets as uncompressed files, not export files. In addition, please provide the LIMDEP dataset, cst.res3.dta as an uncompressed SAS dataset.

EPA's response partially answers the question. However, due to poor documentation of the programs, it is difficult to follow their rationale for making certain assumptions.

EPA Response

EPA disagrees that its programs and files are poorly documented. First, the Agency followed standard docket compilation procedures that govern how background and supporting materials should be provided to the public docket. EPA is not required to include data files in the formats other than those used in the analysis in the docket. For EPA's rationale for making various assumptions see Chapter B5 of the Cooling Water Intake Structures - Section 316(b)
Proposed Section 316(b) Phase II Existing Facilities Rule Case Study Analysis document (DCN #4-0003).

In addition, EPA no longer uses case studies of individual facilities for the final Section 316(b) regulation.

Comment ID 316bEFR.041.817

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 11

With regard to the electronic files for the Florida Case Study (DCN 4-1100 to DCN 4-1124), DCN 4-l110 lists the set of SAS/LIMDEP/ArcView programs and datasets used to generate RUM models and recreational benefits. Please provide all program files in a text file format rather than a portable document format (PDF). Please provide all SAS datasets as uncompressed files, not export files. In addition, please provide the LIMDEP datasets brum.dat and btrips.dat as uncompressed SAS datasets.

EPA's response partially answers the question. However, due to poor documentation of the programs, it is difficult to follow the Agency's rationale for making certain assumptions.

EPA Response

EPA disagrees that its programs and files are poorly documented. First, the Agency followed standard docket compilation procedures that govern how background and supporting materials should be provided to the public docket. EPA is not required to include data files in the formats other than those used in the analysis in the docket. For EPA's rationale for making various assumptions see Chapter D5 of the Cooling Water Intake Structures - Section 316(b)
Proposed Section 316(b) Phase II Existing Facilities Rule Case Study Analysis document (DCN #4-0003).

In addition, EPA no longer uses case studies of individual facilities for the final Section 316(b) regulation.

Comment ID 316bEFR.041.818

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.04

San Francisco Bay Delta

Question 13

What evidence indicates that impingement and entrainment (I&E) data from the 1970's are relevant for 2000? Were any adjustments made to reflect the differences in the number of turbines that were operating in the late 70's versus the late 90's at each of the case study sites?

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA was constrained in its analysis by the available I&E monitoring data provided by facilities, much of which is over 30 years old, as noted by the commenter. However, EPA did adjust historical I&E data to reflect any technology to reduce I&E that may have been implemented subsequent to the collection of the original I&E data.

Comment ID 316bEFR.041.819

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.06.02

Revealed preference

Question 16

The estimated dollars spent on the CALFED Bay-Delta program to protect threatened and endangered (T&E) species was used to estimate society's value of a T&E fish in the San Francisco Bay/Delta case study.
A) What T&E species does this plan propose to protect?
B) Were any adjustments made to reflect the value of only those species that are in fact threatened and endangered near the power plants?
C) How were the ratios of program costs determined for each program element?
D) What is the evidence that this ratio is constant among program elements?

A) EPA's response answers the question.
B) EPA's response answers the question.
C) EPA's response answers the question.
D) EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The Societal Revealed Preference (SRP) method for estimating non-use benefits, which relies on CALFED information, is not used in the cost-benefit analysis for the final Section 316(b) Phase II rule. Therefore, the issue is now moot.

Comment ID 316bEFR.041.820

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.06.02

Revealed preference

Question 17

What evidence suggests that the value of foregone water use is a proxy for society's value of T&E fish?

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The societal revealed preference (SRP) approach is no longer applied by EPA in this rulemaking, and so no longer is used to gain insight on the potential benefits of the 316b regulations. Further discussion on the SRP is provided under response to comment #316bEFR.005.006. In response to the specific question posed, the water uses are foregone because that is the action taken in order to preserve the Bay Delta ecosystem and associated special status fish. The water uses are foregone because society has opted instead to preserve the fish species, hence the value of uses foregone may be indicative of the value of the resources protected by that choice.

Comment ID 316bEFR.041.821

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.04

San Francisco Bay Delta

Question 19

Electronic files for Economics Analysis: DCN 4-3024 to DCN 4-3043; DCN 4-3050 to DCN 4-3059; DCN 4-3070 to DCN 4-3076 DCN 4-3000 lists the documents and data used to conduct the Economics Analysis. Please provide above listed files in SAS (Version 8.0 for PCs) file format rather than a portable document format (PDF).

EPA's response does not answer the question. As EPA knows, many of these files are unusable due to CBI material that is not enclosed and therefore unavailable to UWAG.

EPA Response

A CD of electronic files that do not contain confidential business information or otherwise sensitive data was prepared and made available to the commenter in June 2002. EPA conducted the economic analyses in Excel, not in SAS. Therefore, the files were provided in Excel format. The CD contained the following files: 4-3008, 4-3027, 4-4042, 4-4043, 4-3052, and 4-4053. The public record for this rule contains a considerable amount of data and information as well as a discussion of EPA's rationales, assumptions and methodologies. EPA believes the public record was sufficient to provide the public with a meaningful opportunity to comment upon this rule. All other economic analysis files contain confidential business information or otherwise sensitive data and cannot legally be made available to the public.

Comment ID 316bEFR.041.822

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Question 1

What energy penalty input, if any, was used with IPM 2000? Does IPM 2000 account for seasonal variability in energy penalties? The model should account for the normally higher energy penalties during peak load periods (i.e., usually summer, but in some areas winter) and associated differences in pricing. If the model doesn't capture seasonal increases in the energy penalty, which tend to co-occur with seasonal spikes in demand and price, then it is inadequate for capturing revenue effects, effects on reliability, and likely plant closures.

EPA's response answers the questions, essentially conceding that its analysis of mean annual energy penalty values does not account for seasonal variations in unit efficiency associated with different ambient conditions that increase turbine backpressure and, affect energy availability and cost.

EPA Response

First, EPA notes that the final Phase II rule does not require installation of technologies that would lead to energy penalties at complying facilities, as would have been the case if EPA had chosen to base today's rule on closed-circuit cooling. As a result, any changes to the energy penalty analysis has no effect on EPA's analysis for the final Phase II rule. Still, in response to comments on the proposed rule, EPA modified its energy penalty assumptions for the energy market model runs conducted for the Notice of Data Availability (NODA). For the proposed Phase II rule, the average annual energy penalty, by region and fuel type, was applied to each facility upgrading to a closed-cycle, recirculating cooling system. Based on comments received, for the NODA analyses, EPA changed the energy penalty assumption to attempt to account for seasonal, peak effects. For the NODA analyses, the energy penalty applied was the greater of (1) the peak-summer penalty or (2) the average annual penalty, for each facility projected to convert its cooling system to a closed-cycle, recirculating cooling system. EPA agrees that the approach used at proposal might have understated potential impacts of the energy penalty on generating capacity. EPA revised its approach for the NODA analyses to ensure that impacts are not underestimated (see also Notice of Data Availability, 68 FR 13525).

Comment ID 316bEFR.041.823

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

Question 2

Why did EPA select the facilities it did for purposes of doing the national extrapolation by waterbody type? In other words, why did it use some (e.g., Salem and Pilgrim) and leave some others for the same waterbody type?

EPA's response partially answers the question but does not discuss what attributes of the data it did not use led it to conclude that that data was less reliable than the chosen data, and also what attributes its chosen data (other than the Salem data, which it discusses) make that data the most reliable.

EPA Response

This comment refers to the sample of facilities examined for proposal. For its final analysis, EPA based its regional extrapolations on all of the many facilities evaluated in each region. In the case of California, this included all facilities with I&E data. In all, a total of 46 facilities were evaluated and used as the basis for estimating the relative magnitude of I&E at Phase 2 facilities.

EPA notes that most of the facilities in scope of the rule have not conducted I&E studies. The facility studies that are available, have many limitations. Facility studies generally include only 1 or 2 years of data collected nearly 30 years ago, when aquatic conditions and species abundances may have been substantially different from what they are today. Moreover, I&E rates are usually estimated for only a subset of the species impinged and entrained, and therefore underestimate total losses.

Although EPA recognizes these limitations, EPA had no alternative but to use available data, given the effort that would be required to conduct original studies to obtain less uncertain and more current data, including the need for multiple years of intensive monitoring of hundreds of species at representative facilities throughout the country.

To address data limitations, EPA expended considerable effort to obtain the most complete and highest quality I&E data available for representative facilities in each region. In addition, EPA made adjustments to older data, as needed, to reflect reductions in I&E rates that may have occurred as a result of technology implementation that occurred after the old studies were conducted.

Please see response to Comment 316bEFR.072.055 for a discussion of the size and represenativeness of the sample of facilities used in EPA's analysis for the final rule.

Comment ID 316bEFR.041.824

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.07.02

Monroe

Question 1

Tables I4-2 and I4-3: The data in the column titled Total Catch (#) appear to be harvestable catch data, but no explanation or reference is given as to the source of the data.

EPA's response does not answer the question. The question asks for references to support the recreational or commercial catch or harvest figures presented in the tables we reference. EPA's answer merely sends the reader back to the chapter in this case study which discusses how entrainment and impingement losses are estimated. That chapter does not address the issue raised. UWAG hereby requests that EPA provide references for all of the data catch, yield, and other data presented in Tables I4-2 and I4-3, as well as all other analogous tables presented in any of the other case studies.

EPA Response

In tables I4-2 and I4-3, all of the values are estimated losses due to impingement (I4-2) or entrainment (I4-3). None of the values reported in these tables come from a document that can be referenced. The estimates were developed using the methods described in Part A of the Case Study document (DCN #4-0003).

The columns are all estimates and are defined as follows. Impingement Count (#) is the total number of organisms lost. Age 1 Equivalents (#) is the number of organisms lost, translated into Age 1 fish as described in Part A of the Case Study document. Total Catch (#) is the total number of Age 1 fish that are lost to harvest by commercial and recreational fishermen. Commercial Catch (#) and Recreational Catch (#) are the number of fish lost to the commercial fishery and the recreational fishery, respectively. Total Yield (lb), Commercial Yield (lb), and Recreational Yield (lb) are the lost harvest estimates expressed in pounds instead of numbers of Age 1 fish.

Comment ID 316bEFR.041.825

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.07.02

Monroe

Question 2

Table I4-11: identify actual references in AFS (1993) from which came the "Hatchery costs ($/lb)". Addendum: I also need to know where the EPA got the poundages for the three species that were multiplied times the hatchery costs to get the annual replacement costs.

EPA's response does not answer the question. DTE requested references to specific sections of the AFS tables that support the hatchery costs EPA has used. EPA's discussion of the sources of the AFS values is not responsive.

EPA Response

Hatchery costs per pound are calculated from Appendix 3 in AFS (1993, DCN #4-1302) in two steps. First, EPA calculated the average replacement cost in per pound, in 1990 dollars, across all fish size categories. Second, EPA used the Consumer Price Index to convert the 1990 costs to 2000 costs.

The weight of an Age 1 equivalent for each fish species is estimated by EPA as part of the I&E model, as described in Chapter A5 of the case study document (DCN #6-0003).

In the cost-benefit analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E (DCN #6-0003)

Comment ID 316bEFR.041.826

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.07.02

Monroe

Question 3

Table I4-12: explain how this table was compiled, in particular, how the annual loss values were apportioned/calculated for each species. For example, how were the $673,405 and $1,133,734 low and high values, respectively, for whitefish derived?

This response simply restates what was already in the text of the Monroe facility case study, which simply referred the reader to Chapter A5. No explanation was provided in either Chapter I4 or Chapter A5 as to how the (three) forage species were allocated and values derived among the (fourteen) commercially and/or recreationally harvested species nor was an explanation provided in EPA's response to this question.

EPA Response

The material from this preliminary case study is not used in the final analysis. Generally, the values are generated in two steps.

1) A trophic transfer model is used to translate lost forage fish into lost fishery yield, as described in Chapter A5 (DCN #4-0003). In this case the forage losses reported in Table I4-9 are translated into lost yield of the commercially and recreationally caught species indicated in Table I4-12.

2) This lost yield is valued based on the commercial and recreational methods described in Chapter A9 (DCN #4-0003). The high and low estimates are a result of the

For the cost-benefit analysis for the final Section 316(b) Phase II rule, EPA applied a similar but slightly different methodology for estimating the value of lost forage fish. EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. These lost yields are then valued in the commercial analysis assuming the average value per pound for commercially harvested fish in the region. In the recreational analysis, the lost yields are included in the RUM analysis.

In the documents for the final Section 316(b) Phase II rule, improved documentation is provided on EPA's estimation of the value of forage losses. See the regional study document, Chapter A5: Methods Used to Evaluate I&E, especially Section A5-4.4 Evaluation of Forage Species Losses (DCN #6-0003).

Also of note - EPA no longer uses hatchery costs to estimate the value of lost forage species.

Comment ID 316bEFR.041.827

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.07.02

Monroe

Question 4

Is implementation and verification of the HRC methodology, particularly the "streamlined" version, practical? Combining steps 2 – 4 and limiting the data gathering raises some real concerns about the credibility of, essentially, an unproven methodology.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not use the HRC method for the estimation of benefits for the final Phase II rule. For additional information on the method, please refer to the document entitled "The Habitat-based Replacement Cost Method" (DCN #6-1003) and EPA's response to Comment 316bEFR.005.035.

Comment ID 316bEFR.041.828

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.04

San Francisco Bay Delta

Question 1

Chapter E3, pages E3-11 to E3-16 -- Why does Stratus use 1978-1979 I&E monitoring data and average it with the 1987-1990 I&E monitoring data? The 1978-1979 data pre-dates the BTA program that Pittsburg and Contra Costa have implemented (see discussion on Pages E2-5 and E2-6). Averaging I&E losses from this earlier monitoring period inflates fish losses and economic benefits, and does not accurately reflect current conditions. Mirant suggests that only the 1987-1990 monitoring data be used for this case study.

EPA's response does not answer the question. Mirant asked EPA to explain why it chose to use pre-BTA I&E data from Mirant's two Delta Estuary plants, when those data were collected beginning back in the late 1970's before I&E reduction benefits of BTA were in place. This appears inconsistent with EPA's claim that it attempted to characterize I&E after application of any current technologies.

EPA Response

I&E rates for the Pittsburg and Contra Costa facilities were revised as suggested by the commenter.

Comment ID 316bEFR.041.829

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.04

San Francisco Bay Delta

Question 7

Chapter E4, Table E4-1 - In place of the Huppert-based reported striped bass value range of $9.14 to $14.14 per fish, Mirant believes that the mitigation costs identified in Mirant's Striped Bass agreement with the CA Department of Fish & Game would be a more accurate replacement value for stripped bass. This value is currently less than $2.00 per striped bass yearling.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

In the analysis for the final rule EPA no longer uses a benefits transfer approach to estimating the recreational benefits of the Section 316(b) Phase II rule. Instead, a set of random utility models (RUM) have been estimated. For details on EPA's methods used in the RUM analyses, please refer to the regional study document for the final rule (DCN #6-0003). See especially Chapter A11: Estimating Benefits with a Random Utility Model (RUM) and the recreational chapter for each region (B4, C4, etc).

Comment ID 316bEFR.041.830

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.04

San Francisco Bay Delta

Question 9

Historic survival entrainment data for striped bass are not accounted for. The historic survival studies indicate that a significant percentage of striped bass survive both the thermal and mechanical stresses associated with once through cooling. Entrainment losses for striped bass should be adjusted to account for this survival information.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The commenter refers to data on entrainment rates of striped bass following implementation of the "best technology available" (BTA) for reducing entrainment. For the regional analysis for the final rule, EPA used the post-BTA striped bass entrainment rates as suggested by the commenter.

Comment ID 316bEFR.041.831

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.01.02.03

Ecosystem/Food Web Modeling

Question 10

EPA case study analysis for proposed section 316(b) phase II existing facilities rule, Part A, page A6-6 has this paragraph.
Competition and predation can interact in complex ways with other sources of mortality to alter stock-recruitment relationships. For example, a model of trophic dynamics among fish populations in the Patuxent River that are subject to harvesting as well as CWIS impacts predicted a significant reduction (over 25%) in striped bass, bluefish, and weakfish production as a result of power plant losses of preferred prey species such as bay anchovy and silversides (Summers, 1989). Thus, CWIS losses can contribute to reduced overall ecosystem productivity, irrespective of any potential compensation in populations directly affected by CWIS mortality (Boreman, 2000). The estimate of over 25% reduction in game fish was based on an early estimate of up to 76% population losses for bay anchovy that was superseded by further extensive studies conducted by Pepco (Bailey et al. 1999 Proceedings of the EPRI Coolfont Workshop). Following these studies Maryland Power Plant Siting Program reduced its estimate of bay anchovy losses to 10 – 20% PPERD (1990). There was no additional modeling done to determine how estimate game fish production losses would be affected by the lower estimates of bay anchovy loss but it is safe to assume that these estimates would be substantially reduced as well. [Excerpt from Bailey et al. omitted]

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The version referred to by the commenter of Chapter A6 of the Case Study Document (DCN #4-0003) presented at proposal is not included in EPA's Regional Analysis Document (DCN # 6-0003) in support of the final rule. However, EPA notes that (1) the differing estimates of population impacts noted by the commenter illustrate EPA's position that much greater uncertainties in estimates occur when estimating fishery populations than I&E numbers, and (2) reductions in forage species due to I&E can result in significant reductions in populations of highly valued fishery species.

Comment ID 316bEFR.041.832

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.02.02
Commercial Fishing Benefits

Question 5

Could you provide the details behind the derivation of the same 22.2% value in Holt and Bishop 2002?

EPA's response does not answer the question, because it (1) offers no analysis of the papers cited to show how they support the conclusions EPA has drawn, and (2) continues to rely on an unpublished paper by Bishop (2002). Both of these points go to the crux of the question posed.

EPA Response

The 22.2% value was calculated in research by Bishop and Holt. At the time of the proposed rule, their research was not published. An article on this research has since been published as:

Bishop, R. and M. Holt. 2002. A semiflexible normalized quadratic inverse demand system: an application to the price formation of fish Empirical Economics, 2002, vol. 27, issue 1, pages 23-47.

Regardless, the 22.2% is not used in the cost-benefit analysis for the final Section 316(b) Phase II Rule.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.041.833

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Question 6

Could you confirm that the reference to Bishop, personal communication 2002 (below) includes only the following paragraph and does not contain the derivation of the empirical estimate of 22.2%?
PERSONAL COMMUNICATION-PHONE AND E-MAIL CONVERSATION
From: Richard Bishop, Professor of Agricultural Economics, University of Wisconsin

EPA's response does not answer the question. The document to which EPA's answer refers does not confirm or discuss the full extent of the personal communication with Dr. Bishop.

To: Bob Raucher, Stratus Consulting
Date: February, 2002
RE: Total economic surplus associated with commercial fishery landings
Asked about and discussed/confirmed proper interpretation of several papers authored by Dr. Bishop, including a litigation support document ("Economic Implications of Treaty Fishing in Michigan, July 19, 2000) that was not formally available for citation. Discussion revolved around how (and by how much) a change in commercial fishery landings created a total economic benefit that embraced surplus measures for fishermen, wholesalers, retailers, suppliers, and consumers. Confirmed that we had interpreted the empirical evidence correctly, and that the citations were to the proper public documents.

EPA Response

The 22.2% value was calculated in research by Bishop and Holt. At the time of the proposed rule, their research was not published. An article on this research has since been published as:

Bishop, R. and M. Holt. 2002. A semiflexible normalized quadratic inverse demand system: an application to the price formation of fish Empirical Economics, 2002, vol. 27, issue 1, pages 23-47.

The 22.2% is not used in the cost-benefit analysis for the final Section 316(b) Phase II Rule.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.041.834

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.01

Recreational Fishing Benefits

Question 8

Could you provide the specific dollar per fish values used to calculate the recreational benefits for Salem in Table B6-3, and clarify which analysis was used to obtain the values?

EPA's response does not completely answer the question.

EPA Response

The recreational fishery results in Table B6-3 of the Phase 2 Regional Analysis Document (DCN #6-0003) are shown for the benefits transfer methods (referred to here as the "basic method") and also for the RUM analysis. For the benefits transfer, we applied per fish values as shown in Tables B4-6 and B4-7. For the RUM analysis, no "per fish" values are applied.

Comment ID 316bEFR.041.835

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.01

Delaware

Question 15

Chapter 4 estimates include separate totals for Salem, while the Chapter 6 estimates only provide values for all “in-scope” facilities. Do you have Chapter 6 estimates for Salem?

EPA’s response only partly answers the question.

EPA Response

The material cited by the commenter was not part of EPA's final analysis and is not included in EPA's Regional Analysis Document for the final Phase II rule (DCN #6-0003). However, in response to the commenter's question about the Case Study Document (DCN # 4-0003) presented at proposal, EPA notes that the purpose of Chapter 6 of the Delaware case study was to evaluate all inscope facilities in the estuary, not Salem alone. Therefore, Salem results are not presented separately in this chapter. Instead, they are provided in Chapter 4.

Comment ID 316bEFR.041.836

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Question 5

How can compensation and density-dependence be completely ignored? (A5-2 and elsewhere). There is plenty of evidence for compensation in fish populations.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

Please see response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation.

Comment ID 316bEFR.041.837

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Question 6

Although I understand that there are some issues with the way data was collected or handled in some of the case studies of I&E effects, I think it is probably not valid to assume 100% mortality all the time. Clearly, in some situations and with some species, survival occurs for early life stages of fish (e.g. bay anchovy eggs – 50% {A7-9}, striped bass larvae – 76-79%, winter flounder of 10-97%, etc. as cited in the case studies). I would suggest that perhaps what is needed is a "bounding" exercise where the model is run with some acceptable levels of survival of different life stages and this run be used as a bound on the impacts (with 100% mortality as is now assumed as the upper bound). This will give us a more reasonable range of values in which to evaluate impacts in the case studies.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.041.838

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Question 7

B3-28. The assumption that blue crabs are all killed when entrained is likely a severe overestimate.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA did not review any studies that specifically analyzed the entrainment survival of blue crabs. The Anclote studied crab larvae but the species of crab was unclear. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.041.839

Subject Matter Code 1.01
Comment period

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Question 1

We are still having difficulty opening some of the files on the case study CD, specifically for the Delaware Case Study. The ZIP files give an error message when we try to open them. The BDAT, SD2, IN, OUT, and XPT files cannot be opened. What programs do they use? Tables are not well-defined (specifically the uos table in folder 4-1022).

These referenced datasets do not appear to be in ASCII format. We are still having difficulty opening and/or converting these files.

EPA Response

EPA has made every effort to provide assistance to the public to access and understand data used to support today's final rule.

Comment ID 316bEFR.041.840

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.01

Delaware

Question 2

How is the Hay Road facility having an effect on the DE estuary? Based on the CSA, EPA is assuming and including Hay Road in mean annual data charts, when the facility does not have the ability or structures to directly intake surface water from the source.

In EPA's response, EPA refers to a 1996 DRBC document. This document could not be located on the Agency's website. The intake water for the Hay Road facility's circulating water system as well as the fire suppression system is withdrawn from the Edge Moor Power Plant (an in-scope facility for the Case Study) discharge canal. In essence, the water is recycled. Hay Road does not have the capability nor structures to impinge or entrain aquatic life.

EPA has considered, in their Case Study Analysis for the Delaware Estuary, the Hay Road facility in The Evaluation of I&E Data (Chapter B-3), The Economic Value of I&E Losses Based on Benefits Transfer Techniques (Chapter B-4), and in The RUM Analysis (Chapter B-5).

EPA Response

EPA agrees with the commenter that Hay Road is not in scope of the Phase 2 rule. The Hay Road facility was not part of EPA's mid-Atlantic analysis for the final rule (DCN #6-0003).

The document cited by the commenter is in the docket (DCN # 4-1474) and is available on the web. The full citation is DRBC, 1996. 1996 Delaware River Withdrawal and Consumptive Use Estimates (Tidal Estuary Portion). http://www.state.nj.us/drbc/withdrawals96.htm

Comment ID 316bEFR.041.841

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Question 2

The assumed carrying capacity of the water body is not identified when discussing entrainment and impingement impacts.

EPA's response technically answers the question but does not deal with the issue. We believe that in a discussion during the teleconference call the question was rephrased as follows: How were the upper limits of the model set to prevent gross overestimates of potential fisheries production? We recall the answer as being that the economic model was used to set upper limits based on catch value relating to a particular base year. Can this be clarified?

EPA Response

In the modeling for the cost-benefit analysis for the final Section 316(b) Phase II rule, EPA did not use the economic model to set upper limits based on catch value. No upper bound limits were set in the model.

Instead, EPA compared results from the I&E model to actual fishery harvest levels - for recreational and commercial fishing - from the 1990s and early 2000s to ensure that the results are not gross overestimates of potential fisheries production. Overall, as reported in the regional study document for the final rule, the predicted increases in harvest are a very small portion of the total recreational and commercial harvest in each region of the analysis. See section XII.D of the preamble for the final rule and regional analysis document (DCN #6-0003) for discussion of projected increases in harvest.

Comment ID 316bEFR.041.842

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 4

Estimates of annual operating capacity in the text do not comport with the proportions of annual average intake flow to design flow given in Table D1-2.

EPA's response does not answer the question. UWAG hereby raises the question for the public record.

EPA Response

The intake flow data used in EPA's I&E analyses were average annual operating flows obtained through EPA's survey of the industry. Background chapters and other materials may include flow information from other sources, but these are provided to provide general background only. To the extent that there are any conflicts, EPA intends for the survey data to be used.

Comment ID 316bEFR.041.843

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

Question 5

How can there be no estimate of error levels or confidence intervals? The lack of such implies that the model output may be unreliable and contain vast errors.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record. We believe this was a valid question, but we rephrase the question as follows: What are the estimates for error levels (variance, confidence intervals) for fisheries foregone and economic benefits? Impingement and entrainment are shown with means and standard deviations in Tables D3-2 to D3-9. The mean and standard deviation should also be shown in subsequent tables, e.g., the estimates of fisheries foregone and economic benefits.

EPA Response

The lack of confidence intervals in EPA's results does not, as the commenter maintains, imply that the results are unreliable or incorrect. Rather, the lack of confidence intervals reflects the lack of information in facility documents on the variance in facility estimates of I&E. In many cases only 1 or 2 years of annual estimates are presented. Moreover, given the complexity of EPA's analysis, involving I&E data from 46 facilities, dozens of species, and hundreds of life history values, a formal, quantitative characterization of uncertainty would be a large undertaking in and of itself. Please see Chapter A6 of Part A of the Phase II Regional Analysis Document (DCN #6-0003) for a discussion of uncertainty in the context of EPA's analysis. This chapter also provides an example Monte Carlo analysis exploring uncertainty associated with foregone yield estimates. The example illustrates the high level of effort involved with conducting such an analysis for only one type of loss (entrainment) for one metric (foregone yield) for one species at one facility.

Comment ID 316bEFR.041.844

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

Question 6
Can any of the model conclusions can be tested or measured in any manner?

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record. We feel the following was a valid question: Can any of the model conclusions be tested or measured in any manner? Or rephrased as "Can the model be validated with any existing data?"

EPA Response

In response to the commenter's question about model validation, EPA's estimates of age 1 equivalent losses, foregone yield, and production foregone could be compared to estimates from similar time periods for similar species and for facilities with similar characteristics and similar monitoring programs, to the extent such data are available.

Comment ID 316bEFR.041.845

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03

Case Study Specific Comments

Question 7

How can the success of regulatory action be evaluated if the model cannot be tested and if there is no estimate of the variance of the parameters?

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The purpose of EPA's benefits analysis was to develop the best estimate possible, given the data available, of national impingement and entrainment losses, the costs of reducing these losses, and the economic benefits to be expected nationwide as a result of reductions in I&E.

EPA believes its analysis was reasonable given the data available and the goals of the ecological analysis. EPA's evaluation of I&E data had four main objectives (1) to develop a national estimate of the magnitude of I&E, (2)to standardize I&E rates using common biological metrics so that rates could be compared across species, years, facilities, and geographical regions, (3)to estimate changes in these metrics as a result of projected reductions in I&E under the Phase II rule, and (4) to estimate the national economic benefits of reduced I&E.

EPA's predictions can be tested if and when reliable data are available on actual I&E reductions resulting from the rule's implementation.

Comment ID 316bEFR.041.846

Subject Matter Code 10.03
Case Study Specific Comments

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Question 8

How can the model be proposed as a basis for regulatory action given the lack of accuracy, lack of precision, inability to verify output, and unknown habitat carrying capacity?

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

EPA maintains that its analysis is based on sound science and therefore is a reasonable basis for regulatory action. For a discussion of uncertainty in the context of EPA's analysis, please see Chapter A6 of the Regional Analysis Document (DCN #6-0003). See also response to the related Comment 316bEFR.041.845.

Comment ID 316bEFR.041.847

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.03.03
Tampa Bay

Question 9

It is not obvious if there were upper limits for the Foregone Production relating to carrying capacity of Hillsborough Bay/Tampa Bay. Why were there no upper limits set based on biology? This is critical. There is a real possibility that the Bay may at present be at some equilibrium capacity and no new fish may be possible without significant habitat restoration.

EPA's response partially answers the question, but see comment under item 2. We request a clarification.

EPA Response

EPA's analysis for the final rule did not evaluate Tampa Bay as a separate case study. Instead, Tampa Bay I&E estimates were included in the regional total for the Gulf Region. Please see Part F of the Regional Analysis Document (DCN # 6-0003) for details.

Carrying capacity is not a variable in the production foregone calculation. Please see Chapter A5 of the Regional Analysis Document for details on the production foregone model.

Comment ID 316bEFR.041.848

Author Name Hunton & Williams
Organization obo Utility Water Act Group

Subject Matter Code 10.03.03
Tampa Bay

Question 15

See Page D1-12.
a. What is the relevance of inclusion of some of these sections as related to power plant issues?
B. Are these areas also used in the fishing statistics? For instance the Chassahowitzka National Wildlife Refuge is located in Citrus and Hernando counties and is 65 miles north of St. Petersburg, not an intimate connection to Tampa Bay.

a. EPA's response answers the question.
b. EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

The introductory chapters to the case study reports presented at proposal were intended to provide general background on the study area. This material is not presented in EPA's final benefits analysis for the 316(b) Phase II rule.

Comment ID 316bEFR.041.849

Subject Matter Code 10.03.03

Tampa Bay

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Question 16

See Page D2-7. Under section d. F.J. Gannon. The last sentence of this paragraph lists design intake flow of 2465 MGD.
a. Where did this number come from?
b. Was this number used in the model? This does not agree with Table D1-2 which lists 1267 MGD (sum of table numbers). This is a difference of 1198 MGD (95% increase over 1267 MGD). The rated capacity as verified by TECO on May 30, 2002 is 1346MGD (NPDES permit). If the flow value of 2465 MGD was used in the model the values would be overestimated by 95%.

EPA did not answer the questions. UWAG reiterates its request for an answer, and hereby raises it as part of its public record. The question merits a response if the number listed for Gannon (overstatement of design flow by 2x) was used in any of the calculations. The question is restated here: See Page D2-7. Under section d. F.J. Gannon. The last sentence of this paragraph lists design intake flow of 2465 MGD. A. Where did this number come from? B. Was this number used in the model? This does not agree with Table D1-2 which lists 1267 GD (sum of table numbers). This is a difference of 1198 MGD (95% increase over 1267 MGD). The rated capacity as verified by TECO on May 30, 2002 is 1346 MGD (NPDES Permit). If the flow value of 2465 MGD was used in the model the values would be overestimated by 95%.

EPA Response

See EPA's response to comment 316bEFR.041.842 on intake flow data.

Comment ID 316bEFR.041.850

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 17

See page D2-7. Why was Scenario 2 conducted? Only in rare instances does Big Bend meet the conditions of this scenario.

EPA did not provide a response. UWAG hereby raises the question for the public record.

EPA Response

The information in Chapter D2 of the case study of Big Bend and Tampa Bay presented at proposal is not included in EPA's final analysis.

Comment ID 316bEFR.041.851

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 20

See Page D3-15. Section D3-5. What are the data used to maintain that the fish communities and hydrodynamics are similar between Big Bend, Gannon and Hookers Point? This is highly questionable. Hookers Point is located on the dredged channel for the Hillsborough River. Gannon is at the mouth of East Bay which receives the flow of the Palm River (Tampa Bypass Canal). Salinity zonation is pronounced within Hillsborough Bay particularly during the rainy season. The areas around Gannon and Hookers point are highly urbanized and industrial. There are virtually no natural shoreline and the entire area is dredged with shipping channels in excess of 40 foot depths.

EPA's response does not answer the question. UWAG reiterates its request for an answer and hereby raises it as part of the public record.

We would like to rephrase the question: Are there any data used for the analysis illustrating that the fish communities are hydrodynamics are similar between Big Bend, Gannon and Hookers Point?

EPA Response

EPA recognizes that there are physical, chemical, and biological conditions that may vary locally at individual facilities within a watershed. However, EPA's analysis was not concerned with developing precise, facility-specific estimates of I&E. For an explanation of EPA's extrapolation approach and the underlying rationale for the approach, please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and response to Comment 316bEFR.041.041.

Comment ID 316bEFR.041.852

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 22

See Page D3-15. Tables D3-16 and D3-17.
a. Was there an upper limit for Foregone Production fisheries estimates?
We have not seen any items that specify the models or that I&E cumulative impacts have an upper limit based on habitat carrying capacity. Habitat carrying capacity operates independently of I&E effects. Under the life history section (page D3-5) it is stated that juvenile mortality of blue crabs is usually the result of exceeding the estuarine carrying capacity. The assumption seems to be that if the I&E organisms were to survive they could reach adult size (within constraints of natural mortality and fishing pressure) and thus increase the fisheries yield.
b. Was there any consideration that populations may be limited by habitat availability for one or more life stages. For instance if lack of seagrass habitat limits the potential of spotted seatrout a reduction of I&E may have no net effect on adult populations.

See comment under item 2. We request a clarification.

EPA Response

The commenter asks about features of EPA's I&E analysis with respect to factors limiting population sizes, including carrying capacity in general and specifically habitat limitations. EPA did not model fish population dynamics as discussed in its response to Comment 316bEFR.005.009.

Comment ID 316bEFR.041.853

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 23

See Page D3-24. Analysis of recent plankton data.
a. Where can we access the Peebles data referenced in this section. TECO does not have and has not reviewed the Peebles data but questions the direct comparisons.
b. Were the Peebles plankton data sorted by depth to use representative bottom water?
c. Were the Peebles data seasonal, representative of every month?
d. What is the magnitude of between-sample variance and how were the averages for Table D3-18 determined? The larval densities of eight of the 15 species listed in Table D3-18 have apparently increased since 1977-79.
e. How is this reconciled with the reported losses of fisheries catches listed in the life history section?
f. Were these new data used in any of the models?

a. EPA's response answers the question.
b. EPA's response answers the question.
c. EPA's response answers the question.
d. EPA's response answers the question.
e. We do not understand the response. The Table D3-18 that we have lists four columns, two are reporting larval densities for different periods (1977 - 1979 and 1988 - 2001) the third list the differences. The larval densities of eight of the 15 species listed in Table D3-18 have apparently increased since 1977-1979. The question was: e. How is this reconciled with the reported losses of fisheries catches listed in the life history section? UWAG reiterates this question for the public record.
f. No additional comment.

EPA Response

These comments refer to material presented at proposal in the report on the Tampa Bay case study (see the Case Study Document, DNC 4-0003). The purpose of this analysis was to examine the potential relationship between ambient larval densities and entrainment rates. The analysis was not used in any way in EPA's 316b benefits analysis and was not included with EPA's materials in support of the final Phase II rule.

Comment ID 316bEFR.041.854

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 10.03.03

Tampa Bay

Question 25

See page D3-25. The last paragraph. What is the rationale to justify Foregone Production if the item in question 16 (ichthyoplankton levels are similar for the 20 year comparison) is valid?

If as stated the magnitude of larval entrainment has not changed since 1976-1977 the implication is that existing reproductive populations are being maintained within Tampa Bay or that plankton entrainment measures are a poor surrogate for determining adult populations within the bay.

EPA's response does not answer the question. Instead, EPA's response says this question is in the nature of a comment on the record and will be addressed by EPA if it is raised during the public comment period. UWAG hereby raises the question for the public record.

EPA Response

This comment refers to information in the Case Study Document (DCN #4-0003) presented at proposal. EPA did not include this information in its final analysis for the 316b Phase II rule. However, EPA agrees that if the magnitude of larval entrainment has not changed over time, one may infer that populations are relatively stable or that plankton I&E rates are not closely correlated to adult population abundances.

Comment ID 316bEFR.406.002

Author Name Hunton & Williams

Organization obo Utility Water Act Group

Subject Matter Code 23.01

EBA related comments

Question 20
EBA Chapter C3
Table C3-4

Please provide a spreadsheet that lists all in-scope facilities; and for each in-scope facility lists: (1) the number of angler days (used to compute the angling index for the facility), (2) the angling index value, and (3) the waterbody type of the facility.

EPA's response does not answer the question. As EPA knows, DCN4-2213 is listed as being contained in the CBI docket and therefore is unavailable to UWAG.

EPA Response

EPA did not use the angling index in its analysis for the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gregg Tieken

On Behalf Of:

City of Public Service

Author ID Number:

316bEFR.042

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.042.001

Author Name Gregg Tieken

Organization City of Public Service

Subject Matter Code 22.06

UMRA/Impacts on local governments

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that my utility finds particularly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities are owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.042.002

Author Name Gregg Tieken

Organization City of Public Service

Subject Matter Code 17.08

Option: UWAG's recommended approach

City Public Service endorses the technical and legal comments submitted to the EPA from Utility Water Act Group (UWAG), Large Public Power Council/American Public Power Association (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the commenter's support for these comments.

Comment ID 316bEFR.042.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Gregg Tieken

Organization City of Public Service

EPA should be complimented for considering a variety of alternative approaches to the regulation. City Public Service is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.042.004

Author Name Gregg Tieken
Organization City of Public Service

Subject Matter Code 10.07.03
RFC: Test: benefits should justify the costs

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the waterbodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.042.005

Author Name Gregg Tieken

Organization City of Public Service

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. City Public Service has a good working relationship with the state and believes in deferring, where possible, to the state regulators.

EPA Response

Please refer to the response to comment 316bEFR.039.005.

Comment ID 316bEFR.042.006

Author Name Gregg Tieken

Organization City of Public Service

Subject Matter Code 22.06

UMRA/Impacts on local governments

Criticism: the EPA has underestimated the impact on public power systems. City Public Service believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

City Public Service agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements with coordination with states to ensure reliable grid operations.

City Public Service is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. The EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases-particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

For a response to comments on implementation of new 316(b) requirements, please refer to comment 316bEFR.028.007 in subject matter code 21.09.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

E. Fitzergerald Veira

On Behalf Of:

Troutman & Sanders obo Georgia Power

Author ID Number:

316bEFR.043

Comment ID 316bEFR.043.001

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code SUP

General statement of support

Georgia Power supports several aspects of the proposed rule and applauds EPA's efforts on certain issues such as restoration and the possible use of market-based approaches[.]

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.043.002

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code OPP

General Statement of Opposition

[T]here are aspects of the proposed rule and particular positions taken by EPA in the context of the proposed rule that are arbitrary and unsupported by the record. In certain other instances, EPA is going beyond the scope of its delegated authority. In addition, Georgia Power believes various provisions of the proposed rule require clarification, and proposes ways to improve the proposed rule.

EPA Response

Please refer to the response to comment 316bEFR.034.002.

Comment ID 316bEFR.043.003

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Section 316(b) requires that the “location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” 33 U.S.C. § 1326(b). Through this rulemaking process, EPA is attempting to implement this statutory provision with technology-based performance requirements Under the proposed rule, the facility’s owner or operator gets to choose the technology (or combination of technologies and other measures) the owner/operator believes will meet the performance standards Georgia Power supports leaving it up to the facility owner or operator to determine what technology is most appropriate for its facility and believes the Clean Water Act intends for the facility owner or operator to make that decision.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.043.004

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02

Performance standards

The proposed rule establishes performance standards for each type of waterbody in which a cooling water intake structure may be located. The proposed rule addresses oceans, estuaries, tidal rivers, freshwater rivers and streams, lakes, and reservoirs. Each standard calls for owners or operators to minimize their impacts to aquatic life by reducing, by a certain percentage, the number of organisms entrained or killed by impingement Georgia Power believes that to the extent EPA continues to choose this regulatory approach, these standards and their implementation can be vastly improved over EPA's current approach.

EPA Response

Please see response to comment 316bEFR.311.002.

Comment ID 316bEFR.043.005

Subject Matter Code 21.01

Submittal of required information

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

To begin the process of complying with the new performance standards, each facility submitting a permit renewal application will need to include a possibly overwhelming amount of information in its application, including waterbody characterization data for the waterbody in the vicinity of the cooling water intake structure and data characterizing the design and operation of the structure itself Proposed 40 CFR § 122 21(r)(2)-(3), (5). Each facility must also submit a Comprehensive Demonstration Study, unless it has or will implement controls which have or will reduce its intake flows to a level commensurate with the use of a closed-cycle, recirculating cooling system Proposed 40 CFR § 125 95(a), (b)

EPA Response

See response to comment 316bEFR.034.005.

Comment ID 316bEFR.043.006

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code OPP

General Statement of Opposition

Georgia Power believes that EPA needs to properly address these comments in Order to improve the Rule's enforceability, make the rule more effective and consistent with the overall NPDES regulatory program, and maximize the overall use of resources. Furthermore, by failing to address these comments, EPA runs a significant risk of having the rule, if finalized as proposed, be held arbitrary and capricious and, for certain aspects, beyond the scope of EPA's delegated authority.

EPA Response

Please refer to the response to comment 316bEFR.034.006.

Comment ID 316bEFR.043.007

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02

Performance standards

The Proposed Percent Reductions from the Calculation Baseline are too High.

Under the proposed rule, applicability of the performance standards vary, depending primarily on the source waterbody. If a facility withdraws water from a freshwater river or stream and that facility withdraws five percent or less of the river or stream's mean annual flow, then the facility must reduce fish and shellfish impingement mortality by 80 to 95 percent from the baseline. If the facility's design intake flow is more than five percent of the mean annual flow, the facility must lower impingement mortality by 80 to 95 percent and lower entrainment by 60 to 90 percent.

For an entity whose cooling water <FN 2> intake structure withdraws water from a lake or reservoir, the facility must reduce impingement mortality by 80 to 95 percent from the baseline. For entities whose cooling water intake structures withdraw water from the Great Lakes system, tidal rivers, estuaries, or oceans, those facilities must lower impingement mortality by 80 to 95 percent and lower entrainment by 60 to 90 percent. Regardless of the waterbody, however, the entrainment reduction component does not apply if the facility has a capacity utilization rate that is less than 15%.

EPA states that the performance ranges "reflect the uncertainty inherent in predicting the efficacy of a technology on a site-specific basis." In essence, EPA recognizes the inherently variable nature of aquatic environments 67 Fed Reg 17141, Col 3 The low end of the range indicates the minimum level of impingement or entrainment reduction that EPA believes all facilities -- even those operating in the most sensitive environments -- could achieve with the existing technologies on which EPA's assumptions are based. The high end of the range reflects EPA's belief that in some environments the same technology (technology upon which EPA based its proposed performance standards) will be more effective.

While the overall structure of the rule is not the ideal approach, <FN 3> Georgia Power believes it is workable However, in addition to other deficiencies, the percent reductions from the calculation baseline are too high and not justified by the record

Footnotes

2 EPA defines "cooling water" to mean water used for contact or noncontact cooling,including water used for equipment cooling, evaporative cooling tower make up, and dilution of effluent heat content." Proposed CFR 125.83. Georgia Power requests that EPA make it clear that the water is no longer "cooling water" after it has performed its intended cooling function.

3 Georgia Power agrees with UWAG that the site-specific approach is better.

EPA Response

Please see comment 316bEFR.034.007.

Comment ID 316bEFR.043.008

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.03

Available I&E technologies

EPA's Places Too Much Confidence in Existing Technology For Which Only Limited Information is Available

The impact reduction levels were set based on limited experiences with certain technologies, which EPA implicitly expects facilities will opt to use. EPA based its impingement mortality reduction performance standards on design and construction technologies like wedge wire screens and aquatic filter bather systems (which EPA believes can achieve a 99% impingement mortality reduction); barrier nets (EPA believes barrier nets are capable of 80-90% mortality reduction); and modified screens and fish return systems, diversion systems, fine mesh traveling screens, and fish return systems. 67 Fed. Reg. 17142, Col. 1.

For reducing entrainment, EPA acknowledges that the performance that can be expected from available technologies is less clear than with impingement mortality reduction 67 Fed Reg 17142 The situation is further complicated by the fact that some of the entrainment reduction technologies cause problems by increasing impingement. Still, EPA believes technologies such as aquatic filter bather systems, fine mesh wedge wire screens, and fine mesh traveling screens with fish returns should reduce entrainment by 80 to 90 percent from the baseline

Notwithstanding EPA's admission that the support for its entrainment reduction technologies is less than ideal, EPA proposes using these impact reduction benchmarks anyway. Georgia Power believes EPA is being hasty in its approach and needs to re-examine the performance standards and make appropriate adjustments so that the standards will be more consistent with the practical realities of the numerous uncertainties that are associated with the regulation of cooling water intake structures and their very site-specific environments.

EPA Response

Please see response to comment 316bEFR.034.008.

Comment ID 316bEFR.043.009

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02

Performance standards

EPA Needs to Modify its Proposed Performance Standards to Reflect the Uncertainties Related to the Operation and Impact of Cooling Water Intake Structures.

For several reasons, EPA needs to adjust down the ranges of the performance standards. First, the technologies that EPA relies on have not been broadly tested to guarantee the kinds of results EPA identified. Indeed, perhaps with the exception of fine mesh screens, which have their own shortcomings, there is very little reliable data on the technologies EPA identifies.

Second, EPA itself recognizes the inherent variability of aquatic environments. Adding to the complexity of this problem is the fact that the limited evaluation data that is available does not reflect the diversity of aquatic environments in which EPA expects that these technologies will be applied. Accordingly, EPA should create more room in the standards to accommodate the uncertainties and variabilities.

EPA Response

Please see comment 316bEFR.034.009.

Comment ID 316bEFR.043.010

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 15.0

State or Tribal Alternative Requirements

Third, such substantial percentage reductions assume that this issue has been completely overlooked by state agencies. This is simply not the case Many of the facilities have been around for decades with not only significant and proper regulatory oversight, but also noteworthy public scrutiny. With volumes of NPDES-related data generated regarding water bodies and studies conducted under the various state programs, including assessments done by state wildlife resources departments, significant entrainment and impingement would not have gone unnoticed. Moreover, in certain areas, general knowledge about recreational fishing would have helped to identify facilities that are having significant impacts as a result of entrainment or impingement.

EPA Response

Please see comment 316bEFR.034.010.

Comment ID 316bEFR.043.011

Subject Matter Code 7.02
Performance standards

Author Name E. Fitzergerald Veira
Organization Troutman & Sanders obo Georgia Power

A Possible Improvement to the Rule is to Broaden the Range.

There are several approaches EPA should consider to establish more reasonable standards that are workable within EPA's current structure. One option is .to broaden the ranges and allow permit writers to establish the percent reduction for individual facilities based on characteristics of the waterbody, existing aquatic communities, and other site-specific-data. Georgia Power recommends using 50-70% range for impingement reductions and 40-60% range for entrainment reduction. These ranges are much more reasonable in light of the numerous uncertainties associated with the water bodies, the individual intake structures, the water quality of the various waterbodies, the extent of existing aquatic species, the types of aquatic species, the abundance or lack of nuisance species, the potential for endangered species, and the limited information available regarding the technologies identified by EPA..

EPA Response

Please see comment 316bEFR.034.011.

Comment ID 316bEFR.043.012

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02

Performance standards

EPA Could Establish Interim Limits Until More Is Understood About Available Technology.

Another option that Georgia Power would support is the establishment of interim standards (e.g., for the next five years, reduce impingement by 40% and entrainment by 30% compared to the calculation baseline, where applicable). Then, at the end of that five year period, when assessments of both the waterbodies and technologies have been conducted, a permanent, more stringent standard can become effective.

EPA Response

Please see comment 316bEFR.034.012.

Comment ID 316bEFR.043.013

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

EPA Needs to Establish Clear Definitions of the Objectives of an Acceptable Impingement and Entrainment Study, Including Some Guidance Regarding the Calculation Baseline Impingement and Entrainment Rates.

Under the proposed rule, the permittees of those facilities not employing, and not planning to employ, closed-cycle recirculating cooling systems (or their equivalent) will be required to submit an Impingement Mortality and Entrainment Characterization Study Proposed 40 CFR § 125 95(b)(3), 67 Fed Reg at 17175, Col 3 This Study is one of several steps to be undertaken as part of the Comprehensive Demonstration Study This is arguably the heart of a 316(b) Comprehensive Demonstration Study, yet EPA provides very little meaningful guidance as to how to accomplish this component of the demonstration Because clear objectives and guidelines are not established, the permittee is left with very little information as to how, as a practical matter, to scope the Study and how to extrapolate to a "calculation baseline" Compounding the problem is the absence of a definition of adverse environmental impact Establishing clear guidelines for impingement and entrainment studies is important not only in the context of individual facilities that will be subject to the proposed rule, but also for the overall, long-term goal to reduce the effects of impingement and entrainment and improve the effectiveness of protective technologies There is a great deal of information available from previous 316(b) studies However, the scope, objectives, methods, estimation and reporting of these individual studies vary greatly The variability in the studies themselves is one of the largest obstacles to creating a useful 316(b) database that could be used to help predict impingement and entrainment effects, or help predict the potential effectiveness of various protective technologies for a given set of environmental and operational conditions. Requiring facilities to conduct characterization and demonstration studies, without providing clear guidance to standardize those studies, is short-sighted and only promotes additional variability.

EPA Response

Please see EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.043.014

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 10.01.01

Ecological Risk Assessment

Employing EPA's Ecological Risk Assessment methodology in this context could provide structure for characterizing the potential ecological risk due to impingement and entrainment at cooling water intake structures Georgia Power encourages EPA to consider using its own guidelines (US EPA, 1998 Guidelines for Ecological Risk Assessments, EPAI63OIR-95/002F) in this context.

EPA Response

EPA agrees that its Ecological Risk Assessment Framework provides a useful structure for characterizing impingement and entrainment impacts. See Chapter A1 of EPA's Phase II Regional Study Document (DCN #6-0003)for a discussion of the Ecological Risk Assessment Framework as it applies to section 316b.

Comment ID 316bEFR.043.015

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Elements of an Impingement Mortality and Entrainment Characterization Study Needs to be Clarified.

The preamble identifies three elements of an Impingement Mortality and Entrainment Characterization Study. First, the preamble states that the characterization would include “taxonomic identifications of those species of fish and shellfish and their life stages that are in the vicinity of the cooling water intake structure and are most susceptible to impingement and entrainment.” 67 Fed. Reg. at 17175, Col. 3. EPA needs to elaborate further and provide more clarity as to what it means with respect to this first element. For example, with respect to “taxonomic identifications” of species in the vicinity-of the cooling water intake structure, to what extent can facilities rely on existing data generated by State natural resource and wildlife agencies or others? We understand from EPA’s language that not every specie needs to be evaluated, just the ones that are “most susceptible” to impingement and entrainment. But what does EPA mean by “most susceptible?” One possible interpretation of this term. is to focus on those species that are noticeably higher than the rest with respect to the frequency and abundance of the extent of entrainment or impingement. Another concern is to what extent can the permittee select, representative species when the species that are being impacted are similar?

The second element EPA mentions is no clearer than the first EPA expects a “characterization of these species of fish and shellfish and life stages, including a description of the abundance and temporal/spatial characteristics in the vicinity of the cooling water intake structure." Id. What does EPA mean by “characterization of these species?”

The third element is the “documentation of the current impingement mortality and entrainment and an estimation of the calculation baseline.” Id. EPA does not explain the extent of the documentation that may be needed. Nor does EPA provide any useful guidance regarding the establishment of the theoretical baseline. As a practical matter, if the facility is once-through cooling with no existing technology, Georgia Power is concerned that EPA may take the position that the facility is itself equal to the baseline. However, there might be other considerations that may have already lowered the extent of any impingement or entrainment that may not be limited to technology. For example, certain operational controls or the location/angle of the cooling water intake- structure may operate to limit the extent of entrainment or impingement. EPA should, therefore, provide facilities with the opportunity to take into account other considerations beyond technology for purposes of determining the calculation baseline.

EPA Response

Please see EPA’s response to comment 316bEFR.034.015.

Comment ID 316bEFR.043.016

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 10.03

Case Study Specific Comments

EPA's Case Studies Are of Limited Value.

Georgia Power has some concerns about the case studies that EPA provided. -Because of variabilities in the way the studies were conducted and reported, there is little information that can be transferred in a meaningful way to other facilities. Those case studies, therefore, have limited use In addition, the case studies are repeatedly qualified as out of date and likely to underestimate impingement arid entrainment, suggesting that EPA would like some as yet undefined but better process. Finally, Georgia Power is concerned that a calculated baseline scaled to design MGD is not a defined measure if the underlying impingement and entrainment studies are open to significant criticism. In real operations, actual pumping rates are often significantly less than design MGD, which might put some facilities in a position of trying to reduce a "calculation baseline" that is greatly overestimated.

EPA Response

EPA agrees that the facility studies that are available for estimating the magnitude of I&E have many limitations. However, EPA had no alternative but to use available data, given the effort that would be required to conduct original studies to obtain less uncertain and more current data, including the need for multiple years of intensive monitoring of hundreds of species at representative facilities throughout the country. Nonetheless, EPA made every possible effort to find reasonably accurate I&E data from the best I&E studies available, including studies with similar methodologies. In addition, EPA converted I&E losses to a standard metric (age 1 equivalents) so that losses could be compared and extrapolated among facilities.

See also responses to Comment 316bEFR.072.055 on sample size and representativeness and Comment 316bEFR.041.041 on EPA's extrapolation approach.

Comment ID 316bEFR.043.017

Author Name E. Fitzergerald Veira
Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.04
Determination of compliance

Allowances for Unavoidable Episodic Impingement and/or Entrainment Events.

In development of the Final 316(b) Rule for existing facilities, EPA should acknowledge and make allowances for the occurrence of unavoidable episodic impingement and entrainment events that are beyond the control of the cooling water intake structure facility operator. For example: Threadfin shad (Dorosoma petenense) are a temperate freshwater forage fish species that occurs throughout the southern and southwestern United States. (Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D B McAllister, and J R Stauffer, Jr 1980 et seq ,Atlas of North American Freshwater Fishes N C State Mus Nat Hist , Raleigh i - x + 854 pp)

Threadfin shad are very sensitive to water temperatures with significant mortality of young and adults occurring below 7 C (44 6 F), with 5 C (41 F) reported as the lower lethal temperature for the species. Threadfin shad experiencing decreased swimming ability and/or mortality due to cold stress/shock are subject to impingement, and possibly entrainment, as they enter the cooling water intake structure hydraulic Zone of Influence. Winter stress or kill of threadfin shad commonly occurs in the northern portion of the species range and large die-offs have been known to result m excessive cooling water intake structure impingement rates to the point of intake screen collapse and, consequently, facility power curtailment and/or shutdown. King, R.G., GeoSyntec Consultants, personal communication re: Gentleman Station, Nebraska Public Power District (2002).

Similar phenomena can occur in marine environments involving a variety of thermally (cold) sensitive fish (e.g., snook, Centropomidae, and mullet, Mugilidae). Marine invertebrates are also susceptible candidates for unavoidable episodic impingement and entrainment, particularly planktonic species whose movement is subject to the wind, tides, and currents, and whose populations undergo cyclical expansions or “b1ooms (e.g., jellyfish, a group that includes Scyphomedusae, Hydromedusae, Siphonophores, and Ctenophores).

The occurrence of such an unavoidable episodic event during the conduct of the Impingement Mortality and Entrainment Characterization Study, as currently required by the proposed rule, would unfairly bias the results of the study whose objectives are to provide representative data to support development of the Baseline Calculation for evaluating reductions in impingement mortality and entrainment; document current impingement mortality and entrainment; and provide the basis for evaluating the performance of potential technologies, operational measures, and/or restoration measures. Additionally, in the absence of provisions acknowledging unavoidable impingement and/or entrainment, should such an event occur during Compliance Monitoring a facility could face possible regulatory actions ranging from enforcement penalties to unnecessary implementation of more stringent and costly technological controls and/or restoration measures to meet a required reduction in impingement and/or entrainment mortality from the facility Calculation Baseline; a baseline value that, at the time determined, may not have experienced a similar episodic event.

Therefore, the Final 316(b) Rule for existing facilities should: 1) include language defining and recognizing the occurrence of unavoidable episodic impingement and/or entrainment events; 2) allow exclusion of such events during the conduct of the Impingement Mortality and Entrainment Characterization Study and associated Calculation Baseline determination, and 3) provide exemption from any regulatory actions, including enforcement actions, arising from an unavoidable impingement and/or entrainment event that might occur during Compliance Monitoring or otherwise during the life of the facility NPDES permit.

EPA Response

Please see EPA's response to comment 316bEFR.034.017.

Comment ID 316bEFR.043.018

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

The Use of Off-Stream Lakes or Ponds Should be Viewed m the Context of the Overall Reduction of Water Withdrawn.

Under the proposed rule, existing facilities with intake flow levels “commensurate with” that which can be attained by a closed-cycle recirculating cooling system using minimized makeup and blowdown flows are deemed to be in compliance with the rule as proposed. Georgia Power believes that certain aspects of this section of the rule is arbitrary, legally unsupported, and in need of clarification. Because of EPA’s unclear definition of “closed-cycle recirculating cooling system,” Georgia Power is concerned about the regulatory status of several of its power plants with cooling towers and off-stream ponds or reservoirs.

EPA Response

Please refer to the response to comment 316bEFR.063.011

Comment ID 316bEFR.043.019

Subject Matter Code 3.02

Definition: Cooling Water Intake Structure

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Georgia Power recommends a more practical definition of closed-cycle recirculating cooling system as follows: "A system that minimizes the extent of its overall water withdrawal rate and/or use by recirculating its cooling water through any one of several mechanisms that does not involve once-through use of a significant percentage of the cooling water. Such systems can involve the use of a -cooling tower, with a source of make-up water such as an off-stream lake, or a cooling pond."

EPA Response

See response to 316bEFR034.019.

Comment ID 316bEFR.043.020

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 3.07

Special definitions

Use of Off-Stream Ponds is a Practical Component of a Closed-Cycle System

In Georgia Power's case, off-stream ponds were created to ensure compliance with Georgia's water withdrawal regulatory scheme and to provide a reliable, easily accessible source of water for cooling tower make-up. <FN 4> Essentially, an off-stream pond adds a step to the water withdrawal process while at the same time providing a buffer to the original source waterbody Water is pumped from the original source waterbody into the off-stream -pond. -The pumps at the original source waterbody operate on a limited basis to maintain the off-stream pond at a certain level. Water is then pumped from the off-stream pond to serve various plant functions. The pond's primary function, however, is to serve to make-up the cooling tower water when it is reduced, mostly as a result of evaporation or blowdown. Because Georgia's water withdrawal law implemented through water withdrawal permits imposes certain pumping restrictions, off-stream ponds enable Georgia Power to meet the plants' water needs without overburdening the source waterbody or otherwise violate the water withdrawal regulatory scheme.

Georgia Power believes that a determination of whether a system is "commensurate with" a closed-cycle recirculating system should be based on the overall reduction of water use based primarily on the reduction in water withdrawn from the original source waterbody. Whatever definition EPA ultimately uses, however, Georgia Power's main comment here is to make sure that facilities with off-stream ponds are not excluded from the definition of closed-cycle recirculating systems.

Footnotes

4 Georgia Power does not believe that off-stream ponds are waters of the U.S.

EPA Response

Please refer to EPA's response to comment 316bEFR.032.015.

Comment ID 316bEFR.043.021

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 3.07

Special definitions

At the Very Least, EPA Needs to Change or Clarify Certain Terms Used in the Current Definition of Closed-Cycle, Recirculating System.

EPA does not explain the meaning of certain key terms included in the proposed rule EPA's failure to define some of these terms and certain related concepts will make the preliminary determination regarding whether the facility's system is "commensurate with" a closed cycle, recirculating system difficult. First, EPA does not define "commensurate with." Webster's dictionary definition of "commensurate" is "equal in measure or extent, corresponding in size, extent, amount, or degree." This being the case, we assume EPA to mean "equal to" or "same as" when it uses the term "commensurate with."

We believe "commensurate with" is too inflexible for situations where a variety of factors can affect the need for make-up water or the extent and frequency of blowdown. These factors include climate differences, the need for certain water quality within cooling towers, differences in water quality standards applicable to the receiving waterbodies, and evaporation. For these reasons, Georgia Power recommends using "similar to" instead of "commensurate with".

Second, EPA does not explain what is meant by "minimized make-up and blowdown flows." Configurations of closed-cycle, recirculating system-s vary. As mentioned, some systems, such as Georgia Power's, use reservoirs or off-stream ponds to -provide make-up water. Depending on the configuration of the system, the amount of make-up water needed may vary, due largely to evaporation. A system should be considered minimized provided that the majority of the water used does not serve a once-through cooling function.

Also, the frequency of blowdown varies depending, in part, on applicable water -quality standards and the quality of the intake water. The quality of the water in the cooling tower must be maintained at a certain level to preserve the system. A system's blowdown should be considered minimized when blowdown is not performed more than is reasonably necessary.

EPA Response

Please refer to EPA's responses to comments 316bEFR.032.015 and 316bEFR.034.021.

Comment ID 316bEFR.043.022

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

EPA Should Increase the Water Withdrawal Threshold Relating to Rivers and Streams.

Under the proposed rule, facilities located on freshwater rivers or streams do not need to address entrainment, provided that the facilities' design intake flow is 5% or less than the source river's mean annual flow. EPA explains that the 5% withdrawal threshold is based on the concept that, "absent any other controls, withdrawal of a unit volume of water from a waterbody will result in the entrainment of an equivalent unit of aquatic life suspended in that volume of the water column." 67 Fed. Reg.17151, Col. 2.

Accordingly, EPA concludes that "if 5% of the mean annual flow is withdrawn, it would generally result in the entrainment of 5% of the aquatic life within the area of hydraulic influence of the intake." Id. Because EPA believes that it is unacceptable to impact more than 5% of the organisms within the area of an intake structure, EPA is choosing to require those facilities that withdraw more than 5% of the mean annual flow of a fresh water river to reduce entrainment by 60-90%. For several reasons, Georgia Power believes that EPA's approach is arbitrary.

First, the 5% criterion uses design intake pumping rate and annual average flow. Operational measures which may be implemented because of the hydrologic regime are ignored but may minimize entrainment and impingement. Also, consideration should be given to use of actual volume pumped and river flow for periods during critical life stages when fish and shellfish would be impacted.

Second, the 5% criterion assumes a uniform distribution of entrainable organisms to derive a conservative estimate of the potential for adverse impact. See EPA 2002, EPA -821-R-02-002, page Al-5. Examination of the case study data EPA provided shows no relationship between design intake pumping rate and total entrainment or impingement. The Ohio River Watershed Case Study, EPA 2002, EPA-821-R-02-002, Part C. This can be seen qualitatively by noting that the facility with the greatest capacity to withdraw water from the Ohio River, the W H Sammis facility, with design intake capacity of 7.46% of annual river discharge, reports lower annual entrainment rates than four other facilities with design intake capacities ranging from 0.36% to 4.75% of mean annual flow. Possible reasons for this include: different habitat preferences for various fish species; orientation of the intake in relation to the source water body; differences in life history including differences in reproductive strategies As far as Georgia Power can tell, EPA has provided no supporting data for the proposition that entrainment is proportional to design pumping capacity as a percent of average annual river flow.

Third; the existing intake structure may be located in a waterbody segment that supports minimal valuable aquatic life. In certain cases, potential impingement or entrainment may be reduced because of the location of the structure relative to the channel, migratory pathways or other desirable microhabitats. The 5% threshold makes no allowance, for example, for situations where nuisance species may be the primary species being entrained or impinged.

EPA's broad-brush approach to the 5% withdrawal threshold ignores these factors that could justify a higher threshold.

Given various considerations that could affect the potential relationship between aquatic organisms present in the water body and the percentage that is likely to be entrained, we recommend a higher threshold with the opportunity for the permit writer to be more stringent if the situation requires it. EPA should use a threshold flow equal tol5% of the spawning season flow.

Regardless of the ultimate threshold EPA decides to apply, Georgia Power believes that at any such threshold, the risk of entrainment and the relative significance of impingement should be sufficiently low to warrant an avoidance of both impingement and entrainment requirements below the threshold.

EPA Response

Please refer to the response to comment 316bNFR.034.022.

Comment ID 316bEFR.043.023

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

The Utilization Rate Needs to be Increased.

EPA proposes to exempt facilities from entrainment reduction requirements when a facility operates less than 15% of the available operating time (based on historical data.). Proposed Rule 40 CFR § l.25.94(b)(2); 67 Fed. Reg. 17153, Col. 3. EPA explains that "because these facilities operate only a fraction of the time compared to other facilities, such as base-load plants, the peaking plants achieve sizable flow reductions over their maximum design annual intake flows. 67 Fed. Reg. 17153, Col. 3. EPA also explains that the reduced standard is further justified on the basis that these peaking facilities operate during the peak of winter and summer, which are not the most crucial periods for aquatic organisms. Georgia Power agrees that low capacity utilization facilities should be granted certain exemptions. However, EPA's threshold is too low.

EPA needs to increase the utilization rate that triggers entrainment reductions and give permit writers the flexibility to agree to permit conditions regarding the facility's utilization rate that may depart from the facility's historical operation with or without supporting data, provided that the facility can demonstrate future compliance with the utilization rate it chooses.

Georgia Power believes that a 30% utilization threshold is justified on the basis that, compared to 100% utilization, there is an overall reduction in flow of about 70% which puts the facility within range of the proposed reduction in entrainment (60-90%) In addition, Georgia Power believes the impingement requirement should not apply to facilities with capacity utilization rates up to 20% This would also be in line with the performance standard (80-95% reduction) for facilities that have 100% utilization.

EPA Response

See response to comment 316b.EFR.034.023.

Comment ID 316bEFR.043.024

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

Adverse Environmental Impact Cannot be Presumed.

To the extent that EPA is using 316(b) to regulate cooling water intake structures that are not having an adverse impact on the environment, EPA is acting beyond the scope of its authority. Consistent with the Clean Water Act, EPA must allow a two step process that enables a utility to show whether there is any adverse environmental impact in the first place. Section 316(b) of the Clean Water Act requires the location, design, construction, and capacity of cooling water intake structures to "reflect best technology available for minimizing adverse environmental impact." 33 U.S.C. §1326(b). On the basis of strict statutory interpretation, if adverse environmental impact is absent, then the question whether the facility has best technology available becomes largely irrelevant.

Under the rule as proposed, EPA assumes that there is adverse environmental impact by virtue of the operation of a cooling water intake structure. Georgia Power disagrees with this position and finds it to be not only arbitrary, but completely at odds with the Clean Water Act. EPA is without delegated authority to require facilities to undertake activities with respect to their cooling water intake structures where there is an absence of adverse environmental impacts.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.043.025

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Georgia Power supports the UWAG definition of "adverse environmental impact" as stated in the proposed rule. 67 Fed. Reg. at 17163. EPA appears to take the position that a definition for "advertise environmental impact" is re1evant only if the Agency adopts a site-specific approach. 67 Fed. Reg. at 17164. Georgia Power disagrees with EPA's approach. Consistent with the Clean Water Act, a determination of adverse environmental impact is a necessary first step. As mentioned earlier, EPA should at least consider employing its Ecological Risk Assessment Guidelines in this context.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.043.026

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

There are many considerations that may factor into the presence or absence of adverse environmental impact. At the very least, those considerations should include the following factors: (1) whether species compensate for or accommodate the impact to an extent that the overall impact is "not adverse" (e.g., the nuisance species are minimized or the impacted species would have otherwise died or that the species otherwise make up for the loss); (2) if the facility is impacting the waterbody to an extent that is less than 75% of the calculation baseline then the facility should be exempt under the theory that a 25% impact relative to the baseline is acceptable unless endangered or threatened species are involved.

EPA Response

This comment is identical to 316bEFR.034.026. Please see the response to that comment.

Comment ID 316bEFR.043.027

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.0

Role of Trading

Expansive Trading Should be Allowed.

Georgia Power believes that the rule should be modified to specifically allow trading To ensure maximum flexibility and to encourage some experimentation among the states, EPA should let individual states develop their own trading programs. States should be allowed to pursue interstate trading if they desire. States should be given the flexibility to have their programs include the potential for source-based controls, receptor-based mitigation, and compensation based mitigation.

A trading program would be especially useful in this area because of the variety of methodologies that can be employed. As examples, a program can be structured to augment current water quality standards schemes or to meet broad biodiversity goals.

One possible way for a state to design a program would be to conduct a survey of facilities located in the state (perhaps on a per watershed basis) and identify a series of mitigation measures each facility can undertake in order to achieve certain biodiversity goals, achievement of water quality standards or some other measurable outcome. The state can then assign a certain value to these measures and relate these measures to units that can be applied toward reduction in impingement and entrainment as compared to the calculation baseline. Ultimately, fashioning the program should be up to the states. However, EPA should provide the regulatory basis and encourage states to develop such programs

EPA Response

This comment is identical in nature to 316bEFR.034.027. Please see response to that comment.

Comment ID 316bEFR.043.028

Subject Matter Code 11.0
Role of Restoration

Author Name E. Fitzergerald Veira
Organization Troutman & Sanders obo Georgia Power

Voluntary Restoration Should Not Be Limited to a Supplementary Role.

Under the proposed rule, restoration measures are allowed in lieu of or in combination with reductions in impingement mortality and entrainment 67 Fed Reg at 17146 Georgia Power strongly supports the use of restoration and does not believe that the role of restoration should be limited to supplementing technology or operational measures.

EPA Response

For information on the role of restoration, see EPA's response to comment 316bEFR.034.028.

Comment ID 316bEFR.043.029

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 2.04.06

Restoration measures in place of technologies

Voluntary Restoration is Consistent with the Clean Water Act.

Georgia Power can find no regulatory or legal reason to limit the use of restoration. In fact, one of the key premises of the Clean Water Act is restoration. 33 U.S.C. §1251. To the extent that EPA is concerned about over-reliance on restoration measures or that industry may avoid practical technological fixes, this reflects a failure on EPA's part to allow permit writers to fulfill their roles. The permit writer is positioned on the ground and can recognize when an owner or operator is proposing deficient restoration measures. In any event, the permit writer will eventually be able to identify if the restoration project is a failure and will be able to require additional compliance measures.

EPA Response

Please see EPA's response to comment 316bEFR.034.029.

Comment ID 316bEFR.043.030

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Voluntary Restoration Ensures Flexibility and the Best Use of Resources.

Under EPA's preferred regulatory approach, EPA has opted not to pursue the site-specific approach. In order to add some level of flexibility to EPA's approach, it is imperative that EPA make restoration completely voluntary. While Georgia Power does not believe that voluntary restoration will provide a complete fix for the proposed rule, it will certainly translate to~ a significant improvement. Because owners and operators are best positioned to determine how to maximize their resources, they will be able to identify the optimum approach (or combination of approaches) to comply with the rules There might be situations where restoration is simply not cost effective. On the other hand, physical limitations may make employment of technical improvements unattractive or impracticable. Giving the owner or operator the regulatory freedom to determine which approach or combination of approaches would be most efficient and effective would produce the best result. Indeed, it may enable the employment of more creative, environmentally beneficial solutions.

EPA Response

For a discussion of restoration measures, see EPA's response to comment 316bEFR.034.030.

Comment ID 316bEFR.043.031

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

While Georgia Power supports broad flexibility to engage in restoration projects, Georgia Power would support limiting restoration to the watershed that serves the facility's intake, at least for initial projects. Georgia Power believes restoration projects should not be located elsewhere until opportunities for reasonable restoration within the source watershed are not available.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.043.032

Subject Matter Code 11.0
Role of Restoration

Author Name E. Fitzergerald Veira
Organization Troutman & Sanders obo Georgia Power

Credit for Past Environmentally Beneficial Projects or other Activities that Limit the Extent of Impingement or Entrainment.

Under the proposed rule, facilities that have certain technologies in place that reduce entrainment and impingement will be credited for such technologies when calculating the "calculation baseline." While it is not clear how such projects should be taken into account in determining the "calculation baseline," Georgia Power believes the same treatment should be granted to past projects that may not have involved the employment of technology or technological improvements, but yet served whether directly or indirectly to minimize entrainment or impingement Credit should be expanded to include, among other things, historical operational measures, regardless of whether such measures were put in place to address entrainment or impingement Similar credit should be given to projects that improved the quality of the aquatic environment.

EPA Response

For a discussion of the role of existing design and construction technologies, operational measures, and restoration measures in the final rule, see EPA's response to comment 316bEFR.034.032.

Comment ID 316bEFR.043.033

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Streamlined Demonstration, Monitoring, and Implementation

Because a significant amount of the costs to electric utilities that could result from this rule will be associated with the 316(b) demonstration studies, verifying the effectiveness of the selected compliance methods, and post-permit issuance monitoring, Georgia Power believes that these costs can be substantially reduced, without jeopardizing EPA's objectives, if EPA were to streamline the process.

EPA Response

Please see EPA's response to comment 316bEFR.034.005 for details on measures EPA has taken to streamline the information collection requirements and implementation of today's final rule.

Comment ID 316bEFR.043.034

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Streamline the Demonstration Study.

First, a 316(b) demonstration should never have to be repeated unless circumstances have so changed to make the original demonstration unreliable. If a utility holds a NPDES permit with an accepted 316(b) demonstration, a re-evaluation of entrainment and impingement should only be required under specific circumstances such as: (1)when there has been material change in the operation of the facility that would increase the extent of impingement or entrainment; (2) when technological improvements are determined to be ineffective, (3) when restoration projects have failed; and (4) when significant changes are made to the cooling water intake structure New and significant information should be evaluated through consultation with state and federal natural resource agencies to determine whether species of concern (threatened and endangered species) may be present or changes in the fishery have occurred which may significantly increase the rate of impingement and entrainment at a facility.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.043.035

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.09

Permit applications/implementation schedule

Streamline the Implementation.

EPA is concerned about the potential burden on permitting agencies associated with the implementation of the proposed rule. Georgia Power believes that one of the best opportunities to minimize the impact of the proposed rule on both the responsible agencies and the regulated community is through the permit implementation process. The implementation process needs to be streamlined. Too much information is being required at the permit re-issuance application first step. The responsible agencies are likely to be overwhelmed and the permittees are likely to straggle with having to address so many issues at one time.

Under the proposed rule, owners or operators must submit the following information when applying for a re-issued NPDES Permit: (1) physical data to characterize the source waterbody in the vicinity where the cooling water intake structures are located (proposed 40 CFR § 122.21 (r) (2)); (2) data to characterize the design and operation of the cooling water intake structures (proposed 40 CFR 122 21(r) (3)) which is to be provided in two components, the first being the cooling water intake structure data and, the second being the existing facility cooling water system description; and (3) a Comprehensive Demonstration Study (proposed § 125.95(b)). Only facilities with closed-cycle, recirculating systems (or their equivalent) are not required to provide the Demonstration Study. Georgia Power believes that this amount of information will be overwhelming to the agencies and may have numerous negative results. Georgia Power recommends a more streamlined/Orderly approach as follows:

-All permittees with permits that will expire within two years after the date the rule becomes final shall submit information to the responsible agencies in two steps. In step one, the permittee shall submit the source water physical data, the cooling water intake structure data; and the existing facility cooling water system description to the director within 60 days of the permit expiration date. These permittees should be required to follow the normal permit renewal process(i.e., new permit conditions related to the 316(b) rule will not be imposed in the first renewal process for permits that will expire within the first two years after the date the rule becomes final). This information gathering stage merely gives the agency the ability to determine (1) whether the facility has a closed-cycle recirculating system and is therefore in compliance with the rule, or (2) what performance standard the facility would need to comply with absent a request for a site-specific determination.

-In step two, facilities with permits that will expire within two years after the date the rule becomes final and that do not have closed-cycle recirculating cooling systems (or their equivalent) should be required to submit a Comprehensive Demonstration Study within two years from the day the permit expires. The permitting agency will review the results of the Study and other factors, and shall request any necessary additional information. The permitting agency shall impose all 316(b) related permit conditions when the permit is renewed in the next renewal cycle.

-For those permits with expiration dates beyond the two years after the date of the final rule, steps one and two above are consolidated. The permittee shall submit (1) the physical data to characterize the source waterbody; (2) data to characterize the design and operation of the cooling water intake structure; and (3) a Comprehensive Demonstration Study5 along with the normal permit renewal application.

EPA Response

EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements. Please see response to comment 316bEFR.034.005.

Comment ID 316bEFR.043.036

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.03
Monitoring requirements

Streamline the Verification Monitoring and the Post Permit Monitoring Requirements.

All monitoring activities related to verifying that the various 316(b) compliance measures are effective should cease after sufficient data has been collected. “Sufficient” should mean nothing more than representative data. There should be no minimum monitoring period. The permit writer should be given the flexibility to craft appropriate monitoring requirements.

EPA Response

Please see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.043.037

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 3.07

Special definitions

EPA Should Provide a Definition of “Significantly Greater”

Under the proposed rule, the owner or operator of an existing facility may demonstrate to the Director that a site-specific determination of best technology available is appropriate for its facility if the owner or operator can meet one of the two cost tests. 67 Fed. Reg. at 17145. To obtain a site-specific determination, the facility must first demonstrate (1) that its costs of compliance with the applicable performance standards specified in proposed § 125.94(b) would be significantly greater than the costs considered by the Administrator in establishing such performance standards, or (2) that its cost of complying with such standards would be significantly greater than the environmental benefits at the site.

EPA has not provided any meaningful guidance concerning the term “significantly greater.” To begin with, it is not clear why “significantly” is even part of the analysis. From an economic standpoint. Georgia Power believes that it should be enough that the costs~ of compliance are “greater” than the EPA costs or that the costs are greater than the benefits to be able to qualify for a site-specific determination. We fail to see any reason, whether legal or purely economic, to oppose a site-specific determination when the costs outweigh the benefits under the performance standards approach. To the extent EPA’s primary concern and, the reason for its insertion of “greater,” is because of potential administrative costs associated with reviewing the appropriate documentation in support of a site-specific determination, EPA could encourage permit writers and agency experts to consult with the owner or operator as much as needed to make the permit writer’s work as easy as possible. In other words, Georgia Power, and probably most. if not all of industry, would be happy to do as much as possible to ease the permit writer/agency workload.

One thing is for sure, it would certainly ease the burden on both EPA and the regulated community if EPA were to provide clear and precise guidance on the meaning of “significantly greater.” One way to do this is to identify a cap, beyond which a presumption of “significantly greater” would be established (e g, 25% more than EPA’s estimated compliance costs or if the costs exceed the benefits by more than 25%).

EPA Response

Please refer to EPA’s response to comment 316bEFR.034.037 and 316bEFR.006.003 which deal with this issue.

Comment ID 316bEFR.043.038

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival Has Been Documented.

The proposed rule would establish a performance standard for reducing entrainment, not entrainment mortality. In fact, the proposed rule does not account for entrainment survival. EPA does not provide a credible basis for not recognizing entrainment survival. In particular, EPA states that it chose to regulate entrainment because it does not have sufficient data to establish performance standards based on entrainment mortality. Limited data or the absence of data should not preclude a facility from justifying compliance with the performance standard, at least in part, on the basis of credible scientific data that species survive.

EPA Response

This comment is identical to comment 316bEFR.034.038. Please see response to that comment.

Comment ID 316bEFR.043.039

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02.02

RFC: Directors set performance levels for a facility?

Should EPA require the greatest achievable reduction (within the proposed ranges), or leave it to the Director to determine appropriate performance levels? 67 Fed. Reg. at 17142, Col. 1.

EPA should leave it up to the Director (or the states) to determine appropriate performance levels. <FN 5> Further, leaving this determination up to the Director or the states will enable more flexible use of each facility's uniqueness while still within the performance range. In addition, if a trading program is put in place, the market will entice facilities to achieve the greatest possible reduction where they will gain a marketable commodity from doing so. Also, mandating the greatest achievable reduction increases the burden, possibly in a very uneven way, on facilities.

Footnotes

5 As stated earlier in Part IIA of this document, EPA should goeven further and lower the performance ranges.

EPA Response

See comment 316bEFR.019.003.

Comment ID 316bEFR.043.040

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.02

Performance standards

Should EPA require compliance with the performance standards, or should the rule specify that proper design, installation, operation and maintenance would satisfy the permit terms until it is reissued? 67 Fed. Reg. at 17143, Col. 3.

The rule should specify that proper design, installation, operation and maintenance will satisfy the permit terms until the permit is re-issued. To the extent that the permitting authority requires specific information for a determination of compliance, such information can be requested when the permit is being renewed. In any event, Georgia Power believes that if any compliance monitoring is required, it must be streamlined.

EPA Response

Please see comment 316bEFR.034.040.

Comment ID 316bEFR.043.041

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Should EPA grant exception for an entity whose costs are "significantly greater" rather than "wholly disproportionate to the costs in EPA's record"? 67 Fed. Reg. 17146, 17166.

"Significantly greater" is a more appropriate standard. Georgia Power agrees with EPA 's effort to make the site-specific determinations more available to Phase II facilities, for which complying with new technological standards may be more complicated than for Phase I facilities. Also, site-specific determinations in general are an appropriate way to allocate the burdens of compliance, and the "significantly greater" standard in particular is amore reasonable means for allowing that option to be pursued where merited. Note, however, as discussed in Part II, Georgia Power believes "significantly" should be dropped so that site-specific determinations can be pursued where the cost to the facility is "greater" than EPA's costs.

EPA Response

See responses to 316bEFR.018.009 and 045.012.

Comment ID 316bEFR.043.042

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

Will the proposed performance standards, which are less stringent than Phase I threshold, invite backsliding by facilities that already have superior technologies than this proposed rule requires? 67 Fed. Reg. 17146, Col. 2. State and federal law allow backsliding only under certain narrow circumstances.

Those laws should continue to apply regardless of this rule.

EPA Response

See response to 316bEFR.021.013.

Comment ID 316bEFR.043.043

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

Should restoration measures be allowed only as a supplement to installing control technologies or operational measures? 67 Fed. Reg. 17146, Col. 3.

No, as discussed in Part IL restoration should be allowed as a 100% substitute, where it will achieve similar or better results as installing the proposed technologies. The purpose of the rule is to reduce impact; EPA should explore all ways to do so. Furthermore, the more restoration is allowed, the greater the possibility facilities will have credits to sell and trade; the more efficiently facilities can allocate resources to meet the standard, the better the results.

EPA Response

For discussion of restoration measures as a supplement to technology, see EPA's response to comment 316bEFR034.043.

Comment ID 316bEFR.043.044

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Should voluntary restoration measures be considered in determining what counts toward compliance? What criteria should be included for measuring effectiveness? 67 Fed. Reg. 17166, Col. 3.

Any restoration effort should be considered toward compliance. Restoration is an excellent way to give industry the flexibility it needs in trying to achieve meaningful reductions in impact. EPA should focus on the overall goal of building and maintaining sustainable communities of the species involved. Restoration is another way of achieving that goal, and may significantly improve the cost-effectiveness of reducing adverse environmental impact. The appropriate criteria to determine effectiveness will vary and should be left up to the Director and the state's natural resources expertise.

EPA Response

For a discussion of the use of restoration measures, see EPA's response to comment 316bEFR.034.044.

Comment ID 316bEFR.043.045

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Which, if any, restoration approach makes the most sense: discretionary, mandatory or restoration banking? 67 Fed. Reg. 17169 - 17170.

Discretionary restoration with the option of restoration banking. Each situation is too different, and facilities and permitting agencies need the discretion to employ appropriate restoration where they make the most sense. As a practical matter, mandatory restoration is unwise as it ignores cost benefit considerations, especially in situations where a technological fix will not only be less costly, but can also be implemented much more rapidly with almost instant results. As a legal matter, the Clean WaterAct does not authorize nor give EPA authority to require restoration in the NPDES permitting context. Still, restoration should be strongly encouraged and made broadly available as an option. Same with restoration banking -- this should be made available, but not mandatory. It is a means for bringing market forces to bear on allocating resources, so the market forces should be left to decide how it works.

What should be the spatial scale on which restoration can take place and be attributable to a facility? Water body, watershed, state...? 67Fed. Reg. 17146, Col. 3.

The largest possible scale on which restoration will, as a biological matter, adequately displace impacts. This may be complicated, but EPA should strive to broaden the availability of restoration if the program is to work.

How do you measure "substantially similar performance" of restoration measures?. What can be done to reduce the uncertainty? How do you measure success or failure9 Should a facility be required to restore more individual species than are being impinged/entrained? 67 Fed. Reg..17147, Col. 2.

Restoration is imprecise, and its success or failure should be measured in terms of whether, over the term of the permit, and beyond, as appropriate, the restoration measure provided a similar level of stability to the overall population of the species in question that other technologies meeting the standards would have provided.

A facility should not be required to restore more species than are impacted. However, for purposes of trading or other state or local reasons, a facility should be allowed to restore more than are impacted. One way to continue to emphasize the need for the broadest parameters for restoration and credit trading is that ~f restoration is encouraged on a larger scale, we will have better and better information about it, and future restoration efforts may not be so uncertain.

EPA Response

Please see EPA's response to comment 316bEFR.034.045.

Comment ID 316bEFR.043.046

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.07

RFC: Restoration above BTA level

Who is the appropriate authority for establishing margins of safety and measures to ensure safety of restoration activities? What is an appropriate basis on which to add safety margins (e.g. project uncertainty, nature of species, etc.)? 67 Fed. Reg. 17 147-8.

EPA should establish some guidance in the final rule on restoration ratios, with some flexibility However, this is an area where the permit writer must rely on the State Water Resources and Fisheries expertise. A "one-size-fits-all" approach to this issue would only discourage practical and highly beneficial uses of restoration.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to satisfy the requirements of the final rule, see EPA's responses to comments 316bEFR.060.026 and 316bEFR.212.001.

Comment ID 316bEFR.043.047

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

Should additional (incidental) environmental benefits be considered besides impingement and entrainment m determining proper restoration measures? (e g , habitat conservation) If so, how? [key restoring water quality may benefit species more than reducing direct impacts] 67 Fed Reg 17148

Absolutely. EPA's goal should be focused on preservation of the aquatic environment, however that preservation is efficiently assured. If for example, some action improves water quality in a way that contributes to the health of the population, by all means, credit should be given to the owner/operator

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.043.048

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

Should fish & wildlife agencies be consulted or involved in restoration measures? If so, what information should be submitted to state, tribal or federal fish & wildlife agency? What should be the role of fish & wildlife agencies in any site-specific approach? 67 Fed. Reg. 17146-7, 17167

Fish & wildlife agencies should be involved in restoration issues, particularly state agencies, since it is not only largely their jurisdiction, but also because they are far more familiar with the particular issues of the individual water bodies. All relevant information already prepared for the application should be made available, as needed, to the fish & wildlife agencies. EPA should recommend that facilities consult with the fish & wildlife agencies in designing a site-specific approach.

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

Comment ID 316bEFR.043.049

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Are the narrative criteria at proposed 40 CFR §125.95(b)(1) sufficiently comprehensive and specific to ensure adequate data is used to determine best available technology? 67 Fed. Reg. 17148.

In general, narrative criteria are difficult to implement and present opportunities for abuse. To improve this provision, EPA should specify with more clarity, exactly what is required. Further, EPA should use quantitative requirements whenever appropriate.

EPA Response

EPA agrees that the narrative criteria at § 125.95(b)(1) of the proposed rule alone will not be sufficient for basing a best technology available (BTA) determination. For this reason, EPA has required that facilities conduct quantitative studies or present existing data that is reflective of current conditions before state permitting Directors may make determinations as to which compliance option will be appropriate. Please refer to EPA's response to comment 316bEFR.034.066 for more details.

Comment ID 316bEFR.043.050

Subject Matter Code 12.02

RFC: Monitoring frequencies

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Should EPA set specific, minimum monitoring frequency requirements to deal with uncertainty? One suggestion: once a month over 24 hour period for at least 2 years following permit issuance. Would more frequent sampling be needed to accurately assess diel, seasonal and annual variations in impacts? 67 Fed. Reg. 17149.

EPA should not set minimum monitoring frequency, except to state that monitoring data should be generated as long as necessary to provide representative data. The Director should determine what frequency of monitoring would be appropriate, taking into consideration the circumstances unique to the situation. Some facilities will be dealing with very predictable outcomes, and should not be held to the same level of monitoring as a facility dealing with unique problems and stresses on the biotic population.

EPA Response

Please see EPA's response to comment 316bEFR.034.050.

Comment ID 316bEFR.043.051

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 13.0

More Stringent Requirements

Should EPA allow the Director to require more stringent controls where ordinary compliance would slow the recovery of a listed species? 67 Fed. Reg. 17151.

Only where impingement mortality and entrainment at the facility are clearly primarily responsible for the slow recovery. If there are numerous stressors affecting the species' recovery, the Director should be required to consult with the state's natural resources agency and, as appropriate, the US Fish & Wildlife Service to determine whether other factors should be more closely considered than the CWIS.

EPA Response

Please see response to comment 316bEFR.002.016 and 316bEFR.030.002.

Comment ID 316bEFR.043.052

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

Is the threshold ofdiverting 5% mean annual flow of a river useful for triggering entrainment controls? What about spawning season flows?

Georgia Power recommends using spawning season flows with a threshold of at least 15%.

EPA Response

Please refer to the response to comment 316bNFR.034.022.

Comment ID 316bEFR.043.053

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 15.01

RFC: State or Tribal alts. achieve comparable perf.

Should EPA allow states and tribes to suggest an alternate regulatory requirement at the watershed level which would achieve comparable reductions in impacts? If so, what should definition of watershed be? Should states be allowed to demonstrate comparable performance at the state level instead? 67 Fed. Reg. 17152.

This is a good idea. This is one potential mechanism for allowing states and tribes to continue with pre-existing, successful state programs.

EPA Response

Today's final rule maintains the prerogative of a permitted State to demonstrate to the Administrator it has adopted alternative requirements that will result in reductions in impingement mortality and entrainment within a watershed comparable to those that would be achieved under § 125.94. This alternative recognizes the successful achievements of many states in regulating environmental impacts associated with cooling water intakes. In today's final rule, EPA has deferred the decision on the appropriate definition of watershed to the permit director, however, the State's alternative regulatory requirements must be submitted to EPA for review and approval.

Comment ID 316bEFR.043.054

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

What criteria should EPA use to determine whether an alternate state or tribal program to reduce impingement and entrainment mortality is “functionally equivalent”? Should restoration and habitat enhancement be part of a functionally equivalent program? 67 Fed. Reg. 17180.

Restoration and enhancements should certainly be part of a functionally equivalent program. The overall goal is protecting populations. Relying on “functionally equivalent’ further emphasizes this point EPA is right to focus on the bottom line of population protection, and all the features EPA has proposed -- trading, restoration, habitat enhancement, etc. - help focus everyone on the primary purpose of reducing overall adverse impacts.

EPA Response

See response to comment 316bEFR023.001.

Comment ID 316bEFR.043.055

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 15.03

RFC: Watershed boundaries within political?

At what scale should a watershed be defined to reflect the variability of the receptors? Should watershed boundaries lie within political boundaries of a tribe or state? 67 Fed. Reg. 17152.

The watershed should be defined in the broadest possible terms which make sense as a biological matter. If the watershed goes beyond the jurisdiction of the state or Tribe, the state or Tribe should seek cooperation from the neighboring jurisdiction. If that cooperation can be established, comparable performance should go forward. Although this sounds complicated administratively, we believe in the long haul states and Tribes will successfully establish these relationships, and that industry will be able to allocate its resources toward their most effective use.

EPA Response

This comment is identical to 316bEFR.034.055. Please refer to the response to that comment.

Comment ID 316bEFR.043.056

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Should EPA use minimum standards for comprehensive cost evaluation studies (to qualify for the site-specific option)? EPA also invites comment on the burden reviewing these studies places on permitting agencies 67 Fed Reg 17153.

Only if such minimum standards do not exclude any significant number of facilities from having a fair opportunity to present their case It is reasonable to ask a facility for the information the Director needs, but it is not reasonable to exclude a facility that would otherwise qualify for a site-specific determination from seeking one because it has no way to get the information EPA is looking for. - Any minimum standard should allow for exceptions The important thing is that the standards be designed so no facility that would qualify for a site-specific determination is arbitrarily forced to comply with the proposed standard, and to absorb particularly high costs.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For more information on the cost-cost test and the cost-benefit test, please refer to the responses to comments 316bEFR.410.001 and 316bEFR.005.020, respectively.

Comment ID 316bEFR.043.057

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Should EPA base best technology available on closed-cycle, recirculating technology? 67 Fed. Reg. 17155.

No, EPA has gone on record concerning the prohibitive costs associated with existing CWIS, and how the Phase I rule was strengthened to take a more flexible approach toward existing facilities.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.043.058

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.08

Burden on permitting agencies (general)

What are the burdens of a site-specific Option on permitting agencies? Have the resource requirements created a disincentive for revisiting permit conditions every 5 years? 67 Fed. Reg. 17167.

Georgia Power does not believe that site-specific determinations are necessarily more burdensome on the agency.

EPA Response

See response to comment 316bEFR.034.058.

Comment ID 316bEFR.043.059

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Should EPA allow impingement trading, as well as entrainment trading? EPA views impingement control as inexpensive, so there is more need for entrainment trading. 67 Fed. Reg. 17170.

If in fact impingement trading is truly unlikely to generate any real interest, then there is not much sense in establishing a program for it. But EPA should not be quick to dismiss it. There may be instances where facilities are located in close proximity and can work together to allocate the impingement mortality reduction more efficiently through credit trading. Again, trading programs -- for impingement mortality, entrainment, restoration -- all serve to make compliance more effective by reducing costs and maximizing benefits.

EPA Response

This comment is identical to 316bEFR.034.059. Please see response to that comment.

Comment ID 316bEFR.043.060

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.02

RFC: Would trading afford greater protection?

Would a trading program afford greater watershed protection by being designed to increase the number of facilities involved?

Absolutely. Trading programs are desinged to spread the resources across a large spectrum of responses to a similar problem. EPA's mission is to lessen CWIS impacts nationwide. It makes sense that programs to make the best use of resources, such as a trading program, will necessarily result in more reduction of impacts.

EPA Response

Please see response to comment 316bEFR.034.027 for the role of trading in today's final rule.

Comment ID 316bEFR.043.061

Subject Matter Code 20.08

RFC: Challenges of implementation of trading

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Should it be mandatory, to consider credit purchases before the Director determines technology requirement? 67 Fed. Reg. 17170.

No.

EPA Response

This comment is identical to 316bEFR.034.061. Please see response to that comment.

Comment ID 316bEFR.043.062

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.03

Spatial scale for entrainment trading

What should the spatial scale be for trading? Waterbody? Watershed?

General waterbody type - the scale that will encourage the most trading - although EPA should monitor trading to ensure that neither impacts nor benefits become too geographically concentrated as a result of trading.

EPA Response

This comment is identical to 316bEFR.034.062; please see the response to that comment.

Comment ID 316bEFR.043.063

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.04

RFC: Potential trading units/ credits

What should be the trading unit? Species density? Species counts? Biomass? Should trading be species-specific? 67 Fed. Reg. 17171.

Species density makes more sense than species counts, since density speaks more to the overall health of the population than simple counts, which fail to account for variations in population size. Biomass is too general to prevent impacts to a certain species; trading should at least attempt to be species-specific to ensure that the offsets are truly offsets.

EPA Response

This comment is identical to 316bEFR.034.063. Please see response to that comment.

Comment ID 316bEFR.043.064

Author Name E. Fitzergerald Veira
Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.03
Spatial scale for entrainment trading

Should a national register of trades be established, as opposed to doing it on the local scale? 67 Fed. Re-g. 17173.

Yes. Again, as long as it satisfies the biological benefits of a trading program and does not concentrate impacts or benefits, it should be done on as large a scale as possible.

EPA Response

This comment is identical to 316bEFR.034.064; please see the response to that comment.

Comment ID 316bEFR.043.065

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 20.07

RFC: Harmonize of permit reissuance with trading

When should permits be reissued to -trading partners? Should timing be harmonized among partners in a trading area? 67 Fed. Reg. 17173-75.

Harmonizing trading could cause more problems than it solves. If a facility has a credit to sell, it should be able to hang on to that credit until it finds a trading partner, even after it receives its permit. The timing issue should be made an issue for purchasers of credits only, since these facilities will need to procure credits to show that they meet the standard. If the system can be designed so that the sellers are under no time pressure to sell their credits, but still have plenty of incentive to create saleable credits even in the absence of an immediate buyer, then there should not be a major timing issue.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.043.066

Author Name E. Fitzergerald Veira

Organization Troutman & Sanders obo Georgia Power

Subject Matter Code 21.01

Submittal of required information

Should EPA establish a specific time frame for submitting the information collection proposal required as part of the Comprehensive Demonstration Study? Should the Director's approval of the info collection be required? 67 Fed. Reg. 17175.

There is no reason to mandate a timing. Facilities should know that submitting the information collection in advance is in their interest. Approval of the director is not necessary either, although the director should be required to respond if any additional information is needed within 60 days of receiving the information collection, so that facilities will have time to follow up.

EPA Response

See response to comment 316bEFR.034.066.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Peter Maclaggan

On Behalf Of:

Poseidon Resources

Author ID Number:

316bEFR.044

Comment ID 316bEFR.044.001

Author Name Peter Maclaggan

Organization Poseidon Resources

Subject Matter Code MISC

Miscellaneous comment

The following comments are in response to the draft regulations the U.S. Environmental Protection Agency (EPA) is developing pursuant to section 316(b) of the Clean Water Act. They are submitted as part of the formal public comment process and we request that they be included in the record. The Clean Water Act requires that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. EPA's analysis in support of the proposed regulations to date has focused exclusively on near-field environmental effects. We are concerned that the proposed regulation adopts a simplistic approach, ignoring the potential benefits associated with use of existing seawater intakes to support the development of environmentally superior water supplies for the coastal regions of the nation.

Poseidon Resources Corporation is working with a number of water agencies to advance the development of several large-scale seawater desalination facilities in the coastal regions of Southern California, Texas and Florida. These projects are co-located with existing seawater-cooled power stations and reuse the cooling water discharge from the power plant as the source water to the desalination facility. Thus, they are effectively recycling an existing wastewater discharge and creating a number of meaningful environmental benefits as a result.

In California alone, over 200,000 acre-feet per year (AFY) are currently under development. These projects would directly offset the water supply needs of more than one million people that would otherwise be exported from environmentally sensitive areas such as the Sacramento-San Joaquin Delta and the Colorado River and they are considered critical elements of CALFED Bay-Delta Program and the Colorado River 4.4 Plan. The desalination
projects in Texas and Florida would offset demands on groundwater and surface water supplies that are already taxed beyond sustainable levels.

Additionally, recent environmental studies in California and Florida indicate that the combination of desalination plant and power plant discharges significantly reduce the impact of power plant thermal discharge on the environment. However, these environmental benefits, along with the water supply benefits, will not be realized if the promulgation of the Section 316 (b) regulation discourages the co-location of desalination facilities with existing power stations. This is because the economic viability of seawater desalination is closely linked to the ability to use the existing intake and outfall associated with a seawater cooled power generating station.

The scope of section 316(b) inquiry is not limited to the area of the environment directly under the influence of the intake. To the contrary, section 316(b) is a broadly worded statute that simply directs EPA to minimize adverse environmental impact, regardless of location. We urge EPA consider the broader implications of the proposed regulation. Specifically,
EPA needs to consider the opportunity to encourage the environmental benefits of co-locating desalination facilities with existing seawater intakes and in the process of doing so, encouraging the development of environmentally sensitive water supplies.

EPA Response

Because there are no flow restrictions under the final Phase II rule, no allowance would need to be made for Phase II facilities co-located with desalinization plants.

If a desalinization plant is a permitted point source and uses some of the water it withdraws for cooling, then the 316(b) regulations (Phase I or Phase III) could apply to it. The Phase II regulations apply only to facilities that generate and transmit or sell power and, therefore, would not apply to desalinization plants unless they share an intake with a power plant. Furthermore, the distillation plants use water for cooling, but they probably also use the cooling water for process water, so these facilities probably would not meet the threshold for national regulation established in Phase I. Under the Phase I rule, facilities are covered by the national rule if they have a design intake flow of more than 2 million gallons per day (MGD) and if 25% of their intake is for cooling, but facilities do not need to count water withdrawn for cooling if it is recycled and used for another process. Facilities that do not meet the threshold requirements regarding the amount of water withdrawn for cooling purposes must meet any requirements established on a case-by-case, best professional judgment basis.

Some desalinization plants share intakes with power plants. In such situations, the 316(b) regulations would apply to the intake flow attributed to a desalinization plant if the intake flow the flow threshold, but the power plant would be the permitted entity. For example, in Tampa, co-location of a 100 MGD intake/50 MGD freshwater output desalinization plant at a large once-through power plant allows the desalinization plant to use power plant cooling water as its intake without increasing overall water withdrawals and impingement and entrainment from Tampa Bay. The desalinization plant discharges 50 MGD brine to the power plant's large discharge flow, which minimizes the salinity impacts on Tampa Bay (no more than 0.1 part per thousand increase at the outfall and no change from background a short distance from the outfall). There may be more situations like this in the future because of the availability of a large piece of waterfront industrial property or an existing intake structure that the desalinization plant can use without having to go through the permitting process and NEPA/SEPA reviews, or because of some other useful feature of the power plant.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Lynn Church

On Behalf Of:

Electric Power Supply Assoc

Author ID Number:

316bEFR.045

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), UWAG (316bEFR.041)

Comment ID 316bEFR.045.001

Subject Matter Code 1.01

Comment period

Author Name Lynn Church

Organization Electric Power Supply Assoc

The Electric Power Supply Association (EPSA) is pleased to have an opportunity to provide comments on the proposed rulemaking affecting existing sources under Section 316(b) of the Clean Water Act.

EPA Response

EPA appreciates the comments of the Electric Power Supply Association.

Comment ID 316bEFR.045.002

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 17.08

Option: UWAG's recommended approach

EPSA has been actively following the development of rules under 316(b) and has provided comments on previous proposed regulations. In addition, a number of EPSA members are active participants in other industry groups, including the Utility Water Act Group (UWAG), Edison Electric Institute (EEl) and the Electric Power Research Institute (EPRI). Comments being prepared by those industry groups reflect EPSA member concerns about a number of technical issues raised by this rulemaking. The focus of our comments in this letter will be concerns related to the effects of this rulemaking on the competitive power industry.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

No further response is required. EPA notes the commenter's support for these comments.

Comment ID 316bEFR.045.003

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 7.01.03

Option 3--Site-specific determination

As competitive suppliers of electricity to a deregulated marketplace, EPSA members support the development of environmental regulatory programs that use market-based mechanisms to the extent possible, ensure equal treatment for all participants, and provide flexibility that enables affected facilities to achieve compliance through cost-effective solutions. EPSA member companies own and/or operate nearly 100 of the 550 facilities estimated by EPA to be affected by this proposed rulemaking. We recognize that EPA has an imposing task ahead in preparing guidance documents for implementation of the 316 (b) regulations for existing sources, and we would welcome the opportunity to work with EPA in developing this guidance.

We believe that the 316(b) rule for existing sources can address the needs of the competitive electricity market, and we offer the following comments in support of that belief.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.045.004

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Flexibility

As EPA has noted, there are numerous factors that affect impingement and entrainment potential at a given cooling water intake structure (CWIS). Because of the variety of locations of power plants, it is critical that the regulations allow the affected facilities flexibility in evaluating and implementing compliance measures. EPSA, therefore, supports the provisions in the proposed regulations that would allow flexibility, such as:

-Alternative technologies to meet performance requirements. By not requiring cooling towers, existing facilities will be able to implement effective aquatic life protection technologies at much lower cost, depending on site-specific circumstances.

-Combinations of alternative methods to meet performance requirements. A combination of methods provides more cost-effective approaches to be taken by existing facilities.

-Varying performance requirements based on water body type, since the same level of fish protection is not necessary in all water body types.

-Varying performance requirements based on water withdrawal rate and capacity utilization rate recognizing that reduced flows and seasonal operations may have less potential impact on the environment.

-Use of site-specific standards, based on valid and appropriate cost-cost and cost-benefit tests.

-The voluntary restoration option as an alternative to technologies for compliance. In some cases, this option may result in a greater environmental benefit than if compliance is addressed by meeting the performance standard using technologies whose performance varies with site-specific conditions.

-Use of trading. EPSA supports the adoption of trading as a tool to facilitate compliance among participants. A well-designed trading program promotes flexibility among the permittees while preserving appropriate measures of environmental protection. Trading can be employed in several ways such as regional or localized methodologies, restoration banking, re-establishment of fish migration pathways, and fish stocking. We have additional thoughts on trading and have addressed these in a separate section later in our comments.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

The commenter supports numerous facets of the rule and applicable references for a more detailed discussion for each are:

-Final rule not based exclusively on cooling towers: section VII of the preamble
-Waterbody type-based standards: 316bEFR.061.004 and § 125.94(b)
-Withdrawal rates and capacity utilization: 316bEFR.061.004 and § 125.94(b)
-Cost tests: 316bEFR.005.020 and 316bEFR.410.001
-Restoration: sections VII and VIII of the preamble to the final rule
Trading: sections VII and VIII of the preamble to the final rule

Comment ID 316bEFR.045.005

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

EPA Determination Regarding Best Technology Available (BTA) is Correct

EPSA supports EPA's decision not to require cooling towers to meet performance requirements. In some cases, a CWIS can provide more efficient and economical operation (resulting in decreased price pressure for electricity) and less environmental impact when considering not only impacts to water resources but also impacts to air and land.

EPA Response

The Agency has concluded for the final rule that modifications to existing intake structures can provide more efficient and economical decisions compared to cooling tower retrofits at existing facilities. As such, the Agency agrees with the comment.

Comment ID 316bEFR.045.006

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Clarification Regarding Need For Subsequent Demonstrations

The requirement for submittal of a Comprehensive Demonstration with every NPDES renewal application is unnecessary and will result in delays in the issuance of NPDES permits for existing facilities. This assessment is based on current experience with permitting authorities and the time needed to review 316(b) documentation and develop facility NPDES permits. EPSA believes that a demonstration at every permit renewal is a burden for state environmental agencies and is not necessary if there are no substantive changes at the facility or water body. After successful demonstration of compliance with the requirements of the final regulation, at each later permit renewal, the permit writer should accept the initial demonstration, unless there are significant changes in plant operations or significant adverse changes to the aquatic populations, in accordance with specific, agreed-upon criteria to be adopted by EPA.

EPSA supports EPA's intention to allow the use of previously conducted relevant and substantive demonstrations studies for initial NPDES permitting under this proposed rule for an existing facility in lieu of the proposed Comprehensive Demonstration Studies. EPSA requests that EPA provide clarification for the definition of significant changes to the water body and/or facility that would have to occur before a revised 316(b) demonstration would be required. Further, EPSA recommends that the primary responsibility for identifying significant changes in water bodies be placed on state natural resource agencies that have the appropriate experience and information available to make such determinations.

EPA Response

EPA agrees that the submittal of a complete Comprehensive Demonstration Study with each permit renewal might not be necessary. Please see EPA's response to comment 316bEFR 041.126 for EPA's discussion on reducing burden associated with permit renewal.

EPA agrees that existing studies may be used as part of the Comprehensive Demonstration Study, so long as the studies are reflective of current conditions, but EPA does not agree that such studies may be used in lieu of the Comprehensive Demonstration Study in its entirety. For EPA's position on the use of existing demonstration studies, please see EPA's response to comment 316bEFR.040.001.

Finally, EPA disagrees that the natural resource agencies should be responsible for identifying significant changes in a facility's source waterbody or at a facility's intake structure. Rather, EPA believes that if a facility wishes to reduce its information collection burden at permit renewal, it must prove to its permitting Director that conditions remain substantially unchanged and therefore no additional information collection is warranted.

Comment ID 316bEFR.045.007

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 21.09

Permit applications/implementation schedule

Implementation

EPSA requests that EPA clarify implementation of the proposed regulations through the NPDES permitting process. The time between the effective date of the final rule and implementation has not been defined. Since some facilities may have NPDES permits up for renewal soon after the issuance of the final rule, these facilities will require additional time to prepare work plans and conduct studies required for the application EPSA specifically requests that EPA clarify in the final rule what the application requirements will be and how soon applications will need to comply with the final rule.

As proposed, EPA suggests that the permit application process would be the mechanism for submittal of the demonstration study. In order to allow sufficient time for all permittees to be able to comply with the 316(b) study requirements, EPSA believes that the requirement for the preparation and execution of the study plan should be incorporated into the first renewal of NPDES permit following the promulgation of this regulation. The specific requirements for the studies would be accompanied by a compliance schedule for executing the various activities This approach will allow facilities and the regulatory authority to have an agreed-upon scope and timeframe for completing the work plan and allow sufficient time for agency review.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066. For a discussion of how compliance with the final rule may be determined, see the preamble to the final rule.

Comment ID 316bEFR.045.008

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 21.03

Monitoring requirements

Compliance

EPSA requests that the regulation include language to establish that compliance with the permit conditions associated with the 316(b) regulations is based on proper installation, operation, and maintenance of the selected approach in accordance with the Demonstration Study, rather than on a numeric performance standard. If a facility's post-demonstration monitoring studies indicate that the numeric performance standard has not been met, the facility's liability should be limited to adding technologies, taking necessary operating measures, or using restoration measures to meet the standard. EPSA also requests that the regulation define "compliance monitoring" as the assurance (through record keeping) that the installed technology is being maintained and operated properly.

EPA Response

Please see EPA's response to comment 316bEFR.035.028.

Comment ID 316bEFR.045.009

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Economic Analysis

We commend EPA's proposal to include a cost-benefit analysis. In fact, we believe it is essential to make the rule workable due to the uncertainty that the entrainment alternatives suggested by EPA will be feasible for all facilities. EPA focuses on the monetary costs associated with installing BTA controls compared to the benefits of a reduced level of impingement and entrainment (I & E); at this level of simplicity, EPA's proposal is appropriate.

EPA Response

EPA agrees that cost benefit analysis provides a useful discussion of the costs and benefits of a regulation or other action. EPA would also like to point out that regulatory decisions are based on many factors, and that the Agency considered all of the relevant data, including qualitative benefit estimates, in the section 316(b) rulemaking process. See also EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.045.010

Author Name Lynn Church
Organization Electric Power Supply Assoc

Subject Matter Code 10.1
General: cost tests

However, as EPA develops various methods of performing this cost-benefit analysis, there are omissions and errors in the methods of deriving cost and benefits and ultimately in the comparison of costs to benefits.

EPA Response

See response to comments 316b.efr.045.011 through 316b.efr.045.019 for responses to the specific points referenced in this generic introductory statement.

Comment ID 316bEFR.045.011

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Lynn Church

Organization Electric Power Supply Assoc

Cost Benefit Analysis

EPA considers four alternatives for determining the best technology within the proposal. Only one of these, "the benefits should justify the cost test" (FR p. 17165) is consistent with standard economic criteria and is universally accepted in economics and routinely practiced. This alternative should be the only method included in the final rule as it is the only method that reliably results in decisions to select the alternative with highest overall benefits to society.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.045.012

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

Of the other three methods proposed, the wholly disproportionate cost test and the modified wholly disproportionate cost test will routinely lead to results which make society worse off because they often lead to the identification of a set of alternatives, all of which have benefits that are less than the costs. The "significantly greater than cost test" could lead to the selection of an option from a set of alternatives, all of which have no net or even negative net benefits.

EPA Response

See response to 316bEFR.005.018. EPA would add, regarding the significantly greater cost test, that CWA section 316(b) does not establish a standard for environmental protection that requires that EPA maximize net benefits. Rather, Congress requires in section 316(b) application of the best technology available for minimizing adverse environmental impact. Moreover, EPA has long recognized that there should be some reasonable relationship between the cost of cooling water intake technology and the environmental benefits associated with its use. (See, 41 FR 17387; 65 FR 49094). Such a relationship exists where technologies are economically practicable, but does not require that EPA maximize net benefits. The final rule's compliance alternatives, including the site-specific determination of BTA and the significantly greater test, are reasonable when assessed in this context.

Comment ID 316bEFR.045.013

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Cost Evaluation

EPA has not adequately addressed all elements that should be included in the cost assessment of new intake technology. Technical feasibility and reliability, adverse environmental and other effects, and possible safety concerns do not seem to be considered. EPSA recommends that these items, along with a full technology effectiveness assessment, be included in the cost-benefit analysis for each BTA alternative technology as follows:

Effectiveness: The potential effectiveness of the alternative technology selected to reduce impingement and entrainment of aquatic organisms should be evaluated with consideration to the overall effect on the aquatic ecosystem, including an estimate of the anticipated change in the aquatic population. EPSA supports EPA's decision to consider survivability of aquatic biota with respect to both entrainment and impingement when performing a cost benefit assessment.

Technical feasibility, reliability, and safety: Technical feasibility involves an analysis of the technical difficulties associated with the construction, operation, and maintenance of the selected BTA alternative. Reliability involves analysis of the alternative's consistent ability to deliver water to the cooling system. The long-term reliability of each alternative depends on reasonable levels of maintenance to clean and repair elements of the technology.

For example, for a fine mesh screen alternative, the extent and frequency of screen clogging would be estimated and facility maintenanc requirements associated with screen clogging would be considered in the analysis. For an aquatic filter barrier system alternative, the ability of the technology to reliably withstand natural forces, such as storm-induced wave activity for power facilities in open coastal environments, should be considered. Also, for certain applications, the required size of an aquatic filter barrier may be large enough to be a potential barrier to navigation.

Reliable water supply is critical to the safe operation of power plants, especially nuclear power facilities. EPSA supports EPA's decision to allow for a site-specific determination of BTA if there are conflicts with Nuclear Regulatory Commission (NRC) safety requirements. Issues regarding plant safety, operating staff and the surrounding community should be considered.

In summary, EPSA believes that selection of intake technologies for a given site should consider site-specific considerations in the feasibility assessment, including the demonstration in practice of a considered technology under equivalent conditions before being considered as required technology for a particular facility.

Net Environmental Impacts: Consideration of net environmental impacts (other than on aquatic ecology) should include water resources, noise, air emissions, aesthetics, safety, navigation, local law compliance and cost. For example, a cost-benefit analysis of a wet cooling tower alternative would include water consumption, noise, fogging and icing, salt deposition, air emissions (directly from the cooling tower and attributable to electricity consumption and unit efficiency), and aesthetic or visual impacts.

Benefit Analysis

EPSA has several concerns regarding EPA's treatment of benefits analysis associated with this rulemaking. In the paragraphs that follow, we will elaborate on our view that EPA overestimated the benefits of the regulation, used inaccurate supporting data, and used invalid methods to estimate benefits. In particular, EPA's use of the Habitat Restoration Cost (HRC) method as a surrogate for real benefit estimation is completely inappropriate.

1. EPSA is concerned that EPA overestimated the benefits of the regulation. One of the assumptions used in the benefits analysis is 100% mortality for all entrained organisms. Several studies (discussed in more detail in EPRI/UWAG comments on the proposed regulation) have shown that for many species there is significant survivability associated with entrainment. EPA has also assumed that there is no compensation for entrainment losses of eggs and larvae. Studies have shown (again, discussed in more detail in EPRI/UWAG comments) that natural systems compensate for such losses in order to maintain an adult population that is in dynamic equilibrium. EPSA believes that adequate data exist to make reasonable estimates of the level of entrainment survivability and compensation for the benefits analysis in the regulation. If such reasonable estimates are not included, EPA should, at a minimum, explain why they are not included and state that the benefits are likely overestimated.

EPA Response

The commenter asserts that EPA has not adequately addressed elements in the cost analysis, and then fails to provide evidence to support this claim.

The commenter asserts that the Agency did not address technology effectiveness. However, the Agency did address technology effectiveness in its evaluation of costs as an integral element in the selection of technologies at model facilities. The Agency's analysis and methodology for applying costs to model facilities is presented in the Technical Development Document, wherein the issue of technology efficacy is further discussed.

The commenter asserts that the Agency did not address technical feasibility, reliability, and safety in its analysis of costs. However, the Agency did address these issues in its evaluation and selection of candidate technologies applied to model facilities. The Agency conducted research on and outreach with state-of-the-art fish protection technologies and integrated technical feasibility, reliability, and safety study into its documentation of the candidate technologies. For more information see the discussion of each of the "technology cost modules" in the Technical Development Document.

The example provided by the commenter of a fine mesh screen alternative is illustrative of the Agency's point. The Agency analyzed and included costs for fine mesh screens reflective of a realization that maintenance requirements associated with screen clogging would be an integral piece of the analysis, so much so that the Agency includes in its technology cost modules the ability to delineate moderate or high debris loading dependent on Site-Specific factors of the model facility. Furthermore, the commenter's example of aquatic filter barrier systems underlines the Agency's commitment to a site-specific analysis of costs. The Agency was aware of the issue of filter barrier nets and questions of its reliability to withstand strong tidal forces. Hence, the Agency did not apply this technology to any model facility cases in which strong tidal forces would jeopardize the technology's effectiveness. Finally, regarding the example of navigation and barrier technologies: the Agency refers the commenter to the Technical Development Document, in which they will find ample discussion of the Agency's approach to incorporating waterbody navigation and technology feasibility into the analysis of costs for the final rule. Suffice it to say, this item is explicitly accounted for by the Agency for every model facility in the final costing analysis.

Because the commenter supports the final rule's provision for the consideration of site-specific determinations based on NRC safety considerations, then no response is necessary to the previous assertion that the Agency failed to account for this item in the final rule, as the commenter explicitly contradicts himself.

EPA agrees that Habitat Restoration Cost (HRC) method estimates costs and not values to society and therefore is not a surrogate for benefits. Therefore, the HRC is not used in the benefit analysis of the final regulation.

Please see the response to comment 316bEFR.306.506 for the discussion on the appropriateness of EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Please see response to comment 316bEFR.025.015 for a discussion on density dependence.

Comment ID 316bEFR.045.014

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.03.06.01

Pilgrim

It should also be noted that there are several errors and inconsistencies in the benefit analysis conducted by EPA. For example, there are large discrepancies in the number of fish impinged at Pilgrim Station that was used in the in the draft regulation and supporting documentation. It is not clear which of these values EPA actually used in the benefit analysis, and the impact on the results of the analysis can be substantial. EPSA recommends that EPA review and verify the accuracy of the data used in all Case Studies given that these results are relied on to demonstrate the benefits of the rule and could result in substantial overestimates of benefits.

EPA Response

The commenter indicates there are errors and inconsistencies in EPA's analysis but does not provide specific examples. However, EPA believes this comment mischaracterizes its analysis and notes that EPA conducted extensive QA/QC on all of its analyses for the final Phase II rule, as discussed in its QA/QC Plan (Docket #6-1002). Please see responses to related comments on the Pilgrim analysis: 316bEFR.029.106 and 316bEFR.029.103.

Comment ID 316bEFR.045.015

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's HRC method is purely a measure of costs, not benefits. The habitat replacement costs are the design, implementation of administration maintenance, and monitoring costs of various identified means of restoring underwater habitats in the hope of producing the same in-situ services and services flows that are associated with the various technological alternatives under consideration. In other words, these are the costs of other alternatives for achieving the functions as targeted by the proposed rule. While voluntary stocking and/or habitat restoration are acceptable alternative approaches as alternatives to the installation of specific technologies in order to offset entrainment and impingement losses, the cost of such alternatives is in no sense whatsoever a reasonable proxy for the value (i.e., benefit) of reducing entrainment and impingement. At best this method yields the cost of yet another alternative, not the benefit of the original alternatives.

EPA has deviated from proper economic analysis through the application of this method in case studies supporting the rulemaking. Virtually any alternative could be justified by this approach. Simply taking the next, more costly, alternative and calling that the benefit will always result in a finding that "benefits" exceed cost. Thus, EPSA believes that the benefits of the rule have been inappropriately determined and EPA has put forward a flawed methodology that cannot be used either in support of the rulemaking itself or in any decisions made on facility-specific basis. EPSA is concerned with the precedent that could be set by this approach, not just for this rulemaking and its application to the industry but in other rulemakings that affect the industry. EPSA requests that the final rule be amended to allow this method to be used only for the purpose of estimating cost of habitat replacement as a restoration measure.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (Docket # XX) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.045.016

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.02.05

Valuing CWIS effects on other species

Another issue that has not been addressed by EPA is with regard to the variable “worth” of various aquatic organisms in specific waterways. In some areas of the country, natural resources managers are actively trying to remove certain exotic, nuisance fish species from their waterways. In other instances, the quality of certain indigenous species is low and of minimal importance to both the recreational industry as well as the overall food web in the waterway Allowances should be made for those facilities whose main impact is demonstrated to be primarily on these “low quality” and/or nuisance organisms.

EPA Response

Problem species are not included in EPA's benefits analysis for the final section 316(b) Phase II rule.

Comment ID 316bEFR.045.017

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 9.0

Costs

Estimated Cost of Compliance

EPSA is concerned that EPA's cost estimate for compliance with the proposed regulation underestimates the potential compliance costs. We believe that sufficient data do not exist to estimate the costs for retrofitting existing power plants with technology that can achieve the entrainment reduction requirements in the regulation - 60% to 90% for many facilities. Such reductions can potentially be achieved by aquatic filter barrier systems, fine mesh screens, or cooling towers, but not at all facilities.

EPA Response

The Agency disagrees with the comment. First, the Agency believes that the final regulation reasonably estimates the potential compliance costs, as documented further in the Technical Development Document. Second, the Agency believes that the entrainment reduction standards of 60 to 90% have been well researched and documented for the technologies considered in the costs development of the final rule. For information on the efficacy of the technologies capable of meeting the entrainment reduction targets, see the technology efficacy section of the Technical Development Document. The commenter states that the reductions can "potentially" be achieved by a select set of technologies, but not at all facilities. While the Agency disagrees with the general assertion, it recognizes that the site-specific nature of fish protection may complicate compliance for a subset of facilities (beyond the wide set of conditions analyzed by the Agency in the final rule). The final rule provides for the flexibility that should a facility determine that the cost of meeting the entrainment reduction targets exceed those considered by the Agency that site-specific alternative requirements be provided for that case. Therefore, the commenters concerns have been considered and met.

Comment ID 316bEFR.045.018

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 7.03.01

Sample facilities/technologies

The proposed regulation gives only one example each for applications of aquatic filter barrier systems and fine mesh screens. It is our understanding that each of these applications has required extensive efforts to achieve some level of reliable operation and the target entrainment reductions. The costs associated with implementing these technologies nationwide cannot be extrapolated from these applications. We understand that several pilot and laboratory studies have been performed that indicate that these technologies can achieve the goals. However, until there are more practical applications in the field, the total costs associated with system installation, fine-tuning, optimization, and maintenance for these technologies cannot be estimated with a great degree of confidence. Even then, these technologies will not be applicable to all power plants.

EPA Response

See responses to comments 316b.EFR.034.008, 316b.EFR.060.038, 316b.EFR.077.033, 316bEFR.100.004, and 316bEFR.902.001. Also see comments 316b.EFR.088.008, 316b.EFR.207.009.

Comment ID 316bEFR.045.019

Author Name Lynn Church
Organization Electric Power Supply Assoc

Subject Matter Code 17.03.01
Ex. facilities converted to closed-cycle

In the proposed regulation, EPA has identified three facilities that operated as once-through cooling plants and then converted to closed-cycle plants using cooling towers. We believe that this is an inadequate database to use for the extrapolation of nationwide costs. Two of the three facilities are located in South Carolina, none are located along the coast, and only one is larger than 500 MW. None of the conversions occurred in the last decade. It is unclear how the availability of fresh water and cost of a reliable fresh water supply were considered in the cost estimate. Fresh water allocation and consumption have become increasingly important considerations nationwide with increased competition for water resources in recent years.

EPA Response

The Agency notes that it identified 4 cooling tower retrofit projects, not 3 as the commenter asserts. However, the Agency does not consider cooling tower retrofits as an appropriate basis for the final rule.

The Agency agrees that the small number of cooling tower retrofit projects that have been completed does not present a sufficient data base for extrapolation to national costs because EPA has concerns about how representative these examples are. Of the four retrofit projects, only two were at facilities greater than 500 MW (not one, as the commenter asserts), but this is still a small set.

Comment ID 316bEFR.045.020

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Economic Practicability

EPA claims that the rule will not be damaging to companies that must bear its costs based on a comparison of the annual cost of the rule to the annual revenues of the companies affected by the rule. This comparison is inappropriate, even if compliance costs are a small percentage of annual revenue: such costs may cause some otherwise profitable firms to lose money on an ongoing basis. Additionally, the business structure of a typical EPSA member is not the traditional utility structure that can be looked at in the large firm sense. Individual facilities may need to be profitable on their own in a merchant market. Required installation and maintenance of control technologies at these independent sites could create a considerable financial burden that may not be offset by fixed contract sales, given the other operations/maintenance and capital costs associated with independent power producers.

EPA Response

Please refer to the response to comment 316bEFR.005.021 in subject matter code 9.01 for a discussion on EPA's economic practicability determination.

EPA notes that the energy market model analyses conducted to assess the economic impacts of the proposed rule, the NODA preferred option, and the final rule assess the impacts of compliance costs at the facility level, not the firm level. These analyses have shown that the expected economic impacts of the Phase II rule on complying facilities are generally small (see Chapter B3, DCN 6-0002).

Comment ID 316bEFR.045.021

Author Name Lynn Church
Organization Electric Power Supply Assoc

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Restoration

EPSA supports voluntary restoration as an alternative means of addressing adverse environmental impacts. EPSA also supports the appropriate application of the HRC method to estimate the costs when using habitat as a means of addressing impingement or entrainment losses; however, EPA has made errors in the application of this method in the proposed rulemaking. Below are three reasons why restoration should remain voluntary:

1. EPSA supports EPA's inclusion of restoration as a means of achieving compliance under the proposed regulation. In many situations, restoration may provide the most effective, environmentally compatible, cost-effective, and reliable alternative to achieve mitigation for both impingement and entrainment losses. However, restoration may not be appropriate for all facilities; therefore, as is currently the case in the draft rule, restoration measures should remain voluntary. Further, EPSA recommends that EPA allow facilities and States flexibility to implement restoration measures.

For example, in many freshwater reservoirs the gizzard shad species may be the most common species impinged. States should have the flexibility to use restoration measures that enhance populations of more desirable recreational species than gizzard shad as long as gizzard shad populations are not impaired. Similarly, states and facilities should be allowed discretion to allow broad use of restoration on a geographic basis, such as restoring populations in an area or water body such that there would be a greater environmental benefit that focuses on the vicinity of the facility.

EPA Response

For a discussion of the extent to which restoration measures are voluntary in the final rule, see EPA's response to comment 316bEFR.060.022.

The final rule allows permitting authorities the flexibility to make decisions on the appropriate methods of assessing restoration measure performance on a site-specific, case-by-case basis. All restoration measures must meet the requirements described in the final rule, including those in sections 125.94 and 125.95.

EPA agrees with the commenter that restoration measures may not be feasible for every permit applicant.

Restoration measures must take place in the same waterbody or watershed that contains the cooling water intake structure causing the impingement and/or entrainment impacts. For additional discussion of the appropriate spatial scale on which to conduct restoration measures, see the preamble to the final rule.

For a discussion of the extent to which restoration measures may incorporate state program priorities,

see EPA's response to comment 316bEFR.099.029.

Comment ID 316bEFR.045.022

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

As previously stated in our comments EPSA believes the HRC method is inappropriate for use in estimating benefits. Additionally, EPA's use of the HRC to estimate restoration costs in the 316(b) Case Studies is flawed.

For example, in the Brayton Point Case Study, the selection of habitat restoration alternatives for several species was cursory and limited. Several species would either not be helped by the selected restoration project, or there would be more appropriate alternatives that would provide more improvement per unit of restoration. In order for the restoration project to help the particular species whose losses are being mitigated, that species needs to be limited in productivity by something provided by the restoration.

For example, if winter flounder I & E losses are to be mitigated by a tidal wetlands restoration project, as proposed in the Brayton Point and Pilgrim Station Case Studies (Chapters F and G, respectively), then that project should help winter flounder productivity and/or provide equivalent services by increasing productivity of another species. Moreover, if there is an alternative project that would be of more use to winter flounder productivity, this should be selected instead. This example is used because winter flounder do not rely on tidal wetlands (salt marshes) for completing their life cycle and, although winter flounder may be found in salt marshes, the productivity of the species would be unlikely to show much benefit from salt marsh restoration. In addition, the size of a restoration (or created) habitat area for a specific species should consider additional production of that species in the restored (or created) habitat. Another item that should be considered, particularly when the restoration requirements and costs are determined by a single species, is stocking. It should be noted that stocking of winter flounder is currently being conducted at Pilgrim Station and the initial results are encouraging.

EPA Response

First, EPA notes that it did not use the Habitat-based Replacement Cost (HRC) method to estimate benefits for the final Section 316(b) Phase II rule. For additional information, on the method and its uses, please see the document entitled “Habitat-based Replacement Cost Method” (DCN 6-1003).

With regard to site-specificity of restoration cost estimates, EPA disagrees with the commenter's assertion that EPA's estimates are "flawed." EPA met with and received information from local experts with experience in the types of restoration under consideration. EPA believes that the information was sufficiently site-specific, and sufficiently reviewed by local experts to prevent any systematic bias of unit costs. For additional discussion of HRC restoration costing, please see response to Comment 316bEFR.029.119.

Regarding the selection of restoration actions, the assignment of each species to a restoration alternative reflected the consensus of the local experts who were requested to indicate what single action would most benefit the species in the general habitat where the I&E losses were being experienced.

For example, for the Brayton Point Station HRC case study referred to by the commenter, the focus was on actions that could be taken in the waters of, and connected to Mt. Hope Bay and Narragansett Bay. These assignments were made recognizing that local fish populations could be experiencing population pressure from other sources (e.g., commercial fishing) and that some species could benefit from a range of actions.

With this focus on incorporating local knowledge and information, it is possible that species assignments may contradict findings from other regional efforts. However, selecting a preferred restoration alternative based on information on local habitat utilization and constraints is entirely appropriate and should be a component of any reasonable restoration efforts that are looking to offset localized impacts with projects that would be implemented in the same general area.

Finally, EPA's disagrees with the concerns expressed about the restoration action selected for winter flounder. Winter flounder show a high degree of variability in the habitat utilization of young-of-the-year, which are found in marsh creeks (Roundtree and Able, 1992, DCN # 6-2092). Marsh creeks are a feature tidal wetlands (personal communication K. Raposa, Narragansett Estuarine Research Reserve, 2001, docket number 4-1763). This information supports that conclusion that tidal wetland restoration will benefit is winter flounder.

Comment ID 316bEFR.045.023

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

We have a number of cautions regarding the application of the HRC approach to validating that Habitat Enhancement/Restoration offsets resource and ecosystem losses. In most cases proving this offset biologically (that is, demonstrating that an equal or commensurate number of larvae or adult fish of same or similar species are replaced by restored or enhanced habitat) is an unreasonable if not impossible task. In most water body situations, particularly estuarine environments, the number and variety of impacts on the water body are far too complex to reasonably correlate habitat modifications with long term and complex species population variations.

For these reasons, we strongly recommend that any true-up mechanisms for demonstrating the success of habitat restoration and its correlation to CWIS effects be confined to physical demonstration achieved by use, for example, of aerial imaging to verify changes in: water quality (clarity), in habitat quality and quantity, and sedimentation as determined by bathymetric measurements. These types of verifications avoid the much more difficult and variable biological demonstrations of species replacement, which are subject to too many other impacts to accurately correlate to CWIS-related changes.

In conclusion, we do not believe reliance on the HRC approach for demonstrating replacement of biological losses is a valid, defensible, or reliable method. However, the Habitat Equivalency Analysis model itself, given adequate availability of species data, may be able to serve some purpose in acting as a “reality check” on general mitigation acreage requirements of the habitat restoration/program.

EPA Response

EPA did not use the Habitat-based Replacement Cost (HRC) method to estimate benefits for the final Section 316(b) Phase II rule. However, for additional information on the method and appropriate uses, please refer to the document entitled "Habitat-based Replacement Cost Method" (DCN 6-1003). As this information makes clear, HRC is a type of HEA, and therefore if the commenter considers HEA a valid methodology, it is unclear why the commenter rejects HRC.

An HRC analysis provides a comparison of the cost of offsetting I&E losses through habitat restoration with the cost of preventing I&E losses through "best technology available" (BTA). This comparison can be useful for determining the efficacy of actually requiring a technology for a facility or type of facility, for determining possible actions to offset residual I&E that will continue with a technology, and for comparing relative costs of technologies and offsets that may be under consideration at a facility or type of facility.

With respect to habitat restoration alternatives included in EPA's HRC analyses presented at proposal, EPA met with and received information from local experts with knowledge about which restoration alternatives would most efficiently address the majority of species being lost to I&E in the vicinity of the facilities. EPA believes that the information was sufficiently site-specific, and sufficiently reviewed by local experts to include the most relevant restoration alternatives that could address the majority of species in a practical, cost-effective approach. EPA deliberately avoided including highly experimental or uncertain restorations for species that had no obvious and practical restoration opportunities.

Comment ID 316bEFR.045.024

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Trading

EPSA supports EPA proposal to develop a trading program to provide more flexibility for implementation. However, the devil is in the details of such programs. EPSA and its members have a great interest in supporting market-based mechanisms and look forward to working with EPA to develop the details. EPA should draw from its experiences with the various air trading programs and previous natural resource trading programs for fisheries, wetlands, and zoning. A well-designed trading program provides greater flexibility to the permittee and so facilitates greater environmental improvements. Some thoughts on general details:

-The spatial scale for trading should be the largest geographic area possible in order to provide maximum flexibility.

-The unit for trading should be determined based on what promotes achieving the goals at the lowest costs.

-The trading program must take into account how new facilities will be treated. New facilities should be included in the program to avoid the creation of a two-level playing field and to improve the fluidity of the market.

-EPA should consider expanding the trading program to include other stressors to relevant water bodies. Expanding the potential participants will increase participation and improve market viability. (Stressors identified by EPA in the proposed rule include: habitat alteration, coastal development, dredging, fishing, industrial pollution, nutrient pollution, and waste water runoff)

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule. Please see response to comment 316bEFR.077.052 regarding the unit of trading, comment 316bEFR.077.051 regarding the spatial scale of trading, comment 316bEFR.005.045 regarding trading among new facilities, and comment 316bEFR.005.046 regarding trading for other stressors.

Comment ID 316bEFR.045.025

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 7.01.03

Option 3--Site-specific determination

In summary, EPSA supports the components of the proposed 316(b) regulations that allow flexibility in the evaluation and implementation of appropriat compliance approaches.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.045.026

Author Name Lynn Church

Organization Electric Power Supply Assoc

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

EPSA does, however, have concerns regarding EPA's economic analyses of alternatives, especially with regard to errors in the development of costs and benefits, as well as the application of the HRC method for estimating benefits. EPSA also requests the clarification of several implementation considerations, as noted.

EPA Response

EPA disagrees that the benefit cost analysis prepared for the 316(b) regulation is seriously flawed. No methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003). The Agency believes that despite its limitations, the benefit cost analysis prepared for the final 316(b) rule provides useful, significant, and sufficient information for rulemaking purposes regulatory decision.

EPA has responded to specific concerns regarding the development of costs in Section 9.0 of the 316(b) Phase II Response to Public Comments document.

EPA has responded to specific concerns regarding the development of benefits in Section 10.02 of the 316(b) Phase II Response to Public Comments document.

The habitat-based replacement cost (HRC) method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment # 316bEFR.005.035. For additional information on the HRC, please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003).

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Shirley M. Ruffin

On Behalf Of:

SCANA Services, Inc.

Author ID Number:

316bEFR.046

Comment ID 316bEFR.046.001

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Facilities which withdraw cooling water from zones that would preclude significant entrainment or impingement of aquatic organisms should be exempted from any requirement to perform a Comprehensive Demonstration Study. For example, South Carolina Electric & Gas Company's McMeekin Station withdraws cooling water from Lake Murray through one of the intakes of the Saluda Hydro facility. This arrangement enables McMeekin Station to withdraw cooling water from an average depth of about 140 feet below the surface of the reservoir. At this depth, the presence of viable larval fish or other planktonic organisms is unlikely. Impingement related to McMeekin Station is also unlikely since Saluda Hydro intakes employ bar racks only to screen large debris. It would also be extremely difficult to implement a sampling plan that would quantitatively sample the biological assemblages at this depth.

EPA Response

In the example given, it is possible that the facility does not cause impingement mortality or entrainment of organisms to a level above that of the performance standards, though EPA has left such determinations to the individual permitting Directors. Please see EPA's response to comment 316bEFR.041.007 for EPA's position on facilities with impingement mortality and entrainment rates lower than today's performance standards.

Comment ID 316bEFR.046.002

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 21.06.01

Implications for nuclear facilities

Retrofit costs for nuclear facilities could be much greater than for fossil facilities. The availability of a cost test that balances the conversion costs from once-through cooling to closed-cycle cooling against the actual environmental benefits is crucial.

EPA Response

The cost to cost and the cost to benefit tests have been retained for the final rule. Cooling tower retrofits do not form the basis of requirements for the final rule. The Agency recognizes that costs at existing nuclear facilities will exceed those of fossil-fuel facilities, see response to comment 316b.EFR.029.027.

Comment ID 316bEFR.046.003

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 21.0

Implementation

The final rule will probably cause a flurry of activity in the development and implementation of comprehensive demonstration plans and compliance monitoring. This could put significant strain on the pool of contractors available to perform these activities. The limited availability of qualified contractors could cause delays or sub-standard data quality.

EPA Response

EPA disagrees that the implementation schedule will pose an unreasonable burden on contractors. It is EPA's experience that a sufficient number of qualified contractors will be available to assist facilities and States as needed.

Comment ID 316bEFR.046.004

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 1.01

Comment period

The size and complexity of the proposed rule, with its many alternatives and options, hinders its evaluation and the development of comments.

EPA Response

EPA has made substantial efforts to help explain the complex issues inherent in 316(b), and done a great amount of public outreach, including responding to comments, creating a publicly available record and hosting conference calls. EPA notes that no specific questions were identified by the commenter.

Comment ID 316bEFR.046.005

Subject Matter Code 7.02

Performance standards

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

SCANA has concerns over how "calculation baselines" would be determined. Would the baseline calculation assume a particular flow rate and velocity? Facilities with existing low velocity intakes (< 1 fps approach velocity) and resulting low impingement numbers might be penalized for their good design if they were expected to reduce their impingement by 80 - 95% from what they currently experience. If a higher velocity intake were assumed, the calculation baseline could be much higher. The higher the calculation baseline, the more "improvement" could be shown for any facility modification. In the case of facilities with intake canals, how would they scale their existing impingement numbers for a hypothetical shoreline intake? If the EPA intends to go forward with the "calculation baseline" concept, then it needs to develop detailed guidance on how the baseline would be calculated and ensure that the methodology doesn't unnecessarily penalize plants with good impingement performance.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.046.006

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

A "significantly greater" cost test is appropriate for evaluating requests for alternate requirements by Phase II existing facilities.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.046.007

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

EPA should not be concerned about backsliding of facilities that currently exceed the requirements of the draft rule. If the draft rule adequately protects aquatic life, there is no reason to require more stringent measures.

EPA Response

See response to 316bEFR.021.013.

Comment ID 316bEFR.046.008

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

EPA should allow habitat conservation as a component of a facility's restoration effort.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.046.009

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 21.03

Monitoring requirements

Any impingement and entrainment compliance monitoring schedules must take into account maintenance and/or refueling outages at generating facilities.

EPA Response

In today's final rule, permit applicants must submit proposed monitoring parameters and schedules under the verification monitoring plan. Therefore the facility has the opportunity to propose a monitoring schedule that do not conflict with other activities for the review and approval of the Director

Comment ID 316bEFR.046.010

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 14.02

RFC: Alt. thresholds for entrainment (E) controls

SCANA supports the use of spawning season flows rather than mean annual flows in determining thresholds for entrainment controls. Larval fish and shellfish would be expected to be present in the greatest numbers in waterbodies during the spawning season. Five percent of the spawning season flow is a more realistic impact threshold than 5% of the mean annual flow.

EPA Response

EPA believes adopting a seasonal flow based on spawning events would be difficult to incorporate into a permit as seasonal flows, as well as spawning and migration patterns, are rarely consistent year to year. Incorporating a seasonal flow (or other standard) into a permit would introduce unnecessary implementation and monitoring costs on both the permitting authority and the facility. EPA believes the design intake flow standard for riverine facilities affords a level of protection for the source water body acceptable under most, if not all, stream conditions. The 5% threshold provides a consistent metric against which permit requirements can be developed. Today's rule maintains the 5% mean annual flow threshold.

Comment ID 316bEFR.046.011

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

SCANA supports the UWAG proposed definition of Adverse Environmental Impact.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.046.012

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

SCANA believes that the final rule should permit the use of previous section 316(b) demonstrations for determining whether there is adverse environmental impact and the best technology available for minimizing adverse environmental impact. A previously conducted demonstration should be allowed if it was previously submitted to and accepted by the state regulatory agency.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.046.013

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

SCANA believes that cost-effectiveness evaluations and operational and/or restoration measures are appropriate components of a site-specific approach to determining best technology available for minimizing adverse environmental impact.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to the preamble to the final rule.

Comment ID 316bEFR.046.014

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 11.1

RFC: Discretionary restoration approach

SCANA supports a discretionary restoration approach.

EPA Response

For a discussion of the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.046.015

Author Name Shirley M. Ruffin

Organization SCANA Services, Inc.

Subject Matter Code 11.12

RFC: Restoration banking

SCANA also supports the concepts of restoration banking and entrainment trading.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Deborah French McCay

On Behalf Of:

Applied Science Assoc., Inc.

Author ID Number:

316bEFR.047

Comment ID 316bEFR.047.001

Author Name Deborah French McCay
Organization Applied Science Assoc., Inc.

Subject Matter Code 10.02.03
Use of Replacement Costs (HRC and hatchery-based)

Introduction and Summary

On behalf of the owner of the Brayton Point Station, PG&E National Energy Group, I have reviewed the HRC methodology contained in the proposed 316(b) rule, specifically focusing on the application by the EPA to the Brayton Point cooling water intake system Impingement and Entrainment (I&E) losses. I have identified a number of flaws in EPA's use of the HRC methodology and its application to the Brayton Point Station. My comments are summarized here and explicated in detail in the following sections.

Inappropriate Use of Habitat Replacement Costs as Valuation (Benefit) Measure: EPA proposes to use estimates of replacement cost (via habitat restoration) as a substitute for valuation of I&E losses. This is incorrect both conceptually and in result, as the value of resources to humans is unrelated to the costs of restoring or replacing those resources. Common and low value species may be expensive to restore simply because no research has been directed at that effort, while valuable species may be relatively inexpensive to restore. While not an appropriate tool for valuation of I&E losses, in some circumstances habitat replacement may be appropriate to offset or mitigate I&E losses.

Failure to Identify Appropriate Restoration/Enhancement Techniques that Provide Net Gains in Species Productivity: EPA asserts that it has chosen the most effective HRC method to mitigate the loss of each type of species lost to I&E at the Brayton Point Station (p. F5-1). However, this is not in fact the case. In order for a restoration technique to provide a net gain for the particular species whose losses are being mitigated, the productivity of the species needs to be limited by something provided by the restoration project, such that there is a resulting net gain in production. Moreover, if there is an alternative technique that would result more of an increase in a species productivity at the same or less cost, this alternative should be selected instead. The life history of the I&E species needs to be researched carefully to identify the limiting factor(s) for the population during each life stage. The limiting factor is typically very different at different life stages. Thus, the restoration technique needs to be targeted to specific life stages and provide something that is limiting to the growth and survival of that life stage. One problem with EPA's application of HRC to Brayton Point (admitted by EPA) is that for some species the selection of restoration alternatives was cursory and limited. The productivity of several species would not gain by the selected restoration technique selected by EPA. As to other species, there are more appropriate alternatives that would provide more production gain per unit of restoration. No criteria are provided or apparently followed by EPA as to how the preferred alternative was selected.

Failure to Account for the Various Ecological Services Provided by Habitat Restoration/Enhancement Projects: Most of the ecological services provided by I&E losses are as food to the marine food web. The purpose of habitat restoration/enhancement should be to provide a net improvement in fish production and not to offset each individual one-for-one with the same species affected by I&E. EPA has failed to consider or quantify provision of ecologically equivalent services to those provided by the I&E losses. One-for-one replacement would only be warranted if the population is limited by the size of the spawning stock. If abundant eggs are produced by the spawning stock, such that the population is limited by other factors than supply of new eggs to the population, one-for-one replacement of that species is not needed.

Need to Identify Most Cost Effective Method for Restoration: Alternate restoration projects being considered as mitigation should be scaled and costs developed, such that the most cost-effective option may be chosen. Since direct one-for-one species replacement is typically much more costly than the value (economic benefits) of the I&E losses, replacement of ecological services is a much more appropriate approach.

Inappropriate Dismissal of Restocking as a Preferred Restoration Alternative: The EPA has stated that there is considerable uncertainty in the success rate of restocking programs and so has dismissed it as a viable method, choosing instead habitat restoration. However, restocking is the most direct way to replace I&E losses, particularly for those species where an appropriate habitat restoration technique cannot be shown to provide a net gain in production or is not feasible. The uncertainty of the success of the habitat restoration and its ecological effects on the target species is as large or larger than for restocking.

Errors in Methods Used to Estimate Production: EPA has failed properly to calculate the net production gained by habitat restoration/enhancement techniques. EPA incorrectly used abundance as a proxy for production. The correct methodology is to use production foregone on the loss side of the equation, and balance this with production gained by all age groups owing to the restoration. Additionally, discrepancies exist in the methods EPA used in their HRC calculations between the Seabrook/Pilgrim case study and the Brayton Point Station study. EPA utilized results from the same studies to determine the average density of species between the two sites, while using very different survival rates from juvenile to age-1 to convert the juveniles measured on these habitats to age-1 equivalents. Since the same studies were used to derive the densities on each habitat type, it does not follow that the survival of individuals in these habitats would differ. EPA has also made errors in its calculation of production foregone on the loss side of the equation, resulting in inflated estimates of losses.

Errors in Methods Used to Estimate Costs: EPA's estimate for the unit cost of SAV restoration is almost three times higher than that derived by NOAA's Restoration Center (in Guidelines for the Conservation and Restoration of Seagrasses in the U.S and Adjacent Waters). EPA's restoration cost for shallow artificial cobble reef, which is the habitat for which it projects a gain in juvenile tautog productivity, are erroneously based on costs for constructing a deeper artificial reef designed for lobsters and that would be of no use to young-of-the-year tautog. In addition, costs for a 1024 m2 reef are scaled up to a hypothetical 41 km2 reef project, which is both infeasible and inappropriately costed as explained in detail below.

Failure to Identify Most Cost Effective Method for Mitigation: The appropriate decision process is to select alternatives that either (1) provide habitat that is limiting to the population's productivity (i.e., is useful in increasing productivity because the habitat is in limited supply and/or in degraded condition), (2) reduce mortality to fishing and other causes, (3) replace missing individuals using restocking techniques, or (4) provide equivalent ecological services. EPA has decided a priori that habitat restoration should be the method used, regardless of net gains in productivity and reasonableness of costs.

Appropriateness of Using a Mitigation Ratio Greater than 1:1: The purpose of a mitigation ratio (where more mitigation is to be performed than would be needed based on calculations of production lost versus production gained) is to compensate for the uncertainty of the success of the mitigation project. If all of the gains of the mitigation project were in fact estimated in a quantitative fashion, the mitigation ratio might be warranted. However, in the case where all the services gained are not quantified, the scale of the mitigation already over-compensates for the losses. EPA has not accounted for many of the ecological services supplied by restoration projects. In contrast to EPA's conclusions in Chapter F5-9, the case study does not underestimate needed mitigation because EPA failed to consider all ecological services provided by the proposed restoration. Moreover, EPA has not identified the most effective restoration alternatives for several of the species. Thus, habitat restoration scaled in this manner should not be mitigated at a greater than 1:1 ratio.

Each of these points will be explicated in detail below.

Inappropriate Use of Habitat Replacement Costs as Valuation (Benefit) Measure

In its proposed 316(b) rule, EPA proposes to use estimates of replacement cost (via habitat restoration) as a substitute for conceptually sound and empirically valid methods of valuing I&E losses. In essence, EPA claims that the cost to restore resources is a correct measure of their value. This is conceptually incorrect, as the economists have noted. The value of resources to humans is unrelated to the costs of restoring or replacing those resources. For example, it might be quite inexpensive to restock a species that is highly valued for commercial or recreational fishing or non-use (i.e. the value that people may derive simply from knowledge of the species existence in some area), and likewise it may be relatively expensive to restore another species that has been little studied with respect to restoration methods (precisely because of its low commercial, recreational, and non-use value). Using restoration costs as a measure of value would lead to exactly the wrong conclusion: the implication would be that the high-value species has low value because of the low costs required to restore it, and the low-value species has high value simply because it is relatively costly to restore it.

As the economists have pointed out, EPA is committing a fundamental error by confusing costs and benefits in its attempt to substitute an "avoided cost" estimate for a real measure of true benefits to humans.

EPA incorrectly states (Chapter A11-1.3) that the use of HRC as a valuation method is consistent with federal court findings regarding NRDA regulations under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Oil Pollution Act of 1990 (OPA). In fact, Congress created a special exemption from the general rule in these two statutes. That exemption is not available in the context of NPDES permits. Moreover, even where the exemption applies, Congress and the courts have required that the cost of restoration be proportionate to the value of the injured resources.

The economists have documented elsewhere the inappropriateness of using habitat replacement or species restoration costs as economic valuation methods. As biologists, we address a different issue in these comments: whether EPA has appropriately laid out the concepts and methods to estimate restoration costs associated with I&E losses in its HRC method. This is itself an important question, because while the cost of restoration/replacement is not a reasonable proxy for the economic value (that is, the benefits) of reducing I&E, habitat restoration and/or restocking may be acceptable approaches as alternatives to the installation of specific technologies in order to mitigate I&E losses. Hence, in the remainder of these comments, we address EPA's recommended methods for mitigation and attempts to estimate its costs, with particular focus on the case study of the Brayton Point Station.

EPA has failed to Identify Appropriate Restoration/Enhancement Techniques that Provide Net Gains in Species Productivity

EPA asserts that it has chosen the most effective HRC method to replace each of the I&E species for the Brayton Point Station (p. F5-1). However, this is not in fact the case. In order for the restoration technique to be of assistance to the particular species whose losses are being mitigated, the productivity of the species needs to be limited by something provided by the restoration project, such that there is a net gain in production. Moreover, if there is an alternative technique that would result more of an increase in a species productivity for the same or less cost, this alternative should be selected instead. For example, if survival is controlled by predation, providing a refuge from predation would improve production. If however, food is more limiting to growth and survival, restoration that provides additional food or feeding habitat would be the appropriate choice to improve production. Thus, the life history of the I&E species needs to be researched carefully to identify the limiting factor(s) for the population during each life stage. The limiting factor(s) are typically very different at different life stages. Thus, the restoration technique needs to be targeted to specific life stages and provide something that is limiting to the growth and survival of that life stage.

One problem with EPA's application of HRC to Brayton Point is that the selection of restoration alternatives was according to EPA itself cursory and limited (Chapters F5-3 and F5-4). EPA also relied heavily on the advise of personnel from environmental groups, who are not restoration experts. The productivity of several species would not be increased by the restoration technique selected by EPA. As to other species, there are more appropriate alternatives that would provide more production gain per unit of restoration. Several species and EPA's selected habitat techniques are examined below to demonstrate the flaws in EPA's selected restoration/enhancement techniques for mitigating the Brayton Point I&E.

The tables in Appendix A (attached) summarize the life history of the species entrained and impinged at the Brayton Point plant. Information was sought on the habitat usage by each life stage and the factors and habitats that are likely limiting to that life stage. This type of analysis should be used in identifying potential restoration alternatives that would in fact provide a net gain to the populations of concern. While EPA briefly summarizes the life history of I&E species (Chapter F3), it fails to identify the likely limiting factors for the species involved. Instead, the use of a habitat by a life stage is implicitly assumed to be indicative that the amount and/or quality of that habitat available is limiting to production. In some cases EPA arbitrarily assumes a habitat restoration technique will produce a net gain in production, even if there is no evidence that it would be beneficial to the species.

Tautog (Tautoga onitis)

Eggs, larvae and juvenile tautog utilize shallow (especially <1m deep) vegetated habitats, such as eelgrass (Zostera marina) and seaweed (macroalgae, e.g. Ulva lactuca, Codium fragile, Enteromorpha sp., Chondris crispus, Fucus sp., Laminara sp.) for development, feeding and refuge from predators. As eelgrass beds are limited in extent in Narragansett and Mount Hope Bays, macroalgal habitat is the dominant benthic cover in shallow waters and is an important nursery area for this species. In her four-year study of the distribution, abundance and habitat characterization of juvenile tautog, Dorf (1994 PhD thesis, University of Rhode Island) found the habitat that produced large numbers of juveniles in all years was characterized by a sandy bottom and consistent density of medium to high (25% to >75%) macroalgal cover. This contrasted with shallow areas with gravel/cobble bottom and little to no macroalgal or eelgrass cover, which supported no more than one juvenile collected in any year. The mean monthly juvenile tautog density for sixteen Narragansett Bay sites in shallow water of varying vegetation cover density ranged from 0.03-8.1 fish per 100 m2. An average of 3.48 " 1.4 tautog per 100 m2 were collected at the station of medium to high macroalgal cover that consistently produced large numbers of juveniles between June and October 1988-1992. This is opposed to the mean density of 0.012 " 0.04 tautog per 100 m2 caught during the same sampling period at the gravel/cobble bottom station with little to no macroalgal or eelgrass cover (Dorf, 1994).

Adult tautog utilize vegetated habitats, as well as natural and artificial reefs and structures. As tautog are considered over-fished, the adult population size is limited primarily by mortality to fishing. Deeper reef structures, such as those in Dutch Harbor used for cost information on artificial reefs (Chapter F.5-7.3), might reduce predation mortality on adults (although evidence for this is lacking), but would be of no use to egg, larval or juvenile stages. The most effective means of replacing adult tautog would be to reduce fishing pressure, an option listed by EPA in Chapter F5-3 but not discussed or considered further. This option should be considered, along with habitat restoration and restocking (see discussion below).

If habitat restoration is to be used for mitigation, rather than creating artificial reef in relatively deep water (used by adults) to offset tautog I&E losses, it would be more beneficial to restore eelgrass and/or macroalgal species in shallow water areas. While macroalgal restoration has not been attempted in the area, macroalgae typically colonize eelgrass beds and shallow rock-boulder areas that are relatively stable (as opposed to continuously shifted by surf). Thus, the addition of substrate in shallow water (eelgrass or possibly other structures) would encourage macroalgal vegetation as well. The restoration of submerged aquatic vegetation (SAV), including eelgrass and macroalgae, would produce more tautog recruits to the population than gravel/cobble bottom, based on the data provided by Dorf (1994).

EPA's extraordinarily high figure for the scale of artificial reef assumed to be needed results in part from inconsistent and incorrect use of data and a lack of clarity on the type of habitat to be restored. While the scaling of the artificial reef was based juvenile production in shallow cobble habitat, the costs were based on deeper artificial reef more suitable to lobster and adult tautog. Either the scaling should have been based on the tautog age classes produced, or (more appropriately) the costing should be for the habitat type to be restored.

Winter and Windowpane Flounder

As EPA itself acknowledges in Appendix A and in Chapter F3, winter flounder do not prefer or rely on tidal wetlands (salt marshes) for completing their life cycle. Although winter flounder may be found in salt marshes, the productivity of the species would be unlikely to exhibit significant changes due to salt marsh restoration. Thus, EPA's choice to restore tidal wetlands in order to mitigate winter flounder is inappropriate.

Similarly, windowpane flounder would not gain significantly from salt marsh restoration. This fact is noted by EPA, and tidal restoration is not selected for that species.

Both these species are limited in production by fishing, predation and other sources of mortality. Fishing pressure has increased substantially over the past few decades, clearly causing a decrease in the populations. Additionally, cormorants, jellyfish, and other predators have increased exponentially throughout the Narragansett Bay system (as well as New England waters) over the last 20 years, which is undoubtedly reflected in higher mortality rates. Potentially, food resources could be limiting, particularly to younger stages. Thus, appropriate restoration techniques would need to decrease mortality, such as further reducing fishing pressure, or improve natural survival rates by changing environmental conditions to be more favorable or by providing food resources to increase growth. Again, EPA has failed to consider further reduction in fishing pressure, which is the most likely method to succeed in increasing flounder production.

The choices of habitat restoration techniques that would increase the productivity of these species are limited. Alternatives for habitat restoration could include:

-Improvement of water quality in waters of low oxygen limiting egg and larval survival

-Reduction of predation losses by creating refugia (possibly by providing alternate food for predators)

-Addition of food to the food web by eelgrass bed restoration, as this is a more productive habitat than open shallow water, and the entire food web (including the flounder) would gain.

In view of the difficulty and uncertainty of habitat restoration, restocking would appear to be the most direct replacement alternative, if it can be performed successfully (see discussion below). EPA is incorrect to rule out restocking as an alternative, only to choose much more uncertain restoration techniques.

Potential Net Gains Resulting from Tidal Restoration by Phragmites Removal

In Chapter F of the proposed rule, the EPA advocates tidal wetland enhancement as the preferred habitat restoration technique to mitigate some I&E losses. The enhancement technique selected involves removal of the common reed Phragmites australis (an invasive reed grass that alters habitat structure) and improvement of tidal flows into the marsh. The goal is to change the common reed marsh to a (native) salt marsh dominated by Spartina spp.

Phragmites australis has expanded rapidly in areal coverage over recent decades in marshlands along the northern and middle Atlantic coasts. The rate and pattern of this increase is perceived as invasive and related to anthropogenic interference either through genetic introductions or disturbance. Thus, the removal of Phragmites is popular and high on the environmental group Save the Bay's list of preferences for restoration. As Save the Bay was a primary organization consulted by EPA (Chapter F5-4), this technique was selected over other possible and more productive wetland restoration options (which don't even appear to have been considered).

There is a general lack of quantitative production data showing that Spartina marshes are more productive than Phragmites marshes. This calls into question the scaling of HRC for marsh alteration from Phragmites to other marsh types to improve productivity.   Thus, the data used to measure net gains needs to be reviewed and selected carefully, to be sure the technique used is in fact one that provides a net increase in ecological services.

EPA did not compare fish production or abundance in Phragmites marshes versus salt marshes in its case study example for Brayton Point. In fact, much of the abundance data used was in not even from wetland habitat (in particular for winter flounder which is supposedly aided by tidal wetland restoration).   Abundance data from a variety of habitats were apparently averaged, and it was assumed that this would be the net gain of a undefined tidal restoration project. Thus, the data used to scale the tidal restoration is entirely unreliable for this use.

Failure to Account for the Various Ecological Services Provided by Habitat Restoration/Enhancement Projects

EPA has failed to account for ecological services provided by the restoration techniques that would be equivalent to the services lost to I&E. Instead, EPA adopted an overly simplistic approach by which it assumes that all individuals need to be replaced in kind. That approach fails to recognize that any given restoration technique may provide equivalent services to I&E losses by increasing productivity of other species of similar ecological role and so mitigate the losses.

Continuing with the winter flounder example: some of the services of winter flounder larvae are to become prey to larger organisms.   Those larger organisms are flexible enough to eat other species of prey, as is the case for most marine predators. Thus, the prey service provided by (age-one) winter flounder can be replaced by production of another or several equivalent prey species. The replacement of winter flounder need only be enough to provide services unique to that species, i.e., larger winter flounder that survive the predation and fishing pressure and contribute to the next generation via reproduction. In order to take this approach, the winter flounder individuals that would otherwise survive would need a refuge from predators and fishing, perhaps by providing predators with alternate food sources or by reducing fishing pressure.

For example, age-one equivalent flounders, which serve primarily as prey for other species, and secondarily as recruits to the fishery, may not themselves be directly aided by the creation of SAV. Yet, SAV produces other species that serve as prey for the fish predators, as well as additional food for flounders and the food web generally. Small fish production in such a habitat should be considered suitable for and taken into account in offsetting the I/E losses of age-one equivalents that would otherwise be taken by predators by virtue of providing the equivalent services. Only the fraction of the age-one equivalents that would otherwise be recruited to the spawning stock and make a difference to the next generation of the species would need to be replaced one-for-one. Moreover, this one-for-one replacement would only be warranted if the population is limited by the size of the spawning stock. If abundant eggs are produced by the spawning stock, such that the population is limited by other factors than supply of new eggs to the population, one-for-one replacement of that species is not needed.

The same point would be made for other species. Some of the services of the species and life stages entrained and impinged are to repopulate the local spawning and fishery stock of that species, while other individuals serve as prey to the food web. As most marine animals are opportunist feeders, replacement of similar sized fish prey would replace those ecological services. Thus, we argue that much (if not all) of the mitigation should be in the form of increased production of similar prey to those lost to I&E. This approach has been used in the restoration of many species injured by the North Cape oil spill (French et al., 2001), and in other NRDA cases, as well as development mitigation projects in development projects.

The basic approach is to select a biological restoration or enhancement activity that will provide a net gain in terms of fish production, such as creating seagrass beds or wetlands (salt marsh) that provide habitat and food services to fish, such that there is a net increase in the total fish production of the ecosystem. Seagrass and wetlands have been shown to be more productive in terms of weight of fish produced per unit area than unstructured habitats. However, because some species prefer open bottom, while others prefer these structured habitats, the net fish production gain may not be of the same species as the losses. It may nonetheless be appropriate if it results in production of similar sized fish which provide ecological services to the food web, as well as other ecological services, and so this is compensatory to the losses (French McCay et al., 2001).

Inappropriate Dismissal of Restocking as a Preferred Restoration Alternative

The EPA has stated that there is considerable uncertainty in the costs and success rate of restocking programs and that there are ecological concerns with stocked animals (Chapter A11-1.1). However, restocking is the most direct way to replace I&E losses, particularly for those species where an appropriate habitat restoration technique cannot be shown to provide a net gain in production or is not feasible. The uncertainty of the success of the habitat restoration and its ecological effects on the target species is as large or larger than for restocking. Restocking directly addresses the lost use as a fishery, which, for example, is a particular concern for winter flounder for which tidal wetland restoration would be of little use.

Despite EPA's concerns associated with hatcheries, such as the idea that propagated fishes might prey on or compete with endangered species or might alter the evolutionary genetics of the native species, there have been numerous success stories for restocking programs. Some species that have increased in productivity from restocking are striped bass, endangered shortnose sturgeon (produced 11,000 fry in South Carolina), rainbow trout, lake trout, and turbot (http://southeast.fws.gov/fisheries/hatcheryindex.html).

There are a number of finfish hatcheries in the northeast United States that are focusing primarily on some of the species that have been listed as being impinged or entrained at Brayton Point CWIS. In particular, these include winter flounder and tautog. For the last three years, winter flounder have been reared at Great Bay Aquafarms in Portsmouth, New Hampshire and Llennoco Inc. in Chatham, Massachusetts, who have been supplying the Plymouth Mass Pilgrim plant, in Plymouth, Massachusetts. Recaptures have been recorded at each location. Great Bay Aquafarms (GBA) specializes in the aquaculture of summer flounder (Paralichthys dentatus), which have a similar life history to the winter flounder (Pleuronectes americanus). The GBA hatchery, alone, has an annual capacity of up to 1 million 5-10 gram juvenile summer flounder for stocking its farm. Once stocked into their on-growing operation, the juvenile flounder then reach a 1.5 kg harvest size in 16-18 months.

Juvenile tautog (Tautoga onitis) are currently being raised and studied at the MIT Sea Grant Fin Fish Hatchery in the historic Navy Yard in Charlestown, Massachusetts. At this site, a relatively new and innovative recirculating system has been constructed. This system requires a tank, from which the water flows out through a particle filter to remove waste and excess feed. A pump is then plumed in to aid in the movement of the water through the rest of the system. The water then gets pumped up through a biological filter that strips the water of toxic forms of ammonia that are dangerous to the animals. Water then passes through a UV treatment to reduce the bacteria and virus growing within the system. The water then returns to the tank. (http://web.mit.edu/seagrant/advisory/hatcheryprojects.html).

Additionally, two sites have been proposed as potential summer flounder hatcheries in Rhode Island (http://www.rilin.state.ri.us/leg_bios/naughton/aqua2/APPB.html). These are AquaFuture and V.G. Sea Farms, which would both be located in the Quonset Point/Davisville Industrial Park in North Kingstown. AquaFuture is proposed to produce approximately 200,000 juvenile summer flounder per year, some of which will then be sold to grow-out facilities such as V.G. Sea Farms and Trio-Algarvio in New Bedford, Massachusetts. At V.G. Sea Farms, shallow raceways and a recirculating system would be used to produce an expected 50 tons of fish per year.

Numerous research projects are ongoing in regards to the proper methods to use in order to get the best net production of these species, especially winter flounder, and to the overall success of restocking programs. In particular, at the University of New Hampshire, Dr. W. Hunting Howell and his PhD candidate, Elizabeth Fairchild, are studying the feasibility of winter flounder stock enhancement, and are attempting to answer some important questions, such as when and where the fish should be released (http://zoology.unh.edu/faculty/howell/grad/efairchild/fairchild.html).

Errors in Methods Used to Estimate Net Gains in Production

EPA improperly used species abundance as a proxy for production

While production is the appropriate scalar for measuring the gains of restoration, as described by EPA in the methodology in Chapter A11, in the Brayton case study (as well as others) EPA has stated that data are lacking and so has used instead abundance estimates, corrected to age-one equivalents, as measures of production (Chapter F5-5). In other words, they have implicitly assumed a production-to-biomass ratio of 1:1 (biomass being the standing stock or abundance at a given instant in time). EPA implicitly assumed that the standing stock is not turned over in time, and that those individuals observed at the sampling time are all the individuals that will be produced that year at that age sampled.

An analogy that illustrates the problem is as follows. If replacement income is sought for a person loosing his job, it is the annual salary that should be replaced. The quantity of dollars present in that person's wallet at any one time (when someone happened to query him) may be larger if their salary is larger, but there is not a one-to-one equivalence between his income and the amount in his wallet on a single day, or even with the average of what is in his wallet on a random sampling of days. If the person is paid his annual salary on one day of the year, and the sampling is made on the day he takes home his money, then perhaps the standing amount in this wallet is equivalent to annual salary.

The assumption of a production-to-biomass ratio of 1:1 is invalid for short-lived species that reproduce multiple times a year or at varying times during the year, such as for many of the forage fishes. Also, if a species has a protracted spawning period, such that individuals pass through a life stage using a particular habitat at varying times, the snap-shot standing abundance at any given time would not capture all the production in the habitat. Only in the limited circumstances when all life stages up to age one year use the same habitat and the species spawns over a limited season, will the standing abundance be indicative of annual production of age-one equivalents.

The details of the data used for estimating production from young-of-the-year (YOY) abundance for Brayton Point I&E species are not provided in the proposed rule documentation. Based on the standard life stage tables for the Brayton Point I&E species, it is apparent that the abundance measure does not measure all the production for most I&E species:

The I&E species spawn over at least three months, and many species have more protracted spawning periods (Appendix A and Chapter F3). Thus, there is turn-over of individuals, with new individuals replacing those moving into older stages. The assumed age of the animals for the abundance data used is not documented, and the uncertainty introduced by error in this assumption, as well as by the mortality rate estimate for the remainder of the first year of life, would be extremely large.

Winter flounder YOY do not preferentially use salt marshes as nursery grounds. Thus, the abundance observed in salt marshes is not indicative of production gained, as animals likely move in and out of the habitat sampled. Certainly the abundance in open water habitat is not indicative of production in tidal wetlands, as erroneously assumed by EPA.

Forage fish such as stickleback, reproduce at varying times of the year, and predation rates are high, making a standing stock abundance at a single time a poor indicator of annual production.

The correct methodology is to use production foregone on the loss side of the equation, and balance this with production gained by all age groups owing to the restoration. If survival is increased from the sampled stage to age-one equivalents, or if production of older age classes is improved, the use of abundance corrected to age-one equivalents using the same survival rate as in less advantageous habitat provides an underestimate of the net gains of the restoration. While data are lacking in the form of production rate per unit area, estimations may be made using population modeling.

If young-of-the-year (YOY) abundance data are used to estimate age-one equivalent production per unit area of habitat, it is important to take into consideration the seasonal pattern of the species of spawning and development. It is not accurate to assume that abundance from any time of the year is indicative of production, because of the sampling of different age cohorts and potential turnover of individual over time. Again, the correct methodology is to estimate production over the life span of the individuals gained by the restoration.

Inconsistency in Assumed Survival Rates for the Same Habitat Restoration Technique

Discrepancies exist in the methods EPA used in its HRC calculations between the Seabrook/Pilgrim case study and the Brayton Point Station study. EPA utilized results from the same studies to determine the average density of species (e.g. number/100m2) for common species between the two sites. However, EPA has used very different survival rates from juvenile to age-1 to convert the juveniles measured on these habitats to age-1 equivalents. Since the same studies were used to derive the densities on each habitat type, it does not follow that the survival of individuals in these habitats would differ. Additionally, the survival rates for threespine stickleback, winter flounder, Atlantic silverside, and tautog for the Pilgrim/Seabrook study are higher than those used by EPA for the Brayton Point study (Table 1). Using these estimates, the same habitat is suggested to provide between 2 times and more than 10 times the number of fish per acre for mitigating the Pilgrim/Seabrook Facilities I&E as compared to the Brayton Point Station. Therefore, costs at Pilgrim are estimated to be half to 1/10 less that of the costs for the same losses at Brayton Point.

For example, EPA uses a survival adjustment for winter flounder of 0.2903 for Pilgrim/Seabrook site but a survival adjustment of 0.1697 for Brayton Point. This translates into an average of 0.09 age-1 flounder per m2 of restored tidal wetland for Pilgrim, but an average of 0.05 age-1 flounder per m2 of restored tidal wetland for Brayton Point (Tables F5-19 and G5-19). Therefore, the loss of each age-1 equivalent flounder would require twice the area of wetland to mitigate losses at Brayton Point than at Pilgrim.

[see hard copy for table]
Table 1: Comparison of the information EPA used for case studies at Brayton Point Station and Seabrook/Pilgrim Facilities to develop life stage adjustment factors (estimated survival rate) for juveniles to age 1 equivalents.

Errors in Calculation of Production Foregone

EPA has also made errors in its calculation of production foregone on the loss side of the equation, resulting in inflated estimates of losses. In the production foregone calculations, EPA used the average weight of individuals in a stage, rather than the initial weight for the stage. This problem was reviewed in detail by LMS, as described in their comments on the Brayton Point case study.

Errors in Methods Used to Estimate Costs

EPA based their costs for restoring SAV (Chapter F5-7.1) on a cost proposal made by Save the Bay for eelgrass planting of a 48-m2 area in RI waters. The final costs EPA derived from these estimates were $71.80/m2 of eelgrass bed. In contrast, in their extensive review of the success and costs of seagrass restoration, Fonseca et al (1998) of NOAA's Restoration Center (in Guidelines for the Conservation and Restoration of Seagrasses in the U.S and Adjacent Waters) estimated eelgrass restoration costs at $25/m2, including a planting guarantee. Thus, EPA's estimate is almost three times higher than that derived by acknowledged restoration experts at the government agency charged with planning and carrying out restoration.

In estimating the construction costs for shallow artificial cobble reef (Chapter F5-7.3), which is the habitat for which data are used to estimate the expected gain in juvenile productivity (Chapter F5-5.3.1), EPA used costs for a project for a deeper reef designed for lobsters, that might be of use to older tautog, but not age one juveniles. It is likely that placement of cobble in very shallow water is less costly than construction a reef with refuge spaces for lobster.

Moreover, total artificial reef construction and monitoring costs were divided by the area of the lobster reef (1024 m2) to obtain an estimate of cost per square meter. This cost was then multiplied by the needed reef area (41 km2) to generate a total project cost. Putting aside the reasonableness of constructing 41 km2 of artificial reef of a type designed for lobsters, restoration costs are not linear with area of the project, particularly over four orders of magnitude. There are unit costs for planning and implementation that are not related to area, and there are economies of scale, making smaller projects much more costly per unit area than larger ones. The example costing methodology is inaccurate and misleading in this regard.

Failure to Identify Most Cost Effective Method for Mitigation

The appropriate decision process is to select alternatives that either (1) provide habitat where the population's productivity is limited by the amount and/or quality of existing habitat, (2) reduce mortality to fishing and other causes, (3) replace missing individuals using restocking techniques, or (4) provide equivalent ecological services. The costs of each alternative need to be compared to the public's values of the gains (i.e., economic benefits). EPA has not used this decision process, instead deciding a priori that habitat restoration should be the method used, regardless of net gains in productivity or reasonableness of costs.

Alternate restoration projects being considered as mitigation should be scaled and costs developed, such that the most cost-effective option may be chosen. The costs need to be compared to economic value of the resource, including consideration of what is and is not captured by the valuation measures, to determine if the costs are reasonable as compared to value (i.e., a cost-benefit analysis needs to be performed for each alternative).

Since direct one-for-one species replacement is likely much more costly than the value (economic benefits) of the I&E losses, replacement of ecological services is a much more appropriate approach. EPA has failed to evaluate sufficient alternatives for Brayton Point, as well as other case studies provided.

Appropriateness of Using a Mitigation Ratio Greater than 1:1

The purpose of a mitigation ratio (where more mitigation is to be performed than would be needed based on calculations of production lost versus production gained) is to compensate for the uncertainty of the success of the mitigation project. If all of the gains of the mitigation project were in fact estimated in a quantitative fashion, the mitigation ratio might be warranted. However, in the case where all the services gained are not quantified, the scale of the mitigation already over-compensates for the losses.

EPA has not accounted for many of the ecological services supplied by restoration projects. In contrast to EPA's conclusions in Chapter F5-9, the case study does not underestimate needed mitigation because all ecological services have not been considered and the most effective restoration alternatives have not been selected. EPA has only quantified (and incorrectly at that) the net gains in the particular species lost in I&E on a one-for-one basis using pre-selected habitat restoration choices. Thus, habitat restoration scaled in this manner should not be mitigated at a greater than 1:1 ratio.

[see hard copy for references and appendices]

EPA Response

EPA agrees with the commenter that the Habitat-based Replacement Cost (HRC) method is not a valuation method. EPA has clarified this point in its response to Comment 316bEFR.005.035 and the document entitled “Habitat-based Replacement Cost Method” (DCN 6-1003). EPA did not use the HRC to estimate benefits for the final Section 316(b) Phase II rule.

With respect to habitat restoration alternatives included in EPA's HRC analyses presented at proposal, EPA met with and received information from local experts with knowledge about which restoration alternatives would most efficiently address the majority of species being lost to I&E in the vicinity of the facilities. EPA believes that the information was sufficiently site-specific, and sufficiently reviewed by local experts, to include the most relevant restoration alternatives that could address the majority of species in a practical, cost-effective approach. EPA deliberately avoided including highly experimental or uncertain restorations for species that had no obvious and practical restoration opportunities.

Regarding the issue of offsetting I&E losses and replacement of ecological services, please see EPA's response to Comment 316bEFR.312.003

Contrary to the commenter's assertion, EPA has not eliminated fish stocking as a restoration alternative. Please see the preamble for the final 316b Phase 2 rule. However, EPA notes that there currently are no hatcheries for most of the fish species that are impinged and entrained.

Regarding EPA's assumption that abundance can be a reasonable proxy for production, please see EPA's response to Comment 316bEFR.029.113. EPA notes that it intentionally used location-specific data when available.

Regarding restoration costing, please see EPA's responses to Comment 316bEFR.029.119 and Comment 316bEFR.029.117.

Regarding EPA's production foregone calculations, please see EPA's response to Comment 316bEFR.305.003.

Regarding the issue of mitigation ratio, EPA notes that the question posed by the HRC analyses presented at proposal was “How much would it cost to offset all of the losses, including the multitude of unique ecological services provided by each life stage of each species, if those losses are not prevented by technology?” Since most ecological services will never be described, the only practical means to offset all of the service losses is to offset all of the organisms, by species. Therefore, if minimizing all I&E is the primary purpose for "best technology available" (BTA), then offsetting each of the same losses, not just the life stages, species, or services that happen to be easiest to measure or monetize, is the appropriate purpose of restoration.

Many species lost to I&E were not included in the HRC analyses because restorations were not available, practical, or known. Furthermore, many conservative assumptions were included to ensure that the type and scale of restorations have a high probability of offsetting known losses. As data become available for more species and more habitat restorations, EPA believes that it is more likely that such analyses will prove to be conservative estimates of the amount of restoration required, rather than over-estimates, as the commenter contends.

Finally, EPA notes that the HRC analyses conducted for proposal are not used to estimate benefits for the final rule. Additional information on the HRC method and its uses is provided in the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003).

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Daniel Burke

On Behalf Of:

Texas Natural Resource Conservation Commission

Author ID Number:

316bEFR.048

Comment ID 316bEFR.048.001

Author Name Daniel Burke

Organization Texas Natural Resource Conservation Commission

Subject Matter Code 21.08

Burden on permitting agencies (general)

The TNRCC appreciates the need to minimize the impacts of impingement and entrainment of organisms in cooling water from sensitive aquatic ecosystems. We also understand concerns about compliance costs. Our review indicates that approximately 57 existing industrial facilities in Texas will be subject to the proposed regulations. Therefore, the potential regulatory impacts and administrative burdens are large. In the EPA's economic and benefits analysis, the administrative costs to permitting authorities are estimated to be from $30,043 to $72,405 for each initial permit that is issued after promulgation. The higher cost is incurred when a facility conducts a site-specific demonstration of economic and environmental impacts. Costs of subsequent permitting actions are estimated as $9,311 to $21,996 each. Overall estimates for the maximum state administrative burden were 1,074 staff hours per facility (67 FR 17210).

The TNRCC estimates that an additional six to eight full-time permitting staff (or equivalent effort) would be needed to adequately administer and evaluate the initial round of 10 to 12 permits per year during the first five-year cycle of permit renewals for 57 facilities. This level of effort is commensurate with EPA's estimated costs for permit administration, which in Texas would be about $1,712,451 to $4,127,085 over the first five years -- depending on the number of site-specific demonstrations. Representatives of electrical generating utilities in Texas have indicated that most facilities will choose to conduct site-specific studies if the proposed regulation is promulgated.

EPA Response

EPA thanks the commenter for this information.

Comment ID 316bEFR.048.002

Author Name Daniel Burke

Organization Texas Natural Resource Conservation Commission

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

In the proposed regulation, the EPA established moderately different impingement/entrainment performance standards for different categories of water bodies. The categories were (1) freshwater rivers and streams, (2) lakes and reservoirs, (3) Great Lakes, (4) estuaries and tidal rivers, and (5) oceans. In Texas, approximately 11 affected existing facilities are located on estuaries and tidal rivers, two on freshwater rivers, 11 on multi-use reservoirs, and 33 on smaller reservoirs that were constructed to be cooling water impoundments for a specific facility.

These cooling water impoundments were constructed in the watershed of relatively small streams. They usually provide opportunities for public fishing and aquatic recreation. Fisheries are maintained and manipulated by stocking, and many have been stocked with a variety of non-native fish species. Net evaporation rates are high, and many of them require supplemental sources of water that are piped in from adjacent water bodies. Their regulatory histories, uses, and ecosystems are markedly different from natural lakes and larger mainstream impoundments.

The proposed regulations are inappropriate for cooling water impoundments with the characteristics described above. The EPA should therefore establish separate requirements for cooling water impoundments with respect to performance standards, monitoring, and site-specific demonstrations. This approach could significantly reduce compliance and administrative costs and still protect sensitive aquatic ecosystems from entrainment and impingement impacts in cooling water.

EPA Response

Please refer to the response to comment 316bEFR.041.551 for a discussion of the biology of reservoirs.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Judy Visscher

On Behalf Of:

Holland Board of Public Works

Author ID Number:

316bEFR.049

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.049.001

Author Name Judy Visscher

Organization Holland Board of Public Works

Subject Matter Code 22.06

UMRA/Impacts on local governments

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that our utility finds particlarly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.049.002

Author Name Judy Visscher

Organization Holland Board of Public Works

Subject Matter Code 17.08

Option: UWAG's recommended approach

Holland Board of Public Works endorses the technical and legal comments submitted to the EPA from Utility Water Act Group (UWAG), Large Public Power Council/Americal Public Power Assoiation (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the commenter's support for these comments.

Comment ID 316bEFR.049.003

Author Name Judy Visscher

Organization Holland Board of Public Works

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA should be complimented for considering a variety of alternative approaches to the regulation. Holland Board of Public Works is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

Please refer to the response to comment 316bEFR.040.003.

Comment ID 316bEFR.049.004

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Judy Visscher

Organization Holland Board of Public Works

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the waterbodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.049.005

Author Name Judy Visscher
Organization Holland Board of Public Works

Subject Matter Code 7.01.03
Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. Holland Board of Public Works has a good working relationship with the state and believes in deferring, where possible, to the state regulators.

EPA Response

Please refer to the response to comment 316bEFR.039.005.

Comment ID 316bEFR.049.006

Subject Matter Code 22.06
UMRA/Impacts on local governments

Author Name Judy Visscher
Organization Holland Board of Public Works

Criticism: the EPA has underestimated the impact on public power systems. Holland Board of Public Works believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

Holland Board of Public Works agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements with coordination with states to ensure reliable grid operations.

Holland Board of Public Works is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented.

If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. The EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases-particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

For a response to comments on implementation of new 316(b) requirements, please refer to comment 316bEFR.028.007 in subject matter code 21.09.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

R.Ken Findley

On Behalf Of:

PPG Industries

Author ID Number:

316bEFR.050

Comment ID 316bEFR.050.001

Author Name R.Ken Findley

Organization PPG Industries

Subject Matter Code 3.01

Definition: Existing Facility

PPG requests that applicability of the Phase II rule be limited to specific SIC codes.

PPG's processes operate under SIC codes 2812, 2816, and 2869, none of which are included in the Major SIC Group of 49 designated for Electric, Gas, and Sanitary Services. Because of the high-energy demands associated with the production units, our power facilities are considered to be part of our chlor/alkali (SIC 2816) plants. It is apparent from references identified throughout the proposed rule that it was the agency's intent to regulate commercial utility units during the current rulemaking. See our comments below for some of these references.

EPA Response

As discussed in Section VIII.A.1. of the preamble to the final rule, EPA considered specifying SIC or NAIC codes to clarify the scope of the rule beyond that proposed in § 125.91(a)(2), but did not do so because it believes the changes in § 125.91(a)(3), which define a facility as a Phase II existing facility only if its primary activity is to generate and transmit or sell for transmission electric power, are sufficient to clarify the scope of the rule and due to concerns that SIC and NAIC codes may change over time, which could unintentionally alter the scope of the rule. Also see response to 316bEFR.050.002.

Comment ID 316bEFR.050.002

Author Name R.Ken Findley
Organization PPG Industries

Subject Matter Code 3.01
Definition: Existing Facility

PPG requests that the proposed rule be clarified to exempt non-commercial utilities from the applicability determination. The definition of "Phase II existing facilities" does not adequately exempt existing manufacturing facilities that may occasionally transfer power offsite during peak load events.

Throughout the preamble to the proposed rule, there are statements that allude to the agencies intent to exempt existing facilities whose primary business is the manufacture of chemical products.

From the April 9, 2002 Federal Register: page 17124:

"Today's proposal would not apply to existing manufacturing facilities,"

In discussing additional (Phase III) regulations on page 17126:

"The decree requires further that EPA propose regulations governing smaller-flow power plants and factories in four industrial sectors (, chemical and allied manufacturing) by June 15, 2003."

On page 17128:

"(e.g., existing power generating facilities with design flows below the 50 MGD threshold, certain existing manufacturing facilities). These facilities are not covered under this proposal because they do not meet the requirements of proposed 125.91."

This language clearly distinguishes between power generating facilities and manufacturing facilities.

At http://www.epa.gov/waterscience/316b/econbenefits/a2.pdf, EPA cites several exemptions to the proposed Phase II rule. In section A2-1 Overview of Regulated Facilities, the publication states:

"The proposed Phase II rule does not cover," and "(4) existing manufacturing facilities." The footnote references a statement that includes "and existing manufacturing facilities will be addressed by a separate rule."

The title of an EPA web publication (Fact Sheet EPA 821-F-02-012) issued in June 2002, appears to further support the applicability of the proposed rule. The title is Cooling Water Intake Structures At Large Existing Power Plants-Extension of Comment Period. PPG interprets "Power Plants" as those that generate electricity for public consumption, not power generation units that supply power to a manufacturing facility.

Based on the above references and exemptions published by the EPA, PPG Industries does not interpret the Lake Charles facility to be an entity subject to regulation under 316b-Phase II.

EPA Response

In § 125.91(a)(3) of the final rule, EPA has changed the rule from proposal and specified that an existing facility is a Phase II existing facility only if its primary activity is to generate and transmit electric power or to generate electric power and sell it to another entity for transmission. EPA believes that this criterion – the primary activity being the generation of electric power and its transmission or sale for transmission – sufficiently clarifies and limits the scope of this rule to existing facilities whose primary business is the generation of power for use by other entities. For additional discussion, see sections II and VIII.A.1. of the preamble to the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Ron Hix

On Behalf Of:

Florida Power & Light Company

Author ID Number:

316bEFR.051

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), EPSA (316bEFR.045), UWAG (316bEFR.041)

Comment ID 316bEFR.051.001

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The first is support of the flexibility provided by EPA's "preferred option" that includes the use of alternative technologies to demonstrate BTA, the option of developing site specific approaches based on the cost-cost and cost-benefit tests and the voluntary use of restoration/mitigation in lieu of technologies for compliance.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.051.002

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 19.0

Dry Cooling

The second is support of EPA's comment that dry cooling technologies are not appropriate for this rule making. FPL does not believe that there is currently a sufficient understanding of the potential operational problems or the environmental "costs" (i.e.; decreased efficiency and greater parasitic load resulting in more power demand and more power plants with more air pollution, etc.) to justify the use (and especially the retrofitting) of this technology in all scenarios. We do know that the capital and operational costs of this technology are extremely high.

EPA Response

The Agency has not based the final rule on dry cooling technologies and does not believe that they are viable technologies at date for retrofit to the vast majority of facilities within scope of this regulation, in part, due to the factors addressed by the commenter.

Comment ID 316bEFR.051.003

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

The third is that retrofitting any existing facilities (regardless of water body type or flow of current once-through cooling system) with wet closed-cycle cooling is also inappropriate not only due to the cost and energy penalties, but also the other environmental "costs" such as consumptive use of water, noise, air pollution, drift, etc.

EPA Response

Retrofitting of existing cooling systems with cooling towers is not a basis of the final national rule.

Comment ID 316bEFR.051.004

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 21.06.01

Implications for nuclear facilities

EPA should exempt emergency intakes.

FPL suggests that EPA exempt “emergency” intakes from the coverage of the Phase II rule. Nuclear power plants generally have emergency intakes in case the primary intake that supplies safety related cooling water is not available. These intakes are only used under emergency conditions and the amount of flow would be minimal (only enough to cool emergency equipment as the unit would be shut down). They would only be used for the period of time necessary to ensure a safe shut down of the unit or until the main intake is available again.

The emergency intakes are also periodically tested in accordance with the requirements of the Nuclear Regulatory Commission (NRC) operating license.

EPA Response

Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

Comment ID 316bEFR.051.005

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

If a facility has already been determined to employ BTA, that determination should be adequate

If a facility has previously conducted a detailed, Comprehensive 316 (b) Demonstration study that resulted in the Cooling Water Intake Structure (CWIS) being determined to reflect Best Technology Available (BTA), that determination should stand and no further work should be required under Phase II.

If a detailed demonstration study was not conducted, any information collected in the past, such as a 316 (b) screening study, should be able to be used, assuming no major changes to the intake structure or the water body have occurred since the study was conducted.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.051.006

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Option of meeting an actual flow threshold in lieu of the 50-MGD design flow threshold.

Permittees should have the option of meeting an actual flow threshold in lieu of the 50 million-gallon per day (50-MGD) design flow threshold.

The proposed rule lists a design intake flow of 50-MGD as one of the criteria for applicability of the proposed Phase II regulations. In many cases, however, actual intake flow is below the design capacity. If a permittee is willing to accept permit limitations that restrict its actual water use to some level below 50 MGD, and thereby not be subject to the Phase II regulations, EPA should encourage such actions as a means of reducing the potential for entrainment and impingement.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.051.007

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

Author Name Ron Hix

Organization Florida Power & Light Company

Repowering of Steam Electric Power Generating Facilities (Utility and Non-utility)

In the preamble for the draft 316 (b) rule, EPA asked for "information from facilities that have enacted repowering changes and the degree to which these changes have changed their design flow."

FPL has repowered three facilities to date, converting them from conventional (full-stream) to combined-cycle plants. Two of these facilities were on tidal rivers. The flows were not changed for the repowered facilities as the existing condensers and circulating water pumps were used. This would likely be the case at any facility that FPL repowers that has a once-through cooling water system.

For this reason, we disagree with EPA's statement that,

"The Agency determined that projected compliance costs for facilities withdrawing from estuaries could be lower after incorporating the repowering changes. The primary reason for this fact is the majority of estuary repowering facilities would change from a full-stream cycle to combined cycle, thereby maintaining or decreasing their cooling water withdrawals (note that a combined-cycle facility generally will withdraw one-third of the cooling water of a comparably sized full-steam facility). Therefore the portion of compliance costs for regulatory options that included flow reduction requirements or technologies would significantly decrease if the Agency incorporated repowering changes into the analysis."

As mentioned above, in the type of repowering undertaken by FPL, the CWIS and condensers remained unchanged; only the heat source was different. It is true that on a megawatt/circulating water-used basis, combined cycle facilities have a much lower use rate. However, in both FPL cases (as well as any future cases), the repowered facility produced substantially more megawatts for the same amount of cooling water flow. The steam turbine is generating the same number of megawatts as it did prior to repowering plus approximately 170 additional megawatts from each gas turbine. Thus, the repowering of a unit would have no effect on the cost for 316 (b) compliance.

The real potential benefit of repowering from a reduced flow standpoint lies in more megawatts being produced by a more efficient power plant meaning that a less efficient power plant somewhere, that may have a once-through cooling water system, is operating less.

The third FPL facility that was recently repowered utilizes an off-stream cooling pond. This facility will require more cooling water (cooling pond make-up water) than was previously used because the heat-load to the cooling pond will be greater, resulting in more evaporation and therefore more make-up water being required. FPL does not believe this facility is within the scope of the Phase II rule.

EPA Response

EPA appreciates the information provided by the commenter. See Comment ID 316EFR.087.014 for response on repowering and compliance costs.

Comment ID 316bEFR.051.008

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Restoration/Mitigation

Should restoration measures be limited to the waterbody at which a facility's intakes are sited, or should they be implemented on a broader scale, such as at the watershed or State boundary level?

FPL believes that restoration measures should be expanded to the largest extent possible and should make sense from an ecosystem standpoint and not be inhibited by political boundaries. For instance, mitigation or restoration that could be conducted in an estuary impacts numerous types of fish and shellfish that spend portions of their lives there. Many of these organisms later move to open ocean waters and can move up and down along the coastline.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.051.009

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

EPA seeks comment on whether habitat conservation would be an appropriate component of a facility's restoration efforts.

FPL agrees that activities such as habitat conservation are an appropriate component of a facility's restoration efforts. Other appropriate components are activities such as stormwater management or connecting facilities using septic tanks located near a water body to a POTW. These activities don't directly replace organisms (like stocking) or sea grass (like restoration) but could play a major part in the recovery of an ecosystem.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

For a discussion of ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.051.010

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 11.12

RFC: Restoration banking

EPA is also inviting comments on other restoration approaches that it is considering. These include discretionary and mandatory regulatory approaches involving restoration measures as well as restoration banking, which are discussed below.

FPL believes that innovation should be the driver and all reasonable approaches should be considered. For instance, the development of mitigation banks, such as those allowed by the 404 program, could have a major positive impact on an ecosystem located next to them. This additional value could result in more banks being developed and therefore more restored habitat for all types of aquatic as well as terrestrial creatures.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.051.011

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 17.01

RFC: Other proposed provisions

Other Technology-Based Options Under Consideration

-Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System for All Facilities

-Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type

-Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow

FPL strongly opposes all of the "Technology-Based Options Under Consideration" that would result in mandatory installation of retrofitted cooling towers for any facilities. These options are extremely expensive (far beyond EPA's estimates) and are not warranted.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.051.012

Author Name Ron Hix
Organization Florida Power & Light Company

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

Technical Problems with Retrofitting Cooling Towers

In addition to cost, the are many technical problems associated with retrofitting plants with cooling towers. As an example, consider the St. Lucie Nuclear Plant. Its Final Safety Analysis Report states that St. Lucie Units 1 and 2 use two independent water sources and a common discharge canal for the ultimate heat sink (UHS). The design of the UHS complies with Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Power Plants." In the unlikely event of a loss of the intake, a second independent source of water is available from the Indian River Lagoon. By NRC Technical Specification requirements, the UHS must be operable at all times.

Cooling towers would increase the probability that the ocean intake would be lost, thereby creating a challenge to the UHS that currently does not exist.

EPA Response

See responses to comment 316b.EFR.041.023 and 316b.EFR.208.002.

Comment ID 316bEFR.051.013

Subject Matter Code 6.08

Non-aquatic impacts

Author Name Ron Hix

Organization Florida Power & Light Company

Environmentally Sensitive Areas Increase Cooling tower retrofit costs

Some possible locations for cooling towers are in environmentally sensitive areas. For example, an area that is otherwise feasible for towers at the St. Lucie Nuclear Plant is a protected mangrove swamp. Since the NRC has concluded that the entrainment and impingement of fish and shellfish at St. Lucie has an insignificant impact on the fisheries near the site, <FN 1> there would be no net environmental benefit in destroying acres of mangroves to accommodate cooling towers. Facts such as these support the need for a site-specific analysis to determine BTA under § 316(b).

Footnotes

1 U.S. Nuclear Regulatory Commission. Final Environmental Statement Related to the Operation of St. Lucie Plant, Unit No. 2; Florida Power & Light Company, Orlando Utilities Commission of the City of Orlando, Florida. Docket No. 50-389. NUREG-0842. Office of Nuclear Reactor Regulation. Washington, D.C. April 1982.

EPA Response

The final rule is not based on cooling towers. Therefore, the commenter's assessment of the net benefits in the hypothetical analysis is moot as pertains the final rule.

The Agency has included site-specific alternative provisions in the final rule requirements, which to a certain degree would assess the net benefits of a site-specific BTA determination. However, the Agency notes that the NRC is not the final judge for the significance of impact that impingement and entrainment has on a fishery.

See Sections V, the Rule, and section IX, Implementation, of the preamble on a site-specific determination of best technology available for minimizing adverse environmental impact.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.051.014

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 6.08

Non-aquatic impacts

Sea Turtles Could be at Greater Risk

At the St. Lucie Plant, sea turtles could be at greater risk if flows were low in the intake pipes (between the velocity caps in the ocean and the headwall). This condition could exist if, for example, the St. Lucie intake structures were used to support wet saltwater cooling towers. With a weak current, the turtles could enter the velocity cap and not be carried along. If they loiter in the pipe too long (as may occur with reduced flow with a cooling tower) they may drown, because they cannot surface for air.

Some analysis would be necessary before deciding how best to use the existing velocity caps at St. Lucie if cooling towers were required. Flow rates required for make-up water and the discharge from a wet saltwater cooling tower would need to be studied. Harm to sea turtles could be an unintended consequence of requiring cooling towers.

EPA Response

Cooling towers are not included as a basis for the final rule requirements. Additionally, intake velocity is not regulated through the existing facility phase II rule. Therefore, the commenter's concerns have been met.

Comment ID 316bEFR.051.015

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 21.09

Permit applications/implementation schedule

Comments on execution time line

The preferred alternative for the 316 (b) rule for existing facilities, as proposed, requires an extensive amount of work to be done before an adequate application could be completed. It would be unreasonable to require a completed application less than three (3) years after the rule became final. Therefore, we feel the rule should only apply to facilities that have an NPDES (or SPDES) permit that expires more than three (3) years after the rule becomes final.

EPA Response

EPA agrees with the comment and has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.051.016

Subject Matter Code 6.08

Non-aquatic impacts

Author Name Ron Hix

Organization Florida Power & Light Company

Manatees and Sea Turtles

In addition to fish and shellfish, the rule should consider effects on other wildlife. A facility should be able to take mitigation credit for sheltering manatees and releasing sea turtles.

Manatee Protection Plans

The SPDES permits for five FPL facilities have permit conditions that require them to draft and follow "manatee protection plans". These plans, which are enforced by the Florida Fish and Wildlife Conservation Commission, require the facility to provide an adequate quantity and quality of warm water during cold weather to be effective refuges for the endangered manatees.

Relocating Sea Turtles

Approximately 600 sea turtles entered the intake canal at the St. Lucie Plant in 2001, and over 99% were successfully returned to the Atlantic Ocean. Prior to release the turtles are examined, weighed, measured, etc. The result is an enormous amount of scientific information (which the scientific community considers to be very valuable) on sea turtles being generated. Also, any turtles that are injured or ill (generally these conditions are not related operation of the plant) are taken to a nearby facility for rehabilitation and then released. FPL is constantly modifying and improving this program.

FPL also is permitted to collect fish that have entered the intake canal at the St. Lucie Plant. Many of these fish are released back to the natural environment. Some of these fish are sent to aquariums all over the world, which reduces the number of specimens the aquariums would otherwise have to acquire from the natural environment.

EPA Response

The sea turtles the author refers to are taken into the intake canal which must then be rescued. The goal should be to not take these animals into their cooling water system at all. The manatees the author refers to have grown dependent on the artificial environment created by the facility's warm water discharge. This is a section 316(a) issue. Today's final rule does not require wet cooling towers, and therefore, will not change thermal discharges.

Comment ID 316bEFR.051.017

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Ponds and Cooling Canals

EPA's proposal indicates it has to apply § 316(b) to cooling ponds if they otherwise would qualify as "waters of the United States" (WUS) under EPA's current definition. EPA has long exercised discretion to define WUS and to include and exclude waters from that definition, where necessary to achieve the purposes (or intent) of the CWA. EPA should exercise that discretion here. Cooling ponds built for the purpose of supplying cooling water should be treated as closed-cycle cooling systems that achieve the requirements of any final rule that ends up being promulgated.

It makes little or no sense for EPA to open existing facilities with cooling ponds up to the possibility that they will be required to install additional fish protection technologies on impoundments that were in the first place designed and constructed to provide cooling water.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.051.018

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 7.02

Performance standards

Calculation baseline

The rule must be revised so the "calculation baseline" is not the only available method to determine the extent of adverse environmental impact. Alternative methods must be allowed to demonstrate that an existing CWIS is not adversely impacting populations of aquatic life in an area.

The "calculation baseline" is used in the proposed rule as a method of determining when adverse environmental impact begins. It calls for an "estimate of impingement mortality and entrainment that would occur at a site assuming it had a shoreline cooling water intake structure with an intake capacity commensurate with a once-though cooling water system and with no impingement and/or entrainment reduction controls." (Section 125.93). It would be extremely difficult to make this estimate in a scientifically supportable manner as most of these facilities have been in existence for 30 or more years and the ecosystem has equilibrated to the presence of the CWIS. Performance standards based on the calculation baseline are essentially reducing the performance standard to a volume reduction requirement based on reducing intake capacity to that of a cooling tower system.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.051.019

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 8.05

Proposed standards for oceans

Difficulty with technologies in an open ocean environment

For a facility with an open-ocean intake, it is even more imperative that the site-specific approach for compliance with 316 (b) be maintained. None of the technologies, such as fine mesh screens, wedgewire screens or aquatic filter barriers would work in conjunction with velocity caps already installed offshore to minimize entrainment. The fact that a facility is located in sub-tropical waters further exacerbates the problem of rapid and heavy biofouling that would be expected to impede the operation of wedgewire screens and aquatic filter barriers.

EPA Response

Please refer to the response to comment 316bEFR.032.014 for more information about oceans as sensitive waterbodies.

EPA acknowledges that some technologies will not be feasible at some facilities. A facility such as the one described by the commenter could elect to seek a site-specific determination of BTA under § 125.94.(a)(5).

Comment ID 316bEFR.051.020

Author Name Ron Hix

Organization Florida Power & Light Company

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Compliance with Executive Order 13211

In "316(b) Phase II EBA (EPA-821-821-02--001), Part B: Costs and Economic Impacts, Chapter B6 ; Other Administrative Requirements ", EPA states in Paragraph B6-1, "Pursuant to the terms of Executive Order 12866, EPA determined that this proposed rule is a "significant regulatory action."

EPA states in Paragraph B6-7, "For the purposes of Executive Order 13211, "significant energy action" means: any action..... (1)(i) that is a significant regulatory action under Executive Order 12866 or any successor order , and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy ;"

EPA goes on to state in Paragraph B6-7, " This proposed rule does not qualify as a "significant energy action" as defined in Executive Order 13211 because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. The proposed rule does not contain any compliance requirements that would directly reduce the installed capacity or the electricity production of U.S. electric power generators.

In Paragraph B6-1 EPA has characterized this proposed rule as a "significant regulatory action". Based on the current understanding of the Proposed Rule, it will have a significant adverse effect on the supply of energy. Some generators would be forced to cease operations while others would suffer the consequences of higher generation costs without the provision of a valid cost benefit analysis. For certain, somebody will have to pay for these extraordinary costs. A valid economic analysis must be performed and a Statement of Energy Effects be furnished as required by Executive Order 13211.

The EPA has brushed off this important requirement without offering any valid analysis. We must insist that EPA revisit this issue and justify this flawed conclusion.

EPA Response

Please refer to the response to comment 316bEFR.041.131 in subject matter code 9.03.

Comment ID 316bEFR.051.021

Subject Matter Code 7.03

Available I&E technologies

Author Name Ron Hix

Organization Florida Power & Light Company

Unintended consequences of impingement reductions

As fine mesh and wedgewire screens are used to reduce impingement, one of the effects can be that entrainment is increased. Certain eggs and planktonic forms, which some research indicates are not killed in their trip through a once-through cooling water system, can be entrained and lost to the environment due to the use of these devices. Care must be taken in requiring technologies that shift the problem from one area to another, rather than solve it.

EPA Response

EPA agrees that care must be taken to ensure that the measures adopted to reduce impingement mortality do not consequently result in an increase in entrainment, or vice versa, and should be considered during the permitting phase. Wedgewire screens have demonstrated significant promise in reducing both entrainment and impingement under certain circumstances. If properly deployed, EPA does not believe that wedgewire screens will result in the type of impacts described by the commenter. Fine mesh screens, whether as part of a wedgewire system or traditional traveling screen system, can significantly reduce entrainment of eggs and larvae. Although the potential exists for a corresponding increase in impingement, EPA believes that proper maintenance of the screens (i.e. maintaining through-screen velocities) as well as the incorporation of other design and construction technologies can often mitigate any resulting increase in impingement.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

R. Michael Hartman

On Behalf Of:

Stewards of the St. Johns River

Author ID Number:

316bEFR.052

Comment ID 316bEFR.052.001

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

It would appear that existing steam electric units larger than about 100 MWe operating with once through cooling systems located in estuaries will either need to install closed cycle cooling or demonstrate an alternative site specific performance standard of Best Technology Available (BTA) in accordance with 125.94 (a) (3). These comments apply to such a situation.

If the facility, for cost, land availability, and other environmental impact reasons, feel they can not install closed cycle cooling and wish to use that site specific performance standard approach under 125.94 (c) based on "restoration measures in addition to those already in place are not justified because of significantly greater costs." What constitutes "restoration measures" and "significantly greater costs"? Furthermore, are the regulations flexible so they can be implemented by systems ecologists trying to achieve a net improvement in any affected ecosystem beyond any potential harm that existing facilities without the proposed BTA may be having to that ecosystem? These are the main concerns I have with the proposed regulations.

EPA Response

EPA disagrees with the commenter's interpretation of the rule. The final rule contains five compliance alternatives from which a permittee (including a facility on an estuary or tidal river) may choose. Please refer to the preamble for a discussion of the framework of the final rule.

For a discussion of the role of restoration, please refer to sections VII and VIII in the preamble for the final rule. Also, please refer to the response to comments 316bEFR.410.001 and 316bEFR.005.020 for a discussion of the implementation of the cost-cost and cost-benefit tests.

Comment ID 316bEFR.052.002

Author Name R. Michael Hartman
Organization Stewards of the St. Johns River

Subject Matter Code 17.03.01
Ex. facilities converted to closed-cycle

At the western boundary of the Preserve begins a series of three different steam electric power facilities along about a 3-4 mile stretch of the river. Two of these facilities are two unit coal fired plants that utilize closed cycle cooling. The third is a facility called the Northside Generating Station run by Jacksonville Electric Authority (JEA). That facility originally had three oil fired units. One of those units has been re-powered utilizing fluidized bed combustion technology to burn a mixture of coal and petroleum coke. Another unit is in the process of being similarly re-powered. All of these units use once through cooling systems. A 316 (a) and (b) demonstration was apparently submitted in the late 1970s and subsequently granted by the Florida Department of Environmental Protection allowing the units to keep operating with once through cooling systems up to the present time.

EPA Response

This is an introductory paragraph for comment 316b.efr.052.003. Therefore, no response is necessary to this specific comment. See response to comment 316b.efr.052.003.

Comment ID 316bEFR.052.003

Subject Matter Code 6.08
Non-aquatic impacts

Author Name R. Michael Hartman
Organization Stewards of the St. Johns River

Please bear in mind that the Stewards of the St. Johns think JEA is one of the best and most professionally managed municipal utilities in the country. They have a strong policy for doing great things to benefit the community. Our comments should not be interpreted as concern about JEA or how they may implement these proposed regulations. Rather, we are concerned about the general health of the estuarine ecosystem that some of their existing plants happen to utilize. We believe that this aquatic ecosystem has been in general decline due to many other factors. We hope regulations are finalized and implemented in such a way as to allow the most net improvement in that whole ecosystem for any dollars spent. We are not convinced that the utilization of closed cycle cooling on some of their units would return benefits to that ecosystem in proportion to the costs that they would need to spend to make such a change. Instead, we see other general ecosystem restoration and preservation measures that could yield much greater benefits to that ecosystem. We believe that restoration and preservation efforts of the estuarine section of the St. Johns River is a topic that the whole community in Northeast Florida has a stake in and thus should be consulted in how any regulations are implemented once finalized.

EPA Response

The final rule is not based on and does not require installation of cooling towers. Restoration and preservation efforts can be used to comply with the requirements of the final rule. Therefore, the commenter's concerns have been met.

Comment ID 316bEFR.052.004

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 7.02

Performance standards

How does one quantify and measure economic benefits through deduction by 60-90% of all stages of fish and shellfish larvae due to the existing entrainment at a facility on an ecologically impaired estuary? Is such a question capable of being calculated with any degree of precision? If regulatory action under the TMDL program (CWA section 303 (d)) cleans up an estuary that exceeds several water quality standards, that estuary will likely begin to return to more normal ecological conditions. This means in theory there will be greater benefits from reduction of entrainment as the estuary ecological conditions improve. Would the regulations estimate the benefits now when the river is impaired or after the estuary is improved? How could such a theoretical estimate be done?

It may be more cost effective in making improvements to the overall health of an impaired estuary if a portion of the economic costs for back-fitting closed cycle cooling were instead allowed to be spent on ecosystem studies of the whole ecosystem aimed at finding the best restoration measures. In theory, this means the restoration may not necessarily be directly correlatable to relieving ecosystem impacts due to entrainment or impingement for a facility using once through cooling on that estuary. The health of the whole ecosystem needs to be considered before determining the best restoration measures.

As a biologist familiar with ecological conditions in the St. Johns River, I realize how difficult it is to judge how the St. Johns is being impacted by a wide range of human activity and variable natural conditions around our river. There are no good bio-assessment tools for judging the health condition of habitats in an estuary or for determining what may be causing decline in those ecological conditions. The background noise due to natural changes such as climate, flow rates, temperature and introduction of new species has a tendency to mask changes due to human origin. Suppose the river was like a human patient that had a systemic disease like diabetes. Now suppose that patient had a hyperglycemic episode and fell down breaking an arm. In this case the broken arm is like an estuary with a power plant with a once through cooling system on it. Would not the doctor want to treat the whole patient with diabetes not just the broken arm? In a sense the broken arm is related to the diabetes so evaluation and correcting blood sugar levels may be more important for the long-term health of the individual.

This is how I see applying EPA's proposed regulations for existing once through power plants on impaired estuaries. The best answer is not necessarily a rush to back fit closed cycle cooling or to jump on building fish hatcheries that replace larval fish being entrained. The solution may be to understand and then restore the whole ecosystem slowly over time. We need to apply the right treatment after making the correct diagnosis. The diagnosis varies according to the unique physical, chemical and biological properties of the ecosystem the facility is in. Hopefully EPA and the states will have the flexibility under these regulations to adopt a customized approach that is based on scientific facts not short term political or economic gain.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

EPA recognizes that improvement of impaired waters is a goal of the Clean Water Act and will continue to be achieved over time. EPA also acknowledges that improvements to waterbodies are the result of concerted efforts involving numerous factors, the results of which manifest themselves over time. NPDES permits are valid for five years to allow the permitting authority to revisit issues and circumstances that may not have been present during the previous permit issuance. Improved water quality is one such issue that can be addressed during a permit reissuance.

EPA believes today's final rule maintains a desired flexibility for both the permittee and the Director to determine the most appropriate and cost effective strategy for meeting the requirements of the rule.

Comment ID 316bEFR.052.005

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

These proposed regulations are difficult for me to clearly foresee how they may be implemented. I was not able to find a definition of what a definition of “restoration measures” or “significantly greater costs” were. I only read sections 125.94, 125.95, 125.96, and 125.97. Are definitions of those terms found in other parts of EPA regulations? If they are not, I suggest such definitions be added for greater clarity in understanding the regulations.

EPA Response

EPA did not provide a definition of restoration measures in the final rule. There are a wide variety of techniques that can restore fish and shellfish in aquatic ecosystems. In the final rule, permitting authorities have the flexibility to determine the precise, appropriate nature of a restoration measure on a site-specific, case-by-case basis. EPA has, however, provided specific requirements for restoration measures in the final rule that guide the determination of an appropriate restoration measure.

For a discussion of "significantly greater costs", see EPA's response to comment 316bEFR.006.003.

Comment ID 316bEFR.052.006

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Section 125.94 (c) paragraphs (2) and (3) sound essentially the same. These provisions lay out the basic grounds for using a site-specific determination of BTA. In essence they both allow site specific BTA to come into play when site specific factors cause the costs for BTA (closed cycle cooling) to be higher than the environmental benefits. When this happens then the facility can reduce adverse environmental impacts by employing a combination of design and construction technologies, operational measures and restoration measures in addition to those already in place. Therefore, I do not understand having two separate provisions that appear to say the same thing. Is there a subtle difference that I may have missed?

EPA Response

The final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

The difference between the two subsections is that the first is a cost-cost test based upon the cost of a particular facility's expected compliance costs versus those costs estimated by EPA in the rulemaking. The second is a cost-benefit test which compares the cost of compliance against the expected benefits of compliance. For more information, please refer to 316bEFR.410.001 and 316bEFR.005.020, respectively.

Comment ID 316bEFR.052.007

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The wording of paragraph 125.94 (d) lays out a requirement to allow an alternative site specific alternative for meeting BTA. It states that the facility must show that the fish and shellfish within the waterbody, including community structure and function, are maintained at a level comparable to what would result if the facility were to employ technology (closed cycle cooling) that meets BTA. This proof will not be possible to produce. The waterbody will likely have many natural and other man made stresses all of which vary over time. Against such fluctuation of variables superimposed over a complex ecosystem like an estuary, it is impossible to predict what level of community structure, and function might have existed if EPA’s current definition of BTA would have been applied when the facility first went into operation. The test should be one that does not worry about quantifying ahead of time what exact benefits might equate to using some guess about what closed cycle cooling might do to improve the whole ecosystem. Instead the approach should be to demonstrate that by first studying what the major stresses are in a specific ecosystem, by employing restoration measures, those stresses have a reasonable potential to be overcome. What is needed here is restoration of the whole ecosystem at a cost much less than applying technologies that meet the general definition of BTA. Do not worry if you are dealing with a stress that comes from impingement or entrainment and alleviating that stress.

EPA Response

EPA is not requiring closed cycle cooling in the final rule.

EPA agrees with the commenter that there are uncertainties associated with the implementation and assessment of restoration measures, and that these can pose a challenge in the assessment, design, and implementation of a restoration measure. For additional discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. In some cases, restoration measure performance may be uncertain enough to render a restoration project infeasible for a particular site.

All restoration measures must meet the performance and implementation requirements described in the final rule.

Comment ID 316bEFR.052.008

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Section 125.95 (a) (1) (iii) asks for written comments from consultation with certain government agencies over the Comprehensive Demonstration Study required by this section. I would suggest that the applicant also be encouraged to seek written comments on their proposed study from any public interest firms and affected industry groups that has an interest in the waterbody the facility discharges into.

EPA Response

EPA believes that a facility may consult with public interest firms or any other interested party regarding its 316(b) obligations, but EPA disagrees that such consultations should be mandated by law or may be used in place of consultations with the appropriate fish and wildlife agencies.

Comment ID 316bEFR.052.009

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

I would also suggest the sampling plan referenced in 125.95 (a) (1) (iv) not be limited to estimating impacts due to impingement and entrainment at the site but to also assessing the general health of the ecosystem near the site. In this case one needs to look broader than just fishes and shellfish by the site but also benthic and epibenthos macroinvertibrates and even bacteria and plants in the general aquatic ecosystem by the site.

I also suggest that impingement mortality and entrainment characterization studies specified in section 125.95 (a) (2), include a broad study of the general health of the aquatic ecosystem in the area of the site. As stated before, the first step is to diagnose what the general condition of the aquatic ecosystem is. One can not evaluate any impacts from entrainment and impingement are having on the ecosystem without first understanding the health and general characteristics of the ecosystem the facility discharges to.

EPA Response

Please refer to the final rule preamble section VIII. B. Environmental Impact Associated with Cooling Water Intake Structures, for EPA's position on the need to consider environmental impacts beyond impingement mortality and entrainment in today's final rule.

Comment ID 316bEFR.052.010

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Section 125.95 (a) (4), asks for information to support proposed restoration measures in the Comprehensive Demonstration Study. I submit that the restoration plans needs to follow after information is gleamed from the other biological studies required by this section. How can a facility guess at site specific restoration measures before the results of some of those biological studies are in?

EPA Response

EPA agrees that a Director cannot confirm the appropriate compliance option for a facility without first reviewing data on the facility's intake structure and source waterbody conditions, among other factors. For this reason, EPA has designed the rule such that a facility must first submit a Proposal for Information Collection (see requirements at § 125.95(b)(1)), conduct approximately one year of studies, and submit the results of those studies before the Director determines which compliance option best suits the facility. For additional information on the timing of EPA's submittal requirements, please refer to EPA's response to comment 316bEFR.034.066.

Comment ID 316bEFR.052.011

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Subject Matter Code 21.03

Monitoring requirements

I support the "Verification Monitoring Plan" provisions of Section 125.95 (a) (6). I point out, however, how difficult it will be to differentiate reduction in levels of impacts from entrainment and impingement in an ecosystem with many natural and man made factors impacting it. I suggest this monitoring be directed more at measuring the benefits of improvement in general health conditions of the river ecosystem near the facility.

EPA Response

For the purpose of today's final rule, EPA has chosen to evaluate compliance based upon (1) reduced impingement mortality and entrainment rates; (2) increase in the production of fish and shellfish; and/or (3) compliance with the Technology Installation and Operation Plan discussed in the final rule preamble. EPA believes that today's final rule does take overall ecosystem health into account, by attempting to protect aquatic life in the waterbodies.

Comment ID 316bEFR.052.012

Subject Matter Code MISC

Miscellaneous comment

Author Name R. Michael Hartman

Organization Stewards of the St. Johns River

Lastly I would like to suggest something novel. Most EPA regulations create a set of requirements that are hoped will benefit the environment while adding only a little to the costs of the facility being regulated. Sometimes what happens is some marginal environmental improvements are made but the commercial consultants that get involved in helping the facility comply are the main ones enriched by the experience. They are enriched with knowledge and with cash. How great it would be if local universities could benefit from this experience the way commercial consulting firms often do. In this case the knowledge gain stays in the area to be passed on to students and people in the community. The costs are generally less and benefit the university instead of business investors. The difficulty with university studies, as seen by commercial clients, is that they take longer and the results are less controllable. From a public policy standpoint the later problem should be seen as a benefit. Is there anything that EPA could do in these regulations to encourage utilities to consider the public benefits of using local universities (or a consortium of local colleges and universities) to do some of the studies mandated by the regulations where the right expertise exists at those institutions?

EPA Response

EPA does not take a position on whether facilities should employ colleges or universities to assist with conducting studies required under today’s final rule. However, the studies required in today's final rule may be conducted by any qualified professional. Facilities may choose to have such activities conducted by educational institutions, and there is nothing preventing universities or colleges from soliciting work from facilities.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Bernie Sullivan

On Behalf Of:

PPG Industries

Author ID Number:

316bEFR.053

Comment ID 316bEFR.053.001

Subject Matter Code 3.01

Definition: Existing Facility

Author Name Bernie Sullivan

Organization PPG Industries

PPG believes that more detail is needed in the applicability section specifying that the rule does not apply to facilities whose primary business activity is not power generation.

The proposed Phase II regulation applicability would include a facility that "both generates and transmits electric power, or generates electric power but sells it to another entity for transmission." Section IV of the preamble clarifies the above applicability by stating; "today's rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by co-generation."

PPG supports this statement and recommends that EPA include this in the regulations to provide clarity on the applicability of the Phase II Rule.

EPA Response

See response to 316bEFR.050.002. In the final rule, EPA also has not adopted proposed 125.91(b), which would have addressed a co-generation facility that shares an intake with another existing facility. Rather, EPA replaced this with a provision that clarifies how the rule applies to a Phase II existing facility co-located with a manufacturing facility. See 125.91(b)in the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John W. Shipp

On Behalf Of:

Tennessee Valley Authority

Author ID Number:

316bEFR.054

Comment ID 316bEFR.054.001

Author Name John W. Shipp
Organization Tennessee Valley Authority

Subject Matter Code 17.06
Option: Site-specific determination of BTA

TVA continues to believe that a rule based on an assessment of AEI in the source water body, conducted through a structured ecological risk assessment process, is the proper and optimum way to implement Section 316(b) of the Act.

EPA Response

No response is required for this comment as TVA is a Federal partner in the rulemaking.

Comment ID 316bEFR.054.002

Author Name John W. Shipp

Organization Tennessee Valley Authority

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

If EPA's preferred alternative approach is selected, the public policy soundness and effectiveness of the rule will require that the following five topics be implemented in a manner reflective of sound science and/or natural resource economics:

-Entrainment survival
-Impingement of organisms which were dead prior to interaction with the cooling water intake structure
-Density-dependent compensation
-Conversion of impinged and entrained organisms to equivalent adults
-Assessment of economic value to the reduction of entrainment and/or impingement mortality

TVA believes that consensus criteria can be developed to determine when and how the first three topics should be addressed and that all five of these topics can be addressed in a manner which is practicable and reasonable from an implementation perspective.

EPA Response

No response is required for this comment as TVA is a Federal partner in the rulemaking.

Comment ID 316bEFR.054.003

Author Name John W. Shipp

Organization Tennessee Valley Authority

Subject Matter Code 10.03.02

Ohio Watershed

TVA has reviewed and endorses the findings of EA Engineering Science and Technology Inc.'s assessment of The Ohio River Case Study. (Review of Ohio River Case Study Phase II Proposed Rule for Section 316(b). Prepared by EA ES&T, Inc., Deerfield, Illinois. July 2002. 25 pp.)

EPA Response

No response is required for this comment as TVA is a Federal partner in the rulemaking.

Comment ID 316bEFR.054.004

Author Name John W. Shipp

Organization Tennessee Valley Authority

Subject Matter Code 21.08

Burden on permitting agencies (general)

While TVA continues to question the use of implementation burden as the primary basis upon which to select between practicable regulatory options, the EPA proposed option will be less burdensome to implement than was the historical approach based on AEI in the source waterbody--for those sites where the source waterbody impact determination has not been previously made or addressed.

EPA Response

No response is required for this comment as TVA is a Federal partner in the rulemaking.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Allen Hubbard

On Behalf Of:

FL Dept Industrial Wastewater

Author ID Number:

316bEFR.055

Comment ID 316bEFR.055.001

Subject Matter Code 21.09
Permit applications/implementation schedule

Author Name Allen Hubbard
Organization FL Dept Industrial Wastewater

PROCEDURAL PERMITTING ISSUES

The Proposed Rule 40 CFR Part 125.92, Subpart J "When must I comply with this subpart?" states, “You must comply with this subpart when an NPDES permit containing requirements consistent with this subpart is issued to you.”

The language in this subparagraph does not clearly indicate when the Permittee must comply and when the Permitting Authority must require compliance with the rule for the specific regulated community, which consists of existing facilities. The majority of these facilities have held NPDES permits for many years. They are mostly Once-Through Cooling Water (OTCW) systems, and therefore are mostly older facilities. Thus, the overwhelming majority of the NPDES permits in question will be renewals. Does EPA intend that compliance with the rule must be achieved when the next renewal permit is issued following the effective date of the final Phase II rule?

We are concerned that this rule language may lead to inconsistent implementation among the delegated states and EPA Regions, as permit writers and Permittees struggle to understand the intent of the rule. A number of situations which can realistically occur would make the permitting process confusing and uncertain. What if a renewal application is received before the effective date of the final rule, but a permit is not issued by the effective date? What if a Draft Permit is issued just before the effective date, but not a Proposed Permit? What about a Proposed Permit just before the effective date but not a Final Permit? Such cases boil down to a general concern: Permittees need sufficient time to adequately evaluate and implement the means by which they will comply with the rule, and Permit Writers need sufficient guidance from the rule to determine when compliance must be achieved. Each of these cases obviously has the potential to create a situation in which the Permittee (who may have been operating in good faith and in compliance for many years) can be set at odds with the State and with EPA, potentially delaying renewal and compliance to the detriment of the environment.

Several mechanisms, perhaps in combination, could reduce this sort of implementation crisis. EPA could revise the proposed rule clarifying that facilities which apply for renewal or for their initial permit before the effective date of the Final rule will not be subject to the rule until a specified subsequent date or the next renewal. EPA could revise the proposed rule incorporating a fixed period of time over which facilities can evaluate how they will meet the performance standards or develop site-specific performance standards. Alternatively, a compliance schedule could be incorporated into permits allowing the permittee enough time to come into compliance. In any event, clarification should provide a framework of consistency to guide both Permittees and Permit Writers nationwide.

EPA Response

See response to comment 316bEFR.045.007.

Comment ID 316bEFR.055.002

Author Name Allen Hubbard

Organization FL Dept Industrial Wastewater

Subject Matter Code 6.08

Non-aquatic impacts

ENDANGERED SPECIES ISSUES

The Proposed Draft Rule seeks to protect endangered aquatic species by reducing losses due to impingement and entrainment from cooling water intake structures (CWIS) regulated under Phase II. To the extent that this beneficial effect will result from limitations on warm water discharges at once-through cooling water systems, serious harm may result for the Florida manatee, a very important endangered aquatic species in our State's waters. Unlike many other aquatic species, manatees are not impacted by impingement or entrainment from CWIS. On the contrary, manatees find refuge in the warm water discharge areas of some of Florida's steam electric power plants during cold days in the winter. It is estimated that two-thirds of the Florida manatee population uses these man-made warm water refuges on the coldest days. The situation presents a difficult case study in competing environmental benefits and impacts.

Within the proposed rule, as currently written, we do not find a mechanism for the protection of species that may be adversely impacted by the significant reductions in warm water discharges that will result from implementation of the proposed rule. It is easy to understand how this oversight could have occurred, given the rule's mandated focus on intake structures rather than discharge, the magnitude of EPA's task, and the fact that manatees are uniquely Floridian and Caribbean animals living nowhere else in the United States. Nevertheless, we believe that the proposed rule should be revised to incorporate the flexibility to protect the endangered Florida manatee.

EPA Response

See response to comment 316b.EFR.051.016.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Maya K.van Rossum

On Behalf Of:

Delaware Riverkeeper

Author ID Number:

316bEFR.056

Comment ID 316bEFR.056.001

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 10.03.01

Delaware

As recognized in EPA's case studies document, there are numerous facilities operating with cooling water intake structures within the Delaware River Basin, including (according to EPA's Figure B1-l) over a dozen facilities that would be impacted by the proposed regulation. Among these facilities is the Salem Nuclear Generating Station, located along the Delaware River in Salem County, New Jersey. Salem has one of the largest cooling water intakes in the country and is implementing the controversial mitigation approach which is being promoted in the current regulatory draft.

EPA Response

This general statement about the Salem facility does not require a response from EPA.

Comment ID 316bEFR.056.002

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Every day, cooling water intake structures (CWISs) kill billions of aquatic organisms, including plankton, eggs, larvae, fish and other aquatic life. When Congress amended the Federal Water Pollution Control Act ("Clean Water Act" or "CWA") in 1972, it attempted to address the harms associated with cooling water intake structures by including section 316(b). Section 316(b) requires that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." The proposed 316(b) regulations for existing facilities fail to carry out the mandate of this provision of the law. Of particular concern are the provisions that allow a facility to continue to inflict tremendous impingement and entrainment impacts simply because the owner/operator commits to undertaking some other "mitigation" project they claim and/or deem to be beneficial to the environment and community.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.056.003

Author Name Maya K.van Rossum
Organization Delaware Riverkeeper

Subject Matter Code 2.04.06
Restoration measures in place of technologies

The Clean Water Act Requires BTA on a Facility's Cooling Water Intake Structure--Mitigation does not fulfill the requirements of the law.

The requirements of section 316(b) are clear on the face of the statute - it requires power plants to apply BTA with regard to their CWISs in order to minimize the adverse environmental impacts they cause. Only technologies that will reduce the impingement and entrainment impacts and deaths caused by CWISs can be used to fulfill 316(b)'s mandate. Fish hatcheries, fish restocking programs, programs for removing impediments to fish migration, and implementation of programs for enhancing and/or creating wetlands (examples of "Mitigation Proposals") which are wholly unrelated to cooling water intake structures cannot be used to fulfill the requirements of 316(b). Mitigation Proposals being proposed in the 316(b) context all have common goals: they seek to allow cooling water intake facilities to continue to indiscriminately kill aquatic life rather than make attempts to curb, or stop, the damage they are inflicting; and they all fail to fulfill the mandates of section 316(b) of the Clean Water Act.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

EPA has defined adverse environmental impact in terms of impingement and entrainment caused by cooling water intake structures. In order to reduce the occurrence of impingement and entrainment caused by cooling water intake structures, EPA examined a variety of design and construction technologies and operational measures. As discussed in the preamble to the final rule in Section VIII.B, EPA ultimately developed national performance standards expressed in terms of ranges, which EPA concluded could generally be achieved by application of some combination of the model technologies. EPA recognized, however, that a facility's choice of how to achieve those standards would depend on a host of site-specific factors. Therefore, in addition to authorizing facilities to choose their own suite of design and construction technologies and/or operational measures to reach the performance standards, EPA is also authorizing facilities to use restoration technologies under certain circumstances and still in relation to the applicable performance goal. As noted elsewhere, the ultimate objective of today's rule is to minimize the impact of impingement and entrainment on the waters from which cooling water is withdrawn. Restoration is one way of minimizing that impact.

Comment ID 316bEFR.056.004

Subject Matter Code 11.11

RFC: Mandatory restoration approach

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Mitigation cannot play a role in meeting the requirements of section 316(b) -- but should be required in addition to 316(b) technology requirements in order to remediate for the past damage inflicted by facilities' CWIS. For many years existing facilities with CWIS have been indiscriminately killing fish. Requiring remediation/mitigation to make up for these historical impacts is justified but it does not fulfill 316(b)'s technology requirements.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule and EPA's response to comment 316bEFR.056.003.

For a discussion of the use of restoration measures to compensate for past damages from cooling water intake structures, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.056.005

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Simply put, mitigation does not fulfill the plain language of the CWA because mitigation is not BTA for the location, design construction or capacity of a CWIS. Mitigation does not minimize the impingement and entrainment harms being inflicted on an aquatic system by CWIS as required by the law. Mitigation projects or proposals are often unproven and unprovable -- there is no guarantee of success.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see EPA's response to comment 316bEFR.056.003 and the preamble to the final rule.

EPA agrees with the commenter that there are uncertainties associated with restoration measures. For additional discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.056.006

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 10.03.01

Delaware

PSE&G has been working on the Delaware River on a mitigation experiment in response to 316(b) requirements for its Salem Nuclear Generating Station. To date, that mitigation experiment is failing. PSE&G has been unable to demonstrate that its mitigation effort for the fish kills at its Salem plant is benefiting the fish populations of the Delaware Estuary. PSE&G cannot demonstrate that its mitigation effort at Salem is in any way minimizing the impingement and entrainment of over 3 billion Delaware River fish. It's not likely that PSE&G could demonstrate that its wetlands mitigation efforts have contributed back, in a long-term, sustainable, and successful way to the River's aquatic populations. Further, it can't even demonstrate that if it were successful in eradicating and/or controlling phragmites in designated areas as mandated by its currently permitted mitigation project (an outcome that is itself questionable), that this success would be sustainable without continuous intervening action. In fact, the primary result of PSE&G's mitigation effort is that the Salem facility continues to kill over 3 billion Delaware River fish a year while PSE&G is also harming thousands of acres of marshland by spraying it with glyphosate only to have the targeted phragmites return. There has been no minimization of adverse impact as required by section 316(b).

EPA Response

Under the final rule, EPA allows use of restoration to minimize or help to minimize the adverse environmental impacts deriving from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

EPA is aware of the uncertainties associated with the performance of restoration measures (see 67 FR 17146-17148 and 68 FR 13541-13543). However, EPA believes that implementation of the requirements in the final rule, as described in sections 125.94 and 125.95, will help reduce uncertainties associated with restoration projects and enhance their performance.

Comment ID 316bEFR.056.007

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

The Adverse Environmental Impacts 316(b) BTA Must Address

The theory behind the Mitigation Proposals is that they will result in the utilities replacing the aquatic organisms their cooling water intake structures kill. The utilities claim that by replacing the organisms they kill, the adverse environmental impact their CWISs are having will be minimized. When arguing that Mitigation Proposals can be used to fulfill the requirements of section 316(b), the utilities fail to show how the Mitigation Proposals will address the specific adverse environmental impact section 316(b) is seeking to minimize -- they do not reduce impingement and entrainment. Essentially, supporters of mitigation are arguing that replacing dead aquatic organisms equates avoiding killing those aquatic organisms—an argument that is not based in reality, science or the law.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see EPA's response to comment 316bEFR.056.003 and the preamble to the final rule.

Comment ID 316bEFR.056.008

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The plain meaning of the statute and decisions rendered concerning BTA and section 316(b) make clear that 316(b) BTA must address the specific harms being caused by CWISs (impingement and entrainment). Section 316(b) cannot be fulfilled by a technology or project, which seeks only to address man-made after-the-fact injury to the natural environment and the overall fish losses caused to a source waterbody. Congress, by enacting 316(b), and EPA in its historic interpretation of it clearly intend for the overall harm to the natural environment to be avoided by utilizing technology designed to prevent the specific harms CWISs cause. The impacts the CWIS is having on a waterway's overall health and fishery as a result of its water withdrawals and impingement and entrainment of aquatic organisms is addressed through direct reduction of the impingement and entrainment of aquatic organisms.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.056.009

Subject Matter Code 10.03.01.01

Salem

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

When considering the impacts of the Salem Nuclear Generating Station for purposes of section 316(b) of the Clean Water Act, Dr. Goodyear, in a report made for the Delaware Department of Natural Resources and Environmental Control, makes clear that the existence of a balanced-indigenous community is not a proper gauge for whether or not Salem and its CWIS is having an effect. He notes that the “suite of species present, and the relative magnitudes of those species could shift m important ways and there would still be a balanced indigenous community.“ Dr. Goodyear joins with ESSA Technologies (who conducted a study of the Salem facility for NJDEP) and the case law in concluding that the focus of decision making must be on minimizing the impingement and entrainment impacts. <FN 1> Dr Goodyear supports this interpretation of the law by pointing out scientific problems with PSE&G’s suggested approach. <FN 2>

Footnotes

1 Dr. Goodyear et. al., comments on Appendix F. of the PSE&G Permit Application for Salem 4 March 1999, 12/13/99. (“Dr. Goodyear 12/13/99”)
2 Dr. Goodyear 12/13/99

EPA Response

EPA agrees that ecological impacts can occur on many levels and many serious impacts can occur without causing a change in or an impact on a "balanced indigenous community" which, in any case is the statutory test for section 316 (a), not section 316(b). EPA believes it is important to evaluate all levels of impacts that are possible beginning with accurate I&E monitoring and appropriate annualization of losses.

Comment ID 316bEFR.056.010

Author Name Maya K.van Rossum
Organization Delaware Riverkeeper

Subject Matter Code 2.04.06
Restoration measures in place of technologies

Mitigation does not “Minimize” impingement and entrainment.

Section 316(b) requires that power plants use BTA to “minimize” their adverse environmental impacts. The term “minimize” means to reduce to the smallest possible amount or degree. <FN 3> Minimization of adverse environmental impacts is required regardless of whether the adverse environmental impact a cooling water intake structure is having is significant or not - “[a]ll environmental harm should be avoided.” <FN 4> Therefore, a facility, which is having an adverse environmental impact that can be reduced, should be reduced as much as is possible by using BTA. It is not permissible to allow a facility to continue to inflict its impingement and entrainment impacts largely unchecked simply because a facility promises to undertake some other environmental project (i.e. mitigation) it claims will be beneficial to the impacted waterway or communities (human and nonhuman communities).

316(b) Requires Action on Intake Structures

Section 316(b) mandates that the “location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” Because the language of section 316(b) is clear, its plain meaning controls its construction. <FN 5> The plain language of the statute clearly requires implementation of technologies on cooling water intake structures. The language cannot be read to permit action wholly unrelated to cooling water intake structures.

The Clean Water Act, when reviewed as a whole, is a technology forcing statute -- through regulation industry is encouraged and required to develop the technologies needed to attain the requirements of the law. Assertions by industry that there are no viable alternatives for complying with the law does not alleviate them from the responsibility for identifying and creating, new technologies that do comply with the law. Industry has had 30 years to create technologies which comply with the requirements of 316(b) and which satisfies industry concerns — the fact that they have chosen instead to fight this statutory requirement should not be rewarded with a weakened standard.

Prior EPA guidance, regulatory and court decisions make clear that the a CWIS includes all structures and components of the intake system which are an integral component of the CWIS and associated with the withdrawal of cooling water including dikes, dredged channel, intake canals, etc. In order to fulfill the definition of the term “cooling water intake structure” there must be an intimate connection between the structure at issue and the cooling water intake structure. <FN 6> Technology proposed for use to fulfill section 316(b) requirements should be affiliated with the cooling water intake system in terms of bringing water into the cooling system.

Mitigation Proposals do not impact the location, design, construction or capacity of a CWIS. They are merely an attempt to address the overall harm caused by CWIS’s, i.e. the overall loss of fish and aquatic organisms in the source waterbody, they are not seeking to address the specific impingement and entrainment harms caused by the CWISs. Creation of wetlands, removal of impediments to fish migration, and fish hatcheries are in no way linked to, or associated with, CWISs or the process of drawing water into the cooling system and cannot be used to fulfill the requirements of section 316(b). Technologies/activities which do not specifically focus on the CWIS, such as non-CWIS mitigation efforts, cannot be said to fulfill the requirements of the law.

Footnotes

3 Decision of the General Counsel on Matters of Law Pursuant to 40 CFR §12536(m), Decision of the Administrator and Decision of the General Counsel, Volume 2, 183 (1977) citing Random House Dictionary of the English Language, (Unabridged 1970).

4 Id.

5 Hudson Riverkeeper Fund, Inc. v. Orange and Rockland Utilities, 835 F.Supp. 160, 166 (S.D.N.Y. 1993).

6 Hudson Riverkeeper Fund, Inc. v. Orange and Rockland Utilities, 835 F. Supp. 160, 166 (S.D.N.Y 1993) U.S.ENVIRONMENTAL PROTECTION AGENCY, DEVELOPMENT DOCUMENT FOR BEST TECHNOLOGY AVAILABLE FOR THE LOCATION, DESIGN, CONSTRUCTION AND CAPACITY OF COOLING WATER INTAKE STRUCTURES FOR MINIMIZING ADVERSE ENVIRONMENTAL IMPACT 8 (1976) DEV. DOC."]; Carolina Power and Light Company, Brunswick Steam Electric Plant Units 1 and 2, National Pollutant Discharge Elimination System Permit No. NC0007064 (U.S. EPA Nov. 7, 1977) [hereinafter "Brunswick II"]; Fact Sheet, Application for National Pollutant Discharge Elimination System Permit to Discharge Treated Wastewater to U.S. Waters for John Sevier Plant Owned by Tennessee Valley Authority, Application No. TN0005436 (Jan. 23, 1986) [hereinafter "John Sevier Fact Sheet]

EPA Response

For a discussion of EPA's authority to include restoration under today's rule as a means to meet the requirements of today's rule, see the preamble to the final rule.

For further discussion of restoration measures as an aspect of cooling water intake structure design, see the preamble to the final rule.

Comment ID 316bEFR.056.011

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 2.04.04

Use cost-benefit tests

Mitigation and the 316b Cost Test.

As the result of interpretive agency and judicial decisions, 316(b) has been subject to a cost test —technologies cannot be required pursuant to 316(b) if their costs are wholly disproportionate to the environmental benefit to be gained.

We note at the outset that the plain language of 316(b) does not provide for implementation of a cost test. As a result, we do not believe that an appropriate application of 316(b) would include such a test. But, to the extent that past decisions have included, and continue to rely upon, application of the wholly disproportionate cost test, and provided the cost test will continue to be utilized, it is important that 316(b) decisions and rulemaking include an appropriate application of this test.

A widely used argument against closed cycle cooling and in support of the use of Mitigation to fulfill the requirements of section 316(b) is that the cost of implementing technologies (particularly closed-cycle cooling systems) that would meet the requirement of section 316(b) is so high that it is wholly disproportionate to the environmental benefits which would be obtained. Utilities argue heavily that they cannot afford the technologies needed to meet the 316(b) standard. These arguments tend to focus on the total cost of implementing a required 316(b) technology, as opposed to the incremental costs to the ratepayers.

These cost arguments are faulty and inconsistent with the requirements of section 316(b) and EPA's interpretation thereof. It is important that the proposed rules clearly establish that to the extent the wholly disproportionate test is applied, that it is focused on the incremental cost to the ratepayer and that it must, in order to support thorough and informed decision making, include a thorough analysis of all of the economic and environmental benefits that the technologies and/or mitigation proposals under consideration would achieve.

It is essential that a facility's ability to pay for a required 316(b) technology not be used to absolve them from the requirements of the law. Ability to pay is not a proper part of any cost consideration. The Clean Water Act was designed as a technology-forcing statute— as such it is incumbent on the industry to find cost-effective ways to meet the requirements of the law.

Consideration of the economic impact on an individual facility should not be part of the analysis -- ability to comply with regulations, provide service and remain economically viable is an accepted part of the free market process. Society cannot be made to subsidize the inability of a facility to comply with the law by allowing it to continue to adversely impact our public trust resources -- our waterways, our fisheries, our aquatic systems.

In applying the 316(b) cost test, past decisions closely link the acceptable cost level with the level of environmental benefit to be achieved. The decisions regarding consideration of costs pursuant to section 316(b) have not required a specific cost-benefit analysis nor have they focused upon the ability of a facility to pay for intake technologies; they have required that the cost of the technology not be wholly disproportionate to the environmental benefit to be gained. <FN 7> Therefore, it is clear that a consideration of costs pursuant to section 316(b) should focus on the amount of environmental benefit to be obtained from the technology considered, not whether or not the facility can afford the technology.

The 316(b) cost analysis requires a careful analysis of the costs of a proposed technology in conjunction with an analysis of the environmental benefits to be achieved. Under proper application of this test, as the environmental benefits associated with proposed technology increases so to does the acceptable cost level pursuant to 316(b), i.e. a high level of environmental benefit warrants a high level of cost.

Footnotes

7 Carolina Power and Light Company, Brunswick Steam Electric Plant Units 1 and 2, National Pollutant Discharge Elimination System Permit No. NC0007064 (U.S. EPA Nov. 7, 1977) at 61.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.056.012

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

When Could Mitigation be an Appropriate Option Under the Regs?

Section 316(b) is, under the plain meaning of the statute, technology driven. As discussed to this point, if there are CWIS technologies available to minimize the impingement and entrainment impacts of the facility, then that is what the law requires be implemented. Mitigation can be an option, can only be an option, in those circumstances when there are no CWIS technologies available that can accomplish the minimization goal. This reading of the law is supported by previous 316(b) decisions.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.056.013

Author Name Maya K.van Rossum
Organization Delaware Riverkeeper

Subject Matter Code 6.07
Documented facility examples of CWIS impacts

The Crystal River Power Plant, owned by Florida Power Corporation, CWIS is located in an estuarine nursery. The facility has five generating units, two of which employ closed-cycle cooling and three of which use once-through cooling. <FN 8> The three once-through cooling units intake 1,889 MGD of cooling water from the estuary <FN 9> and in so doing annually impinge and entrain more than 40 tons of finfish and shellfish. <FN 10> In issuing a NPDES permit for the Crystal Rivers Plant, EPA determined that the location, design and capacity of its three once-through cooling water intake structures did not reflect the best technology available for minimizing adverse impacts as required by section 316(b). <FN 11> After determining that fine mesh screens were not a technically feasible technology for the cooling water intake structures because of associated siltation problems, <FN 12> and that the cost of installing closed-cycle cooling towers, which would reduce entrainment damage by approximately 85 percent, <FN 13> were wholly disproportionate, EPA determined that the plant could fulfill the mandate of 316(b) via a combined capacity reduction and Mitigation Proposal <FN 14> EPA required that the Crystal River Plant reduce its flow by 15 percent during the months of November through April, and that it construct and operate a fish hatchery “in an attempt to replace fish and shellfish eggs, larvae, and juveniles entrained by the plant.” <FN 15> EPA explicitly stated that implementation of this plan “constituted minimization of the environmental impacts of the cooling water intake as required by section 316(b) of the Clean Water Act for the Crystal River Power Plant” once-through cooling units. <FN 16>

In reading this decision it is clear that while cooling towers were not required, the flow reductions were clearly the major means by which EPA intended to achieve compliance with 316(b). Operation of the fish hatchery was merely a supplemental requirement to try and replenish fish to the source waterbody. The fish hatchery was used only as “an attempt” to replace the lost aquatic organisms--not to meet the requirements of 316(b).

Footnotes

8 Florida Power Corporation, Crystal River Power Plant Units 1, 2, and 3, Citrus Country Florida, National Pollutant Discharge Elimination System Permit No. FL0000159 Findings and Determinations Pursuant to 33 U.S.C. § 1326 (EPA Region IV Sept 1, 1988) [hereinafter “Crystal Rivers”}].

9 Id. at 7

10 Id. at 5.

11 Id. at 7.

12 Id. at 8.

13 Id. at 7.

14 Id at 8.

15 Id. at 8.

16 Id. at 8.

EPA Response

EPA considered this facility in its rulemaking and, in fact, has included a compliance option associated with reduced flow. EPA also believes that restoration can have an important role in achieving compliance with section 316(b). Please see the preamble to the final rule.

Comment ID 316bEFR.056.014

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

The Tennessee Valley Authority's John Sevier Steam Plant used a detention dam to form a cooling water intake pool for the powerplant's cooling system. <FN 17> Because the primary purpose of the dam was to provide an adequate supply of condenser cooling water to the plant, it was determined to be an "integral component of the intake structure and subject to the provisions of Section 316(b). <FN 18> The existence of the dam was contributing to adverse impacts in the Cherokee Reservoir and the Holston River upstream from the plant. <FN 19> Because the dam interrupted spawning runs of indigenous migratory fish species and was responsible at least partly, if not completely, for the depletion of these species in the local waterbodies, and because the dam did not allow far successful use of tailwater areas for spawning by reservoir fish, the plant's cooling water intake structure was determined to have had a significant adverse environmental impact and did not fulfill the BTA requirements of section 3l6b. <FN 20> Initially, while making its Tentative 316 Determination, EPA determined that removal of the dam was not necessary because other mitigative measures existed for reestablishing the migratory pathway for spawning. Of significance was EPA's determination that the fish and removal of the dam "would probably result in additional severe adverse environmental impact." <FN 21> Subsequently EPA determined that many of the technologies originally thought to be available were in fact not feasible technologies for the plant. <FN 22> Additionally, EPA determined that the construction of a new intake system, removal and disposal of sediments, and the modification that would result to flow release patterns from upstream impoundments, which would all occur if the dam were removed, would result in the costs of removing the dam to be wholly disproportionate to the environmental benefits to be obtained. <FN 23> As a result, EPA did not find removal of the dam to be BTA pursuant to section 316(b). Ultimately, EPA required TVA to conduct a stocking program in order to assure replacement of fish populations which. have been extirpated or depleted "until such time as technology becomes available to modify the dam;" that it annually assess available technologies for fish passage and implement such technologies if they become available at a cost that is not wholly disproportionate to the anticipated benefits; conduct or support research and development of fish passage technology, in addition to other monitoring requirements. <FN 24> The Agency then stated "at this time" these conditions constitute minimization within the meaning of 316(b). <FN 25>

The key to the John Sevier decision is the fact that the Agency was unable to find any technologies which were feasible at the John Sevier Plant for minimization of adverse environmental impacts. Therefore, rather than not do anything, it seemed that EPA was attempting to place some requirements on the plant to address the concerns embodied in 316(b) as nearly as possible. Primarily it is important to note that while EPA was apparently, at the time of the decision, unable to find any technologies that would fulfill 316(b), it clearly required that TVA continue to assess possible technologies, attempt to create them, and that it implement them as soon as they became feasible, the costs test was met, and they would not further harm the already degraded environment. Additionally, in conjunction with its statement concerning the costs of the dam removal, EPA explicitly stated that if the environmental benefits associated with dam removal increased, then the cost of removing the dam may, in light of this information, no longer be wholly disproportionate thereby leaving this option open for future 316(b) determinations. <FN 26> Therefore, this case was a special situation in which no feasible technologies existed for addressing the adverse environmental impacts, yet EPA was attempting to implement 316(b) to the best of its ability with specific conditions that feasible technologies be sought out and implemented as soon as available.

Footnotes

17 John Sevier Fact Sheet, supra note 122, at 11.

18 Id.

19 Id. at 10-11.

20 Id. at 11

21 Id. at 12.

22 Id.

23 Id.

24 Id. at 13.

25 Id.

26 Id.

EPA Response

Because of the uncertainties associated with the performance of restoration measures (see 67 FR 17146-17148 and 68 FR 13541-13543), EPA believes it is important for a facility to assess the range of design and construction technologies and operational measures available to it before requesting approval from the Director to pursue restoration. EPA believes it is also important that a facility explain why it believes that restoration is the most feasible, cost-effective, or environmentally desirable option. Therefore, EPA has established requirements at sections 125.94 and 125.95 to ensure that restoration measures are used only when appropriate.

Comment ID 316bEFR.056.015

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

A settlement made in 1980 between five utilities, EPA, the New York Department of Environmental Conservation and local environmental groups regarding several powerplants located on the Hudson River <FN 27> was meant to settle a challenge the environmental groups brought concerning permitting of the powerplants at issue. As part of the settlement, the utilities were to use their best efforts to keep the volumes of water they drew in for cooling purposes to a minimum, they were to construct, lease or contract for the operation of a hatchery for the stocking of the river with striped bass fingerlings, <FN 28> they were to engage in a biological monitoring program, <FN 29> and they were to provide an endowment to fund research to advance the scientific understanding and management of the Hudson River fishery. <FN 30> Of primary importance, and the major reason why utility reliance on this settlement is unfounded, is the fact that the fish hatchery program has been unsuccessful. By all accounts, the Hudson River is no better off in terms of its fishery than it was when the settlement was reached; therefore it cannot be said that the settlement in any way minimized the adverse environmental impacts the utilities were having on the Hudson River and its fish. Furthermore, the provisions regarding the fish hatchery stated that "[n]one of the Utilities shall be liable in any way for the results of the operation of the hatchery or the stocking of the fingerlings....' <FN 31> This statement clearly indicates that there was no intention by the parties to the document that this requirement fulfill the mandate of section 316(b) of the CWA, it was merely an attempt to get the utilities to mitigate past environmental damage they had inflicted on the Hudson River with their CWISs.

Even along the Delaware River, the recently reissued permit to PSE&G for operation of the Salem Nuclear Generating Station stated that use of mitigation was not intended to fulfill the requirements of section 316(b), but merely as a supplement to technology requirements provided for in the permit. While challengers to this permit question the accuracy of that position — it seems clear from the terms of the permit and public agency statements that the mitigation was in fact part of the 316(b) mandates imposed in the Salem permit — it is NJDEP's stated position, and the stated position that EPA signed off on when it did not challenge the permit in its draft and/or final stages.

Footnotes

27 Settlement Agreement, between U.S. EPA, Attorney General of the State of New York, Hudson River Fishermen's Association, Inc., et. al. (Dec. 19, 1980).

28 Id. at 159.

29 Id.at 163.

30 Id at 162.

31 Id. at 159.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others. For a discussion of the uncertainties associated with restoration measures, see EPA's response to comment 316bEFR.206.055.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.056.016

Subject Matter Code 2.04.01

Require closed cycle cooling

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

The Terms of the Clean Water Act require a focus on capacity and therefore must necessarily focus on use of closed cycle cooling.

Reducing a facilities' intake capacity (the quantity of water withdrawn) via closed cycle cooling is clearly the most effective technology available for reducing impingement and entrainment impacts. The proposed regulations fail to require this most effective technology in all necessary an appropriate circumstances. As a result, these regulations fail to fulfill the requirements of the law and fails to provide the protection needed by our aquatic ecosystems and populations.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.056.017

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

Consideration of the existence of other power plants in the area.

316(b) “location” decisions should include consideration of the existence of other powerplants in the area. The need for consideration of the cumulative impacts of surrounding CWIS has been well stated by EPA in the past. <FN 32> According to a 1980 EPA decision, the Brunswick Memo, it is impossible to determine the impact a single powerplant located in an estuary is having on that estuary and the aquatic life which inhabits it. <FN 33> The Brunswick Memo suggests that it is possible that an intake located within an estuary may have an inconsequential impact. <FN 34> Yet, the memorandum notes that the number of powerplants in a single estuary, as well as in estuaries nationwide, is continuing to expand and that this state of affairs “must eventually spell doom for important marine resources.” <FN 35> The Brunswick Memo concludes this analysis by stating: “[t]he environmental decision to be made by the regulatory agency is -- at what point do we draw the line -- at this power plant; or the next, or the next? It appears that Congress has answered this question by requiring best technology to minimize impact at all, plants” <FN 36> Thus, EPA Regional Counsel has suggested that BTA requirements, including location decisions, must look beyond the immediate universe and impacts of a single powerplant, and must include consideration of all the powerplants within an area, and the impacts their cooling water intake structures are having on the source waterbody. To the extent that the regulations fail to mandate consideration of cumulative impacts in its 316(b) decision making, they are not in accordance with law.

Footnotes

32 Memorandum from Office of Regional Counsel to Rebecca W. Hanmer, Regional. Administrator (April 9, 1980) (hereinafter “Brunswick Memo”).

33 Id.

34 Id.

35 Id. at 3.

36 Id. (emphasis in original.)

EPA Response

EPA agrees with this commenter that cumulative impacts can be important. Multiple facilities located in a watershed are more likely to be affecting the same population of a particular species. EPA disagrees, however, that today's rule must require consideration of such impacts. Section 316(b) applies to individual point sources and their cooling water intake structures; therefore, the inquiry can focus on the facility alone. EPA believes that the permitting authority has the discretion to consider the cumulative impacts of multiple intakes in a watershed as part of its section 316(b) decisionmaking process because stricter controls may be necessary when more than one facility kills large numbers of individual of the same species in the same watershed.

Comment ID 316bEFR.056.018

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 10.03.01.01

Salem

Mitigation on the Delaware is a Growing Failure — And Cannot Justify Use of Mitigation For Purposes of 316(b) Elsewhere.

The Mitigation experiment permitted by the NJDEP at PSE&G's Salem Nuclear Generating Station for achieving 316(b) requirements has failed. Salem still kills over 3 billion fish and aquatic organisms a year through impingement and entrainment. Species killed include:

Over 59 million Blueback Herring
Over 77 million Weakfish
Over 134 million Atlantic Croaker
Over 412 million White Perch
Over 448 million Striped Bass
Over 2 billion Bay Anchovy

Additionally, sea turtles and shortnose sturgeon, threatened and endangered species, are killed at Salem. Precise figures on these kills have not been provided, but they have been acknowledged and documented on the public record. In fact, PSE&G used to have a special turtle resuscitation program, long since cancelled, especially to address their turtle kills. All of the sea turtles in Delaware Bay are either threatened or endangered.

EPA Response

Past performance of restoration measures is not necessarily indicative of future performance elsewhere. Restoration measures allowed under today's final rule must meet the requirements of the rule, including those described in sections 125.94 and 125.95 of the final rule.

EPA notes the commenter's concern that threatened and endangered sea turtles may be killed at Salem. Potential I&E of these species was not considered in EPA's analysis of the mid-Atlantic region because EPA was unable to locate I&E data for these species.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.056.019

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

PSE&G was permitted to fulfill the requirements of section 316(b) by installing alterations to their intake screens, testing experimental sound technology (this is simply a test and results to date are not proving significant reductions in impingement and entrainment and for some species these tests have actually increased the number of organisms killed) and reducing their cooling water intake capacity from a permitted 3.2 billion gallons per day to the 3.024 they were only ever actually using — in other words their permitted capacity was reduced to actual capacity resulting in no actual reduction in capacity at all. In addition PSE&G was permitted to implement a wetlands restoration experiment.

While NJDEP stated that the mitigation was not required to fulfill the BTA requirements of 316(b), it is clear that the mitigation was in fact an integral part of the 316(b) decision and outcome. Without the mitigation experiment NJDEP would not have settled for zero capacity reduction, an unproven and experimental sound deterrence and bubble effort, alterations to existing intake screens and biological monitoring in the Delaware Bay and Estuary. Throughout the process the mitigation was clearly an integral and necessary part of the 316(b) decision.

PSE&G's Wetlands Experiment involves restoring, enhancing and/or preserving 10,000 acres of what PSE&G characterizes as degraded wetlands. The original argument supporting this program was that restoration/enhancement of these wetlands would increase fish production in the Delaware Estuary. In addition to the legal problems with use of this program for fulfilling the requirements of section 316(b), there are other, fundamental scientific problems with this approach for addressing the fish kills imposed on the Delaware Estuary by PSE&G's Salem plant.

First, PSE&G never provided scientific data indicating that food or habitat were limiting factors for the fish populations in the Delaware Estuary — and there is in fact no data or information that would indicate that this is in fact the case. Therefore, altering wetlands to increase food and habitat availability for fish is likely not to have any effect on fish populations in the estuary.

Second, PSE&G's success criteria and evaluation methodology for its wetlands enhancement efforts do not include determining whether the fish populations of the River are benefiting from the wetlands restoration efforts. Instead their success criteria focus on change in vegetation coverage, algal productivity, macrophyte productivity, etc... PSE&G excluded impacts to fish populations because PSE&G is unable to provide this kind of information. Mitigation is problematic in this regard in that science is limited in its capability to quantify these kinds of benefits, at least to the extent necessary to demonstrate any population benefits such as PSE&G is claiming. PSE&G simply cannot establish that its wetlands mitigation has improved the fish population.

Third, PSE&G's own data is confirming studies by other scientists, that the foundation upon which their entire mitigation project is predicated is not true. PSE&G has always asserted that phragmites is inferior at producing food and/or habitat for fish populations. But forage studies within three sections of their own Alloway Creek site as well as studies by the New Jersey Marine Sciences Consortium indicate that phragmites-dominated marshes on the Delaware Bay contribute just as much basic nutrient material into the food web as spartina-dominated marshes.

Another fundamental and flawed underpinning of the PSE&G Mitigation justification, is the false premise that phragmites is inferior to other species, particularly spartina, at providing food and habitat to aquatic species. According to emerging research, Phragmites is not less beneficial as food and habitat for fish, wildlife and other organisms as compared to Spartina. Therefore, the entire underlying basis for PSE&G's marsh experiment is debunked and no longer sustains the asserted goals of the program. "As new data are generated, the general perception that regularly flooded phragmites marshes are less functional than the spartina marshes they replace does not appear to be upheld." <FN 37> "Efforts to restore salt marsh areas by replacing the undesired Phragmites with the desired Spartina are often justified by the assumption that the productivity of animal populations will be enhanced. However, evidence from the studies reported here as well as those of others (e.g. Fell et al, 1998; Wainright et al., 2000) does not support the general assumption that Phragmites leaf detritus is of poorer nutritional quality for estuarine consumers than that of Spartina." <FN 38> Phragmites is native to North America and has been found to be a component of Eastern U.S. marshes for 2000 to 4000 years at least. <FN 39> Multiple studies document that "Phragmites production is equivalent to the role of S. alternaflora production in the diet of key estuarine species" <FN 40> and that it is consumed by fish in the marsh. Phragmites has also been found beneficial in other ways with benefits beyond those provided by Spartina. For example they release less contaminants back into the environment than Spartina. "In comparison to a Spartina community, Phragmites enhances both mineral and organic decomposition, basically doubling the accretion potential of the marsh." <FN 41> "Phragmites function may actually exceed that of other wetland plants in ameliorating certain estuarine dilemmas like eutrophication and marsh loss." <FN 42>

The statement by NJDEP during its most recent permit decision making with regards to the Salem facility, that "Phragmites eradication is generally looked upon favorably by natural resources agencies such as the Department" is not a fair representation of new and emerging science on the issue. Today there is significant information regarding the benefits of Phragmites to aquatic species as well as terrestrial species. PSE&G has not provided any information to support a contention that the overall quality of benefits provided by spartina are greater than those of phragmites and will be of greater value to aquatic populations. In addition, PSE&G and NJDEP discussions of the Cohansey, Alloway and other sites that are dependent on herbicide and marsh manipulations fail to reflect the adverse impacts that loss of this habitat is inflicting on animal populations. In many instances the marsh is devoid of vegetation, or has only low growing vegetation, over extended periods of time depriving the wildlife of shelter, habitat and food. The discussions and decisions to allow this program to continue fail to characterize or consider this damage.

Considering the reality that the efforts of PSE&G are largely being held up as a model for using mitigation to achieve 316(b) requirements it is important to understand why mitigation at Salem is not, and cannot, address the concerns that 316(b) is intended to address - i.e. impingement and entrainment of fish. As a legal matter, mitigation does not satisfy the requirements of 316(b) BTA; as a practical matter PSE&G is unable to demonstrate that its mitigation experiment actually provides benefits to the estuary ecosystem. The problems with PSE&G's mitigation experiment include, inter alia, the following:

-PSE&G failed to conduct any baseline data that would demonstrate whether or not food and habitat were limiting factors for the aquatic communities of the Delaware River system and therefore whether or not wetlands restoration could have contributed positively to their numbers.

-PSE&G is unable to demonstrate that the wetlands it is seeking to restore on these sites are superior, in terms of food and habitat for fish and other aquatic populations, than phragmites-dominated wetlands.

-PSE&G has failed to conduct the baseline data on the contributions of the phragmites stands to the food chain in order to make the necessary comparisons. It is very possible that the fish used the phragmites-dominated marshes in the same way and to the same degree as they would spartina-dominated marshes and therefore nothing has been truly gained by PSE&G's efforts, or would be lost if they were discontinued.

-PSE&G has failed to demonstrate that even if it is successful at replacing the existing phragmites in these areas with, other species of plants, that this change in vegetation is sustainable and will not be overrun by neighboring stands of phragmites within a matter of years.

-The draft permit fails to consider the unsustainability of the phragmites-dominated site (e.g. the Cohansey and Alloway sites). Without continued human intervention, the thousands of acres of phragmites located in Delaware Bay region will reinvade, and thus the alterations secured by PSE&G will be lost with no net or long-term change to the region from these areas.

-As noted by NJDEP, PSE&G cannot document the number of fish benefited by, or resulting from, the wetlands effort and so cannot demonstrate any benefit or lack thereof. Without this kind of information there can be no support to the suggestion that the wetlands are benefiting the fish populations of the River more-so than prior to PSE&G intervention or than would have been provided naturally (i.e. In the case of the salt hay farms, PSE&G merely mimicked a process that nature had already begun undertaking).

The PSE&G mitigation experiment, rather than being an example of why mitigation should be allowed, is actually a prime example of why it shouldn't - the project does not have the scientific baseline data necessary to justify it, the project is not providing data that will demonstrate its impacts on fish, the project does not fulfill the plain language and meaning of 316(b), and the mitigation project which must extend beyond the 5 years of PSE&G's NPDES permit is for all practical purposes unenforceable in terms of 316(b). And, as a result, opening the door to mitigation as a requirement of 316(b) pushes the door wide open and invites in abuse.

As the EPA case study points out, there are limits in the Delaware, today and in the past, on commercial and recreational takes of striped bass, Atlantic menhaden and others. These limits notwithstanding the Salem Nuclear generating Station has been permitted to continue its fish kills indiscriminately, unchecked by regulation. Salem's continued operation has helped create the need for catch limits, and lengthen the term of these limits, and has contributed to an overall sense of unfairness in the local commercial and recreational fishing industry that big business is not subject to the same rules as the rest of the community. Commercial and recreational fishing along the Delaware River are critically important to the local economy and these catch limits impact local community livelihood.

The EPA case study makes the same arguments as PSE&G regarding Salem, essentially that because improvements in water quality and catch limits have helped restore our fisheries to a certain extent that Salem should be allowed its indiscriminate killing. This argument cannot be allowed to continue. I also point out that while on Page B1-9 of the case study EPA asserts that the numbers of American shad have increased more than a thousand-fold since the early 1980s, on page B 1-13 EPA states “Although improved water quality and development of a fishery management plan led to some recovery after 1975, shad remain well below pre-1990 levels.” The case study states further that there are concerns about the extent to which the shad populations have actually recovered. These statements show that EPA’s conclusions regarding the value of mitigation are based on flawed interpretations and data. It also demonstrates one of the problems with a mitigation approach— it is difficult to get an accurate assessment of the health of a fishery, both pre and post mitigation. Efforts to minimize unnecessary and excessive takes of fish species are the best way to work to protect their populations and numbers -- 316(b) required BTA may require capacity reduction at PSE&G’s Salem plant as well as BAT in the CWIS.

It must be noted that EPA asserts in the Delaware Estuary case study that “The non-native common reed (Phragmites australis) ... has reduced the overall biological value” of the tidal marsh in the Delaware Estuary. “by eliminating feeding and nesting areas for waterfowl and wading birds.” EPA also states “This has led to a significant drop in available food resources, habitat diversity, and open water space and affects of number of species, including ducks, which are excluded from these infested areas.” EPA’s claims about wetland benefits to bird populations are unfounded and irrelevant. First, this is irrelevant from a 316(b) perspective. The cooling water intake structures ate harming fish, not birds. Second, PSE&G failed to conduct a scientific comparison of bird use of the marsh both pre-and post- their efforts, And finally, the wetlands experiment sites in the Alloway and Cohansey Creek Watersheds have turned into tremendous “dead zones,” areas devoid of healthy vegetation either because it had been herbicided, burned, disced or mowed. During these extensive periods, often occurring during the critical spring or fall, the vast areas disturbed by this project cannot be accurately said to be providing ecological benefits to birds or other marsh dependent critters.

Footnotes

37 (Judith S. Weis, Habitat and Food Value of Phragmites australis and Spartina alternaflora for Fiddler Crabs, Grass Shrimp. and Larval Mummichogs, printed in New Jersey Flows, Water Resources Institute, Vol. 1, No. 1, Fall 2000).

38 (Judith S. Weis, Habitat and Food Value of Phragmites australis and Spartina alternaflora for Fiddler Crabs, Grass Shrimp, and Larval Mummichogs, printed in New Jersey Flows, Water Resources Institute, Vol. 1, No. 1, Fall 2000).

39 Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. 1, Winter 2000.

40 Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. 1, Winter 2000.

41 Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. 1, Winter 2000.

42 Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. 1, Winter 2000.

EPA Response

For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see EPA's response to comment 316bEFER.056.003 and the preamble to the final rule.

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.056.020

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 10.03.01.01
Salem

Impingement and Entrainment Impacts of Salem have Been Undercounted.

The Delaware Estuary relies heavily on studies and findings by PSE&G. Not only were these studies and findings used to establish impacts on the Estuary by Salem, but they were also used, by extrapolation, to identify impingement and entrainment impacts from other facilities in the study area. While it is true that there is more information regarding the impingement and entrainment impacts of Salem than at most other facilities, and therefore it may be appropriate to use data on the impacts of Salem to help quantify impacts at other facilities, the impacts of Salem have themselves been undercounted and need upward adjustment in order to give a truly accurate representation of the impingement and entrainment of cooling water intake structures nationwide.

ESSA Technologies, hired by NJDEP to review PSE&G's most recent studies and data regarding its Salem facility, found that PSE&G had underestimated their impingement and entrainment impacts. And, as a result, not only does EPA's case study undercount the impacts of Salem, but it also undercounts the impacts of the other facilities for which it relied upon PSE&G's data.

Throughout the course of its 154-page analysis, ESSA Technologies identified problems with the studies, data and conclusions contained in PSE&G's permit application. Examples of ESSA findings include (but are certainly not limited to):

-According to ESSA, PSE&G "underestimates biomass lost from the ecosystem by perhaps greater than 2-fold." <FN 43> "... the actual total biomass of fish lost to the ecosystem (including fisheries, station losses, and losses of food to predators, summed over all species) is at least 2.2 times greater than that listed in the Application." <FN 44> PSE&G's estimates exclude "a) actual biomass of fish lost at the station for all species including bay anchovy; b) lost prey production other than bay anchovy thereby underestimating catch foregone; and c) the projected increases in RIS abundance in the Application that should be included in estimates of catch and production foregone. The largest under-estimates are for bay anchovy, spot, striped bass, Atlantic croaker and weakfish. Problems with the estimates of natural mortality rates contribute to the underestimation of lost biomass. The difficulties with production foregone imply redoing all dependent and related analyses." <FN 45>

-". . .natural mortality rates were overestimated for at least the 7 RIS species that are increasing and therefore the actual total biomass of fish lost to the ecosystem should increase further than the 2.2 fold amount..." <FN 46>

-ESSA notes specifically, and repeatedly, the importance of the entrainment and impingement loss estimates and conditional mortality rates, to the other calculations made in the application. They then recognize, discover and point out many shortcomings in the entrainment and impingement estimates. They discuss the "extensive interpolation and extrapolation of entrainment data" and the "high degree of process error (bias) in the sampling methodology." <FN 47> And ESSA states "It is judged, however, that the estimated impingement mortality rates are not representative of actual mortality rates of impinged fishes after they are returned to the Delaware river via the fish return system of the station.” <FN 48> These shortcomings are critical because they underpin any of the other calculations upon which NJDEP is basing its decisions, including the ever-important cost/benefit analysis.

-ESSA Technologies determined that PSE&G has not provided an accurate assessment of the impingement and entrainment impacts of Salem. ESSA found that the sampling provided by PSE&G failed to characterize a number of data uncertainties. ESSA concluded that “documentation of the uncertainty and potential bias associated with the impingement and entrainment loss estimates, and with the CMR estimates, is important because the results of these analyses provide key input to subsequent analyses of the effects of the station, such as fish stock jeopardy, lost fish production and biomass, assessment of the Base Case Future station operations scenario, and ultimately, the cost/benefit analyses of BTA to reduce entrainment and inipingement.” <FN 49>

-“In summary, all the natural mortalities (M) for young fishes are likely overestimated, which has direct implications to CMRs if estimated with the EEIM. The CMRs of pre-juvenile 1 stages would be underestimated. The elevated Ms would result in underestimation of production foregone of growing populations, which would directly affect the fisheries benefit analyses of the cost/benefit assessment of alternative technologies to reduce entrainment and, impingement. <FN 50>

-ESSA pointed out that there were often adjustments made to data sets and analyses. ESSA at times expressed concern about the “magnitude of the correction necessary.” <FN 51> It noted that entrainment sampling in some instances required use of a multiplier -- the result was that “if only one larvae were caught and not extruded it would be counted as 9. At the other extreme, it is possible that during periods of low larval density as many as 8 larvae (and possibly more due to random process error) could be extruded through the net resulting in an observation of zero entrainment.” <FN 52>

Footnotes

43 ESSA Technologies Review of Portions of New Jersey Pollutant Discharge Elimination System (NJPDES) Renewal Application for the Public Service Electric & Gas’ (PSE&G) Salem Generating Station, Final Report, Prepared for Division of Water Quality, NJDEP, June 14, 2000, p. xi. (“ESSA Report”)

44 ESSA Report p. 75

45 ESSA Report p. ix

46 ESSA Report p. 75

47 ESSA Report p. 6

48 ESSA Report p. 6

49 ESSA Report p. 6

50 ESSA Report p. 31

51 ESSA Report p. 11

52 ESSA Report p. 11

EPA Response

EPA recognizes the potential importance of the data issues raised by the commenter, and agrees that the extrapolation methods used at proposal were not ideal. Therefore, in response to this concern, EPA revised its final analysis by adding additional facilities (a total of 46) and extrapolating on a regional, rather than a national basis. For its analysis of the mid-Atlantic region, Salem was only one of many facilities with I&E data that were used to estimate regional I&E. I&E rates were averaged across multiple facilities, lessening the impact of Salem's data on EPA's I&E estimate for the mid-Atlantic.

Comment ID 316bEFR.056.021

Subject Matter Code 10.03.01.01

Salem

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

In addition to ESSA Technologies, the State of Delaware and USF&WS both conducted independent expert review of the permit application materials. The USF&W characterizes the impingement and entrainment impacts at Salem as “high”, <FN 53> as “substantial and potentially significant”, <FN 54> and as “ecologically significant”, <FN 55> and the “conditional mortality rates for some representative important fish species are high enough to be of serious concern.” <FN 56>

Footnotes

53 USF&W Correspondence to NJDEP dated 6/30/00

54 USF&W Correspondence to NJDEP dated 6/30/00

55 USF&W Correspondence to NJDEP dated 1/10/01

56 USF&W Correspondence to NJDEP dated 1/10/01

EPA Response

EPA notes the commenter’s point that local agencies consider Salem’s I&E losses “significant” and of “concern.”

Comment ID 316bEFR.056.022

Subject Matter Code 10.03.01

Delaware

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

With regards to PSE&G assertions that Weakfish in Delaware Bay are subject to shrimp bycatch mortality, Dr. Desmond of the Delaware Division of Fish and Wildlife has stated unequivocally that the Bay's Weakfish are not subject to shrimp bycatch. <FN 57> If PSE&G had not included bycatch mortality in its calculations then there would have been a 12% increase in weakfish equivalent recruits -- there would be 12% more weakfish surviving than PSE&G estimated. This amounts to a 256,000 <FN 58> understatement by PSE&G. As a result, PSE&G's calculations yield lower harvest benefit figures and other costs and benefits, attributable to Weakfish reports and therefore they skew the cost/benefit calculations against technologies that would reduce the impacts to Weakfish in Delaware Bay.

PSE&G's response that ASMFC's recent adjustment yield per fish figures balance out this 12% understatement is inaccurate. While it is true that with regards to pounds harvested by commercial fishermen the changed numbers might balance each other out, this is not the case with regards to impacts to the recreational fisheries. Recreational fishermen are not interested in pounds of fish, they are interested in individual quantities. The 12% undercount by PSE&G impacts the quantity of fish available for recreational fishermen. This 12% figure is not cancelled out by the ASMFC change. The result is that there are more individual fish for fishermen to catch. This translates into more fishing days for recreational fishermen. The result is an increase in the economic benefits that accompany increased number of recreational fishing days.

Footnotes

57 September 26,2000 memo from Dr. Kahn to Andrews Manus

58 Response to Memorandum dated September 26, 2000 from Desmond Kahn to Andrew Manus, December 7, 2000, p. 8

EPA Response

EPA is unclear about the commenter's point about the ASMFC adjustment and recreational catch of weakfish. While it is true that recreational fishing is considered in terms of numbers of fish, not pounds, pounds of fish are readily converted to numbers. In any case, EPA notes that for its final analysis Salem was only one of many facilities with I&E data that were used to estimate I&E for the mid-Atlantic region. Because I&E rates for weakfish were averaged across multiple facilities, EPA believes that estimates of Salem weakfish losses did not significantly influence EPA's I&E estimate for weakfish in the mid-Atlantic region.

Comment ID 316bEFR.056.023

Subject Matter Code 10.03.01.01
Salem

Author Name Maya K.van Rossum
Organization Delaware Riverkeeper

According to Dr. Desmond Kahn, Delaware Division of Fish and Wildlife, PSE&G's permit application did not include an estimate of conditional mortality rate (CMR; "The proportion of fish killed by the plant if no other sources of mortality are operating") from entrainment of striped bass, although CMRs were estimated for other RIS species. <FN 59> The result is to seriously understate striped bass mortality caused by Salem, and therefore to skew both the analyses of adverse environmental impact as well as cost-benefit analyses and the wholly disproportionate test. According to Dr. Kahn, the CMR caused by Salem for striped bass averaged 32% to 37%. In some years, CMR estimates were over 50%. Dr. Kahn disagrees with PSE&G's assessment that the cause of such high figures (as the over 50% figures) is the result of the Chesapeake Bay striped bass entering the Delaware. Ultimately, the origin of the fish is irrelevant, we are still killing millions of fish, presenting an adverse environmental impact.

Footnotes

59 Mortality of Delaware River Striped Bass from entrainment and impingement by the Salem Nuclear Generation Station, Dr. Desmond M. Kahn, Delaware Division of Fish and Wildlife, March 30, 2000.

EPA Response

EPA's analysis for the 316(b) rulemaking did not estimate conditional mortality rates, so this comment does not apply to EPA's benefits estimates for the mid-Atlantic region. Most facilities in scope of the Phase II rule have not collected the data needed to estimate conditional mortality rates.

Comment ID 316bEFR.056.024

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Subject Matter Code 10.03.01.01

Salem

In addition to the ecological loss of the striped bass, which was not reflected in the cost-benefit analysis, by virtue of the fact that the figures were not presented, the costs to the fisheries and fishing industry were therefore not represented. According to Dr. Kahn, the level of conditional mortality to striped bass by Salem "is high enough to be of serious concern, since it must be considered in addition to fishing mortality in stock management and may be a major impediment to stock productivity. <FN 60> The result of this high level of mortality "is equivalent to lowering the maximum reproductive rate of the stock by one third." <FN 61> "With this mortality, the accumulation of sufficient spawning biomass will require a marked reduction in exportation compared to a stock without this high mortality." <FN 62> Dr. Goodyear, reporting to and for the State of Delaware, joined in Dr. Kahn's concern about PSE&G's failure to more vigorously attempt to obtain entrainment estimates for striped bass. <FN 63> The figures in the materials suggest this value is, in reality, high.

Footnotes

60 Mortality of Delaware River Striped Bass from entrainment and impingement by the Salem Nuclear Generation Station, Dr. Desmond M. Kahn, Delaware Division of Fish and Wildlife, March 30, 2000.

61 Mortality of Delaware River Striped Bass from entrainment and impingement by the Salem Nuclear Generation Station, Dr. Desmond M. Kahn, Delaware Division of Fish and Wildlife, March 30, 2000.

62 Mortality of Delaware River Striped Bass from entrainment and impingement by the Salem Nuclear Generation Station, Dr. Desmond M. Kahn, Delaware Division of Fish and Wildlife, March 30, 2000.

EPA Response

Conditional mortality rates were not evaluated as part of EPA's benefits analysis. Most facilities in scope of the Phase II rule have not collected the data needed to estimate conditional mortality rates.

EPA recognizes the commenter's concern about striped bass. However, EPA had no alternative but to rely on facility-generated data. However, EPA notes that for the final rule the Delaware analysis was replaced by an analysis of the entire mid-Atlantic region, which included many more facilities in addition to Salem. Because the analysis was based on many facilities, EPA believes that the Salem estimates of losses did not significantly influence EPA's I&E estimate for the mid-Atlantic region.

Comment ID 316bEFR.056.025

Subject Matter Code 10.03.01.01

Salem

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

Based on the significant level of undercounting identified by ESSA Technologies, the US Fish and Wildlife Service, and experts working for the State of Delaware regarding the impacts of Salem, EPA must adjust upward the figures representing the impingement, entrainment and population impacts of Salem. The more conservative assumptions that EPA has already applied to account for some of this error simply do not go far enough to remedy the self-serving underrepresentation of impacts provided by PSE&G.

While EPA has clearly not undertaken enough steps and adjustments to remedy all of the problems with PSE&G's studies and assertions which resulted in their dramatic and tremendous understatement of their ecological impacts in terms of impingement and entrainment at Salem, it is clear that EPA was absolutely correct in its recognition that they had to correct many of the assumptions, bias, errors and misstatements made by PSE&G and its scientists. EPA adjustments to PSE&G's studies, data and calculations were and are necessary in order to obtain and provide a more accurate determination of the impingement and entrainment impacts Salem has on the aquatic species that live in the Delaware Estuary. (Attached find copies of the various reports concerning the many shortcomings, bias and inaccurate assertions made by PSE&G in their studies and resulting 316(b) materials.)

EPA Response

EPA notes these concerns of the commenter about PSEG's impingement and entrainment analyses for the Salem facility. However, EPA's analysis was dependent upon the available data. Nonetheless, to make its analysis more robust, EPA's evaluation of the mid-Atlantic region for the final rule included many more facilities in addition to Salem. For this analysis, EPA's goal was to develop a regional estimate of impingement and entrainment, rather than facility-specific estimates. Please refer to EPA's response to Comment 316bEFR.041.041 concerning EPA's extrapolation approach.

Comment ID 316bEFR.056.026

Subject Matter Code 10.03.01

Delaware

Author Name Maya K.van Rossum

Organization Delaware Riverkeeper

The Delaware River Case Study Understates Impacts to Threatened and Endangered Species.

We are very concerned that EPA failed to evaluate the potential impacts of CWIS' on federally listed threatened and endangered species because they lacked any data. Failure to locate data is no excuse for ignoring the impacts to species that are already at risk. The Delaware Estuary Case Study essentially concluded that because there is no data regarding impacts on threatened and endangered species that there is no impact. Because Salem is used as a model for 35 facilities across the country the magnitude of this error is significant, is magnified, and has far-reaching negative implications for the natural environment, including for threatened and endangered species.

In a December 1998 report prepared by the National Marine Fisheries Service it is stated that Salem does impact the federally endangered shortnose sturgeon that live in the Delaware River. While this is not a comprehensive study on the impacts, the report states that 8 shortnose sturgeon were discovered in trash bars at Salem. Based on their reviews they guestimate that between 0 and 11 fish are impinged at Salem each year. There were no findings regarding entrainment but clearly sturgeon are killed at Salem, if adults are getting caught on trash racks it is highly likely that juveniles, and younger, are also getting killed there.

We also know that Sea Turtles have been injured and killed at Salem. The New Jersey permit record has information about the impacts to the federally threatened turtle populations injured and killed at Salem, and even for a period required a turtle resuscitation program at Salem.

So there is some data available which has not been taken into account regarding impacts to threatened and endangered species by the Salem facility. And more importantly, a lack of data cannot be used to conclude that there is no impact —this is bad science and bad logic. Data regarding impacts to threatened and endangered species needs to be identified and or collected before such a significant and far reaching decision (in light of the use of Salem as a model for so many facilities across the country) is made.

EPA Response

EPA agrees that a lack of data cannot be used to conclude that there is no impact, and in fact did not conclude that there are no impacts to sea turtles from operation of Salem's cooling water intake structures. However, EPA was unable to locate data for sea turtles impinged and entrained at Salem.

Unfortunately, the lack of data on sea turtle I&E rates in general meant that EPA could not include these species in its analysis. This does not mean that EPA concluded that I&E of sea turtles does not occur, only that it's extent is unknown. More information on this issue is needed.

Please see Chapter A13 of Part A of EPA's Regional Analysis Document (DCN #6-0003)for a discussion of T&E species and approaches for analysis of potential I&E impacts.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Douglas J. Fulle

On Behalf Of:

Oglethorpe Power

Author ID Number:

316bEFR.057

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.057.001

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The proposed rule would implement section 316(b) of the Clean Water Act <FN 2> for certain existing power producing facilities that employ a cooling water intake structure and that withdraw 50 million gallons per day or more of water from waters of the U.S. and use at least 25% of water withdrawn solely for cooling purposes. The proposed rule constitutes Phase II in EPA's development of section 316(b) regulations and would establish national requirements applicable to the location, design, construction, and capacity of cooling water intake structures that reflect the best technology available for minimizing adverse environmental impact at these facilities.

Footnotes

2 33 U.S.C. §§ 1251 (CWA §§ 101), et seq.

EPA Response

Please refer to the response to comment 316bEFR.038.007.

Comment ID 316bEFR.057.002

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Cost - Benefit Test

A facility may qualify for a site-specific determination of best technology available ("BTA"), if the costs of implementing the performance standards in § 125.94(b) are significantly greater than the costs considered in establishing them or in the benefits of compliance. in such case, a facility may receive alternative performance standards if it can meet one of the two cost tests in proposed § 125 .94(c)(1). Therefore, the cost-benefit test is key to the successful implementation of this rule. As such, assuming that EPA will adopt the Phase II rules under the current proposed framework, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

The final rule includes a compliance alternative that allows a site specific determination of BTA. See section VII of the preamble to the final rule, 40 CFR 125.94(a)(5), and response to 316bEFR.006.003.

Comment ID 316bEFR.057.003

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 10.07.02

RFC: Appropriateness of “significantly greater”

“Significantly Greater”

The proposal provides for a site-specific determination of the BTA, if the costs of compliance at a site would be “significantly greater” than either the benefits of meeting the performance standards or the costs the Agency considered in establishing such standards. EPA must provide a clear definition of what is meant by “significantly greater.” To maximize net benefits to society, economic theory dictates that “significantly greater” should be interpreted to mean any cost benefit ratio greater that 1:1.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.057.004

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Application to Existing Facilities

In addition to the performance standards set forth in the proposal, a process for approving existing intake technologies as “best available” should be included, where it can be shown that the facility is not causing adverse environmental impact or that the technologies have already been deemed “best available” by the state where the facility is located. Such a process is reasonable, since § 316(b) of the CWA has been in effect since 1972, and has already been implemented on a case-by-case basis at many sites. A such, there are numerous electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impact, or that BTA has already been installed. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or if the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for further studies or additional intake technology.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today’s final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Additionally, under compliance alternative 2 (see 125.94(a)(2)), a facility may demonstrate that it already meets rule requirements if its existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards at 125.94(b) and/or the restoration requirements in 125.94(c).

Comment ID 316bEFR.057.005

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 7.01.01

Option 1--Demonstrate existing BTA

In § 125.94(a) of the proposed rule, EPA offers three alternatives for establishing BTA requirements at covered facilities. Under the first option, a facility may demonstrate to EPA that it already employs technologies or measures nee4ed to meet the performance requirements set forth in the proposal. See § 125.94(a)(l). If a facility chooses to establish compliance under this first option, the facility must then meet the performance standards set forth in § 125.94(b). To adequately demonstrate the efficacy of such existing technologies and/or measures, a facility must conduct a Comprehensive Demonstration Study (a “Study”) under § 125.95(b), unless, using the performance standards listed in § 125.94(b)(1), a facility reduces its intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system. If a facility can demonstrate to EPA that it meets the performance standard in § 125.94(b)(1), then the facility is not required to conduct and submit a Study. However, the rule does not state what such a facility would have to show in order to establish that it meets the performance standards in § 125.94(b)(1). EPA should consider, therefore, providing specific criteria within the rule for satisfying this performance standard.

EPA Response

The commenter has characterized the proposed rule; therefore no response is required for this part of the comment. Please refer to the preamble for a discussion of the framework of the final rule.

EPA assumes that the commenter is referring to what criteria a closed-cycle facility must meet in order to satisfy the performance standards. EPA notes that facilities with closed-cycle recirculating cooling systems are considered to be in compliance with the performance standards and are not required to submit a Comprehensive Demonstration Study. Please refer to § 124.94(a)(1) for further information.

Comment ID 316bEFR.057.006

Author Name Douglas J. Fulle

Organization Oglethorpe Power

Subject Matter Code 7.02

Performance standards

Compliance Assessment

Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the "best available", the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see response to comments 316bEFR.307.064 and 316bEFR.029.040.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

[omitted]

On Behalf Of:

[omitted]

Author ID Number:

316bEFR.058

Comment ID 316bEFR.058.001

Subject Matter Code MISC

Miscellaneous comment

Author Name [omitted]

Organization [omitted]

This letter was removed from the 316(b) comment index, as it was directed towards a separate rulemaking.

EPA Response

No response necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John V. O'Shea

On Behalf Of:

Atlantic States Marine Fisheries

Author ID Number:

316bEFR.059

Comment ID 316bEFR.059.001

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code SUP

General statement of support

The Commission strongly supports the EPA's decision to establish consistent national standards that outline minimum requirements of location, flow, and velocity for existing facilities. This will remove the uncertainty in the existing case-by-case basis approach while still allowing the state permitting authorities to provide additional site-specific measures when the resource requires them.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.059.002

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 8.04

Proposed standards for tidal rivers and estuaries

The Commission also supports the EPA's decision to provide greater protection for water bodies with greater biological productivity.

EPA Response

EPA agrees with the commenter.

Comment ID 316bEFR.059.003

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Although the Commission supports the overall approach to these proposed regulations, we have some significant concerns. The EPA has proposed three options for establishing the best technology available for minimizing adverse environmental impacts in the proposed rule. The ASMFC supports the first two but opposes the third option of the facility owner demonstrating that the cost of compliance would be significantly greater than the EPA estimate or value of the benefits. We do not believe that there is enough data available on all of the fish species to fully estimate the cost of impingement and entrainment at each individual facility, nor do we believe that the methods currently proposed fully estimate the value of the key commercial and recreational fisheries or their forage base.

EPA Response

The final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA agrees with the commenter that developing a complete estimate of benefits of alternative CWIS may not be feasible. See EPA's response to comment #316bEFR.206.047 on benefit categories omitted from EPA's analysis of the benefits of reduced cooling water intake. Also see EPA's response to comment #316bEFR.005.020 on application of the cost-benefit analysis to assessing the value of alternative CWIS technologies. See also sections V and IX of the preamble on site-specific determination of BTA.

Comment ID 316bEFR.059.004

Subject Matter Code 19.0

Dry Cooling

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

In addition, we believe that the EPA has already removed what they believe to be economically infeasible options by choosing not to require dry condenser cooling technology.

EPA Response

No response necessary.

Comment ID 316bEFR.059.005

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 21.08

Burden on permitting agencies (general)

Currently, most of the state permitting agencies do not have the appropriate staff to properly evaluate these proposals, and it would increase the permitting workloads and timeframes substantially to necessitate the review of comprehensive cost-benefit analyses.

EPA Response

EPA appreciates the lack of resources at some State agencies and plans to provide guidance concerning implementation of today's final rule. Due to the multiple compliance alternatives available in today's final rule, EPA expects that most facilities will not seek a site specific determination of BTA based on the costs of compliance with today's rule being significantly greater than the benefits of complying with the national performance requirements. Therefore, the ensuing burden under this compliance alternative should be minimal.

Comment ID 316bEFR.059.006

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

If the EPA does choose to go forward allowing this option the ASMIFC urges you to require costs to be "wholly disproportionate" to the costs EPA has considered as you did with the new facilities rule rather that "significantly greater" as has been proposed for this rule.

EPA Response

The comment includes no reasoning for its request. See response to 316bEFR.006.003.

Comment ID 316bEFR.059.007

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

We also have concerns with allowing restoration measures by a facility in lieu of reductions in impingement mortality and entrainment. While many of the restoration efforts taking place along the Atlantic Coast are beneficial to the species we manage, restoration should not be used in place of technology to reduce impacts. Restoration should only be used when these impacts cannot be avoided or have already occurred. Restoration science is not currently able to recreate the full functional equivalency (the full range, sequence and timing of interdependent life cycle stages that make up a productive, functioning, aquatic community) destroyed through impingement and entrainment.

EPA Response

For discussion of the consideration of design and construction technologies and operational measures before the use of restoration measures, see EPA's response to comment 316bEFR.033.005.

Comment ID 316bEFR.059.008

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

If the EPA does choose to go forward with allowing restoration in lieu of reductions, the ASMFC urges you to require restoration efforts in the same local waterbody where impacts are occurring.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

EPA does not want to preclude use of restoration measures on a watershed scale that can accomplish the environmental objectives of the final rule while providing additional flexibility to permit applicants and permitting authorities. For example, EPA believes there are some populations of migratory fish that move on a scale larger than the local waterbody surrounding a cooling water intake structure. Restoration measures can sometimes be implemented to produce and result in increases of these types of fish in the watershed containing the impacted waterbody. Because of the migratory nature of the fish, benefits can still accrue to the impacted waterbody despite the restoration measure taking place elsewhere in the watershed.

Comment ID 316bEFR.059.009

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

In addition facilities should be required to demonstrate that their restoration efforts would achieve a high level of functional equivalency before it is considered as an alternative to reductions in impingement and entrainment.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mark V. Carney

On Behalf Of:

PG & E National Energy Group

Author ID Number:

316bEFR.060

Comment ID 316bEFR.060.001

Subject Matter Code SUP

General statement of support

Author Name Mark V. Carney

Organization PG & E National Energy Group

As noted in the attached comments, we support several aspects of the proposed rule - including EPA's conclusion that cooling towers are not BTA for existing sources. We also appreciate the potential flexibility offered by voluntarily restoration and trading.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.060.002

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Mark V. Carney

Organization PG & E National Energy Group

We also support the use of sound economic analysis in selecting appropriate alternatives for effectively addressing I&E impacts associated with cooling water intake structures. Of the decision criteria presented by EPA in the proposed rule, only one, “a test based on the concept that benefits should justify costs”, will result in the selection of an alternative for reducing I&E that maximizes net benefits to society. The same is not true for a “wholly disproportionate” or “significantly greater cost to benefit” tests.

EPA Response

EPA agrees with the comment that sound economic analysis should be used to select appropriate alternatives. However, EPA does not agree that only a strict benefit-cost criterion is appropriate in this case. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of a “wholly disproportionate” or “significantly greater cost to benefit” tests please see comment #316bEFR.060.002. See also the preamble to final rule.

Comment ID 316bEFR.060.003

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Unfortunately, sound economics was abandoned in EPA'S decision to use the Habitat Replacement Cost (HRC) Method for estimating benefits associated with reductions in I&E. Even more unfortunate was EPA's decision to use HRC in the Brayton Point case study. As concluded by Dr. Robert N. Stavins, an economist at Harvard University who assisted PG&E NEG in evaluating the proposed rule and case study (see attached comments), HRC is not a method of valuation or benefit estimation at all, but a method of assessing costs. While mitigation, restocking, and/or habitat restoration are acceptable alternatives to the installation of specific technologies in order to offset I&E losses, the cost of such alternatives is in no sense whatsoever a reasonable proxy for the value (i.e. benefits) of reducing I&E. This assessment of the HRC method is shared by other economists, including Drs. David Harrison, Jr., and William Desvousges who assisted the Utility Water Act Group and the Edison Electric Institute's assessment of the proposed rule.

Therefore, we strongly object to EPA's use of HRC for valuing benefits. Its use and results should be removed from the documentation (i.e. case studies, the proposed rule and all supporting documentation), and the "values" calculated should be subtracted from all benefit estimates, including those carried out for the Brayton Point Station. Further, HRC should not be used to support the final rule or NPDES permits at any PG&E NEG stations.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003_. See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.060.004

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.03.05

Brayton Point

The Brayton Point case study, noted above, is premised on numerous faulty assumptions, erroneous analytical methods, and flawed calculations. It places undue, but substantial, reliance on several reports prepared by Mark Gibson of the Rhode Department of Environmental Management which, among other flaws, use and present data in a misleading way that distort the impacts of Brayton Point Station, misrepresents the actual conditions of Mount Hope Bay, and mischaracterizes the recovery of winter flounder in Narragansett Bay. The cumulative effect of EPA's errors is to produce a grossly excessive estimate of the benefits of the proposed rule for Mount Hope Bay that has no basis in sound science.

EPA Response

EPA disagrees with the commenter's conclusion that EPA's analysis is based on "faulty assumptions, erroneous analytical methods, and flawed calculations." Without details to support these accusations, EPA is unable to respond further. However, EPA wishes to note that EPA Region 1's 2002 NPDES permitting determinations for BPS provide multiple lines of evidence indicating that the BPS is having an adverse impact on finfish in Mt. Hope Bay. This information is provided in EPA Region 1's 2002 NPDES permit determinations for BPS and the related Responses to Comments document (available at http://www.epa.gov/region1/braytonpoint/index.html)

Comment ID 316bEFR.060.005

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.02

Performance standards

We are also troubled by EPA's proposed mandatory performance standards for reducing I&E. The three PG&E NEG stations affected by the proposed rule withdraw cooling water from three very different types of water bodies - an ocean, an estuary and a tidal river. Each ecosystem is quite different yet EPA, under the proposed performance standards, is proposing a one-size-fits-all requirement for reducing entrainment and impingement mortality. The only way to accurately and appropriately select BTA is on a site-specific basis.

EPA Response

Please see response to comment 316bEFR.311.002 and the preamble to today's final rule.

Comment ID 316bEFR.060.006

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Mark V. Carney

Organization PG & E National Energy Group

Finally, each facility with an NPDES permit renewal pending should have the option of complying with either the existing site-specific process or the new rule. Providing such an option is particularly important given the significant changes EPA is making to its interpretation of the substantive requirements of 316(b).

EPA Response

In today's final rule, EPA offers five compliance alternatives including a site-specific determination of BTA. Please see the preamble to the final rule and response to comment 316bEFR.034.005 for additional discussion.

Comment ID 316bEFR.060.007

Subject Matter Code SUP

General statement of support

Author Name Mark V. Carney

Organization PG & E National Energy Group

EPA's proposed rule contains several elements with which PG&E NEG, in principle, agrees. PG&E NEG agrees with EPA's conclusion that closed-cycle cooling does not represent the "best technology available for minimizing adverse environmental impact" at existing facilities. PG&E NEG also agrees with EPA's inclusion of a site-specific alternative to its proposed national performance standards and supports EPA's abandonment of the "wholly disproportionate" cost test. PG&E NEG welcomes EPA's consideration of several proposals that would provide new flexibility in complying with Section 316(b), including voluntary mitigation measures, mitigation banking and mitigation trading. Each of the foregoing elements should be included in EPA's final Phase II regulation.

EPA Response

Today's final rule maintains the desired flexibility for both the permittee and the Director to determine the most appropriate and cost-effective means for meeting the requirements of today's rule. EPA also notes that compliance alternative 5 allows a site-specific determination to be made based on cost-cost and cost-benefit considerations.

Comment ID 316bEFR.060.008

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code OPP

General Statement of Opposition

Although EPA's inclusion of these elements is laudable, PG&E NEG believes that EPA's Phase II proposal as a whole is fatally flawed. EPA's approach is premised on fundamental misconceptions concerning the scope and purpose of Section 316(b) of the Clean Water Act. As a result, the proposed rule contains a number of provisions which are inconsistent with Congress' grant of authority under Section 316(b) and should be altered or eliminated. In addition, EPA has failed to provide an adequate scientific and technical justification for its proposal. EPA's supporting documents include critical factual and analytical errors and provide no rational basis for the regulatory conclusions EPA has reached.

For these reasons, EPA's current proposal is not a permissible implementation of Section 316(b). It should be modified significantly prior to promulgation of the final rule.

EPA Response

Please refer to the response to comment 316bEFR.034.002.

Comment ID 316bEFR.060.009

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 2.04

EPA's legal authority to:

Misinterpretation of EPA's Statutory Authority

Section 316(b) states that:

Any standard established pursuant to Section 301 of this title or Section 306 of this title and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

In PG&E NEG's view, the language, legislative history, and contemporaneous agency interpretations of this provision compel two conclusions concerning its proper scope and method of application:

-First, that the scope of authority delegated to EPA by Section 316(b) is limited to regulation of the four enumerated physical aspects of cooling water intake structures. Congress has granted EPA no broader authority to regulate cooling water systems or to consider environmental stresses or effects not related to the specific cooling water intake structure in question;

-Second, that determinations of "best technology available for minimizing adverse impact" must be made on a case-by-case basis, taking into account the unique circumstances of a particular facility affecting the feasibility, cost, and effectiveness of technology to reduce entrainment and impingement impacts. This determination requires a threshold finding by EPA that an adverse environmental impact exists at the facility which requires minimization and also requires EPA to demonstrate that there is a particular technology for use at the site which is "available" at an economically practicable cost.

EPA's proposal is inconsistent in critical respects with these principles.

In the proposed rule, EPA improperly seeks to expand the limited scope of Congress' authorization under Section 316(b). EPA asserts authority under Section 316(b) to impose closed cycle cooling and operational measures through an illogical interpretation of the word "capacity" and to require mitigation measures as aspects of cooling water intake structure "design." EPA also incorrectly claims authority under Section 316(b) to consider cumulative intake structure impacts and other outside environmental stressors in determining the "best technology available."

These interpretations are inconsistent with the plain language of the statute and at odds with settled principles of statutory construction. EPA may not use illogical and unjustified interpretations of single words to assume an authority over aspects of a facility and its environment that Congress did not grant. Provisions of the proposed rule that rely on EPA's authority to impose closed-cycle cooling, operational measures and mitigation and that would require consideration of the cumulative effect of environmental stressors, including other intake structures, exceed the scope of Section 316(b) and should be eliminated from the final rule.

Although EPA correctly recognizes that a site-specific determination of BTA is required, EPA's proposed rule restricts the ability of many, if not most, facilities to obtain a set-specific determination of BTA. Instead, EPA proposes presumptively applicable performance standards that would provide facilities only a limited opportunity to obtain a site-specific determination, based on either the cost-cost or cost-benefit tests. In addition to impermissibly limiting access to a site-specific determination of BTA, EPA's performance standards approach ignores EPA's obligation to show, for each individual case, that there is adverse environmental impact requiring minimization. It also ignores EPA's obligation to demonstrate that any identified technology is "available" at an economically practicable cost.

The mandatory performance standard limited site-specific alternative is inconsistent with Section 316(b) and should not be contained in the final rule without substantial modification. At the very least, EPA should make the site-specific alternative available to any facility that requests it and ensure that a Section 316(b) determination under the site-specific alternative requires on a threshold finding of adverse impact and a determination that the technology chosen is available at an economically practicable cost.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.060.010

Subject Matter Code 7.02
Performance standards

Author Name Mark V. Carney
Organization PG & E National Energy Group

Lack of Scientific and Technical Justification

In addition to its erroneous legal premises, EPA's proposal lacks valid scientific and technical support.

EPA provides no biological or technological justification for the proposed performance ranges. EPA claims that the performance standards are based on a group of screening and avoidance technologies, yet the record does not demonstrate that those technologies are actually feasible, available at a reasonable price, or able to achieve the stated performance standards. To the contrary, several of them are demonstrably unusable in many instances and may be unable to achieve reductions within the performance ranges even where they can be used. EPA's supporting documents fail to establish that these technologies are BTA for existing sources.

In addition, EPA provides no credible biological justification for the performance standards or for any other aspect of its proposal. EPA's assessment of the biological impacts of entrainment and impingement misreads the available data and relies on analytical methods that have no scientific support. These errors include incorrect assumptions concerning impingement and entrainment mortality and use of invalid methods to estimate the adult equivalent losses resulting from losses of eggs and larvae. The cumulative effect of these errors is to significantly overstate the losses from Impingement and Entrainment ("I&E") and, therefore, the environmental benefits of the proposed rule. EPA's flawed biological methods provide no basis for concluding that EPA's specific proposals represent a rational approach to addressing adverse environmental impact resulting from I&E.

EPA Response

Please see response to comments 316bEFR.307.064 and 316bEFR.311.002.

Comment ID 316bEFR.060.011

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's economic analyses are equally unsupported by sound methodology. Compounding already excessive estimates of the biological losses caused by I&E, EPA utilizes invalid valuation methods, including the Habitat Replacement Cost method and forage fish replacement costs, which impart further, and dramatic, upward biases into EPA's estimates of the "benefits" of the proposed regulation. Use of these methods has no basis in economic theory and is inconsistent with EPA's own guidelines for estimating environmental values.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.060.012

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA's misunderstanding of economic principles is similarly reflected in its choice of the "significantly greater" cost test as an alternative to the "wholly disproportionate" cost test for existing facilities. Although the significantly greater cost test represents an improvement over the wholly disproportionate test, it reflects the same fundamental error. By requiring that facilities expend resources on technology up to the point that their costs are "significantly greater" than the benefits, this test ensures that in many, if not most, cases, the amounts expended will exceed the benefits obtained. As a result, society as a whole will be worse off.

EPA Response

See response to 316bEFR.018.009 and 045.012.

Comment ID 316bEFR.060.013

Subject Matter Code 10.03.05

Brayton Point

Author Name Mark V. Carney

Organization PG & E National Energy Group

These errors are amply demonstrated in EPA's deeply flawed "case study" of Brayton Point Station. In the case study, EPA repeatedly relies on inaccurate assumptions and demonstrably incorrect calculations to conclude that the Station is having an adverse impact on Mount Hope Bay. EPA then employs invalid and biased biological and economic models to develop estimates of the significance of the economic scope of that impact that are hundreds or even thousands of times greater than those produced by any accepted approach. Relying on these grossly inflated values, EPA, not surprisingly, suggests that imposition of strict controls would be cost-justified.

EPA's reliance on such demonstrably incorrect data and invalid analytical methods is inconsistent with the requirements of the Paperwork Reduction Act and PL 106-554 (the Data Quality Act), 44 U.S.C. § 3500 et seq. In addition, EPA's use of such deeply flawed methods can provide no rational basis of support for the proposed rule.

EPA Response

The commenter argues that EPA's Brayton Point analysis is "deeply flawed" but provides no basis for this assertion. Without specifics on what the commenter considers incorrect, EPA cannot provide specific responses to this comment. However, EPA asserts that its analysis is based on sound science, and has provided responses to specific comments on the Brayton Point case study elsewhere in these responses to comments.

Comment ID 316bEFR.060.014

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

EPA's Rejection of Closed-Cycle Cooling as the Best Technology Available is Correct

PG&E NEG wholeheartedly agrees with EPA's determination in the proposed rule that closed-cycle cooling is not the "best technology available" ("BTA") for existing sources as a whole or for any subgroup identified by waterbody type or waterbody type and flow. See 67 FR 17,155 col. 1; 17,155 col. 3; 17,158 col. 3. EPA has correctly recognized that the enormous cost, and engineering impracticability of retrofitting a large, multi-unit existing plant with cooling towers renders closed-cycle cooling completely inappropriate as a basis for the existing facility rule. This is the case whether closed-cycle cooling is required of all facilities within the scope of the rule or only those meeting specified waterbody or waterbody and flow standards. <FN 1> Rejection of closed-cycle cooling as BTA is also consistent with nearly thirty years of practice, in which EPA has repeatedly refused to require existing facilities to retrofit to closed-cycle cooling under the authority of Section 316(b).

Footnotes

1 In fact, PG&E NEG believes that the economic case for rejecting closed-cycle cooling is far stronger than EPA acknowledges in the proposed rule. EPA's analysis of the benefits and costs of closed cycle cooling includes numerous errors that enormously overstate the biological and economic benefits of cooling towers and grossly understate the economic, environmental and safety costs of retrofitting closed-cycle cooling in existing facilities. These errors have been evaluated at length by UWAG in Section IV of its comments on the Phase II Rule and PG&E NEG endorses those comments and incorporates them by reference into these comments. PG&E NEG also concurs with UWAG's analysis confirming EPA's assessment that dry cooling cannot be justified for existing facilities.

EPA Response

EPA notes that the comment supports EPA's final rule determination on recirculating cooling tower retrofit projects.

However, the Agency disagrees with the following statement, "EPA has repeatedly refused to require existing facilities to retrofit to closed-cycle cooling under the authority of Section 316(b)." When the facts specific to a particular facility justify characterizing closed-cycle cooling as BTA for an existing facility (i.e., Brayton Point Station), EPA has done so.

Comment ID 316bEFR.060.015

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 2.04.01

Require closed cycle cooling

However, PG&E NEG believes that closed-cycle cooling must be rejected for a more fundamental reason than that outlined above: Section 316(b) gives EPA no authority to impose closed-cycle cooling. By its terms, Section 316(b) only authorizes EPA to regulate specific characteristics of cooling water structures -- their design, location, capacity and construction. It is self-evident, as EPA has acknowledged, that the cooling system used by a particular facility is
part of the "intake structure." In re Central Hudson Gas & Electric Corp., Decision of the General Counsel No. 63, 378 (1977) ("A cooling tower is not an 'intake structure' within the meaning of Section 316(b)."). As a result, Section 316(b) does not authorize EPA to dictate the type of cooling system that a facility must use. See In the Matter of the NPDES Permit for Brunswick Steam Electric Plant, Decision of the General Counsel on Matters of Law, No. 41, at 181 (1976) ("Section 316(b) does not authorize the Agency to impose a particular closed-cycle cooling technology.").

Despite its acknowledgement of the foregoing, EPA claims, as it did in those cases, the ability to regulate a facility's cooling system indirectly under Section 316(b), on the theory that Congress' use of the term "capacity" authorizes EPA to restrict the volume of flow through the intake structure to the extent that closed-cycle cooling (or, presumably, dry cooling) becomes necessary. In re Brunswick Steam Electric Plant, at p. 181. This interpretation has never been upheld by any court and defies both logic and firmly established principles of statutory construction. It is blackletter law that, when interpreting a statute, every word used by Congress must be given meaning, if it is at all possible to do so. See Reiter v. Sonotone Corp., 442 U.S. 330, 339 (1979) ("In construing a statute we are obliged to give effect, if possible, to every word Congress used".). As a result, a statute must be construed so that "no clause, sentence, or word shall be superfluous, void or insignificant." United States v. Campos-Serrano, 404 U.S. 293, 301 n.14 (1971). EPA's interpretation fails under both of these principles. Adopting an unnecessary and strained reading of the single word "capacity," EPA renders meaningless the remainder of the statute's language, which, as EPA admits, limits its authority to the regulation of cooling water intake structures.

EPA's assertion of authority to regulate "volume of flow" under the "capacity" banner also lacks any basis in the legislative history of the statute, notwithstanding EPA's historical statements to the contrary. See, e.g., In re Brunswick Steam Electric Plant at 178, n. 10. The references which EPA cites as illustrating Congress' concern with the levels of entrainment resulting from high volumes of flow had nothing to do with the debate over Section 316(b). <FN 2> Indeed, to the extent that this legislative history is relevant at all, it supports PG&E NEG's position, not EPA's. Assuming Congress believed that the demands of the cooling system, and not only the characteristics of the intake, were appropriate objects of regulation, it plainly could have given EPA direct authority to regulate cooling systems under Section 316(b). Congress did not do so. Instead, it enacted a provision specifically focused on intake structures alone, using language which, given its plain and ordinary meaning, merely describes characteristics of those structures. Congress' refusal to grant EPA a broader authority over cooling systems under Section 316(b) must be respected.

For the reasons above, PG&E NEG endorses EPA's conclusion in its preferred alternative that closed-cycle cooling is not BTA for existing sources.

Footnotes

2 See William A. Anderson & Eric P. Gotting, Taken in Over Intake Structures? Section 316(b) of the Clean Water Act , 26 Column. J. Evntl. L 1, 33-34 (2001) (noting that legislative exchange in which reference was made to cooling water flows as relevant to entrainment occurred in the context of debate over whether other agencies could establish stricter effluent limits under NEPA and had nothing to do the scope of Section 316(b)). A copy of this article is provided in Appendix Ito these comments.

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.060.016

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA Correctly Includes a Site-Specific Approach to Establishing BTA

PG&E NEG concurs with EPA's decision to provide a site-specific approach by which facilities may obtain a case-by-case determination of the best approach for reducing and/or mitigating the I&E associated with their cooling water intake structures. Until now, a case-by case application of the BTA standard has been the norm. It recognizes the unique circumstances of each facility, which dramatically affect the degree to which any particular technology will be environmentally beneficial and can be implemented at a justifiable cost. It is also the only method that is consistent with Congress' intent that Section 316 be applied in a case-by-case manner. Experience demonstrates that the site-specific determination of BTA is practicable way for EPA and delegated states to implement 316(b).

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Comment ID 316bEFR.060.017

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 2.04

EPA's legal authority to:

The availability of a case-by-case determination is necessary as a matter of policy and law

The determination of what constitutes "best technology available" depends by its nature on unique, site-specific factors, including the age, design and location of the facility. While a "performance standards" approach may serve to expedite the review process and provide certainty to an industrial sector as a whole, by definition it will not produce a result reflecting the best science for every particular situation. Indeed, establishing BTA through uniform, nationally applicable ranges based on a pre-selected set of technologies will produce results, in many cases, that are not optimal for either the facility or the environment. In some cases, it may be that no technology is available that can meet the performance standards at any reasonable cost. <FN 3> Given the inherent limitations of the performance standards approach, it is necessary that a site-specific approach also be made available. At a minimum, the site-specific approach must, as EPA's does, provide an alternative means of compliance for facilities that cannot meet performance standards using the technologies identified by EPA or cannot do so at a reasonable cost.

Indeed, it would be unlawful for EPA to not provide for meaningful site-specific alternatives should facilities be unable to achieve the performance standards using the technologies EPA relied on in setting the standards (either because the technologies are not technically feasible or because they do not achieve the standards in a particular application). The language of Section 316(b) directs EPA to ensure the use of "best available" technologies, not to enforce compliance with performance ranges.

However, PG&E NEG believes that a site-specific approach must be available to any facility that requests it. PG&E NEG notes that a case-by-case implementation of Section 316(b) is the only method that is fully supported by the language of Section 316(b) and EPA's own past practice. By its terms, Section 316(b) requires EPA to ensure that the "location, design, construction, and capacity of cooling water intake structures" constitute BTA. Significantly, each of these terms -- "location," "design," "construction," and "capacity" -- refers to an aspect of the cooling water intake system that is highly site- and case-specific. These terms also closely interrelated -- a change in the "location" of an intake affects both the type of "design" that is possible and the type of design most able to "minimize adverse environmental impact" -- and inextricably linked to other case-specific factors, including facility cooling water needs and the geography of the facility's location. Given the clearly and necessarily site-specific nature of the terms Congress chose to use, this language itself compels the conclusion that Congress intended the "best available technology" determination to be made on a case-by-case basis.

This view is also supported by the remaining language of Section 316(b). In particular, the statute specifically states that any standard issued under Section 301 or Section 306 "and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available. . . ." (emphasis added). Congress clearly could have stated that the Section 301 or Section 306 standards must establish the best technology available for cooling water intakes for each class or category of point sources, but it did not do so. Instead, Congress specified that Section 316(b) concerned the application of these standards to a particular point source. Congress' requirement that cooling water intake structures "reflect" best technology available is equally significant, especially when coupled with the site-specific nature of the four terms described above. Had Congress intended to authorize uniform technology standards on a category or class basis, it could simply have required that intake structures "incorporate" or "use" best technology available. Congress' requirement instead that the four listed characteristics of the structure "reflect" best technology available indicates that Congress intended EPA to do something different here: to determine whether, in a given instance, the combination of the intake's location, design construction and capacity "reflect" -- i.e. achieve a result consistent with -- best technology available. Such a determination would clearly require a case-by-case approach.

EPA's own past practice provides additional compelling evidence that Section 316(b) requires a case-by-case approach. In 1973, less than two years after the CWA was enacted, EPA issued a proposed rule providing for a case-by-case determination of BTA. 38 FR 34,410 (1973) (stating that the proposed rule would "provide a framework for the case-by-case determination of best technology available"). This was followed in 1976 by a final regulation adopting the same approach. 41 FR 17,387, 17,388 (1976) ("Decisions relating to the best technology available are to be made on a case-by-case basis"). While the Section 316(b) rule was later invalidated on procedural grounds, EPA's adoption of the site-specific approach provides contemporaneous evidence that EPA understood Section 316(b) to require case-by-case evaluation of BTA requirements.

One year later, this understanding was again adopted by EPA in its Draft 316(b) Guidance. See Section 316(b) Draft Guidance, U.S. EPA (1977). In that Guidance, EPA stated:

"The environmental-intake interactions in question are highly-site specific and the decision as to best technology available for intake design, location, construction and capacity must be made on a case-by-case basis." Id. at p.4 (emphasis added). This same case-by-case approach continued in use for almost twenty-five years thereafter and there is no reason to change it.

For the foregoing reasons, PG&E NEG believes that EPA's inclusion of a site-specific approach is not only correct as a matter of policy, but necessary as a matter of law.

Footnotes

3 One example is the fabric filter marketed by Gunderboom, Inc., which can potentially achieve significant reductions in both entrainment and impingement, but cannot be used in a variety of circumstances. See Section III.B.1.b.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII. The final rule does provide for a site-specific determination of BTA in specified circumstances. See, 125.94(a)(5).

Comment ID 316bEFR.060.018

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Site-specific method is practicable for use by EPA and delegated states

Although EPA offers a site-specific alternative for determining BTA, EPA suggests at several points that it is concerned about the burden that this alternative could impose on EPA and the delegated states. This concern is not founded. To begin with, given Congress' clearly expressed intent that EPA recognize and address the unique circumstances of cooling water users by implementing Section 316 in a case-by-case manner, it is doubtful that EPA could appropriately refuse to offer a site-specific alternative regardless of the resulting burdens on EPA or delegated states, where the applicable statutory criteria compel a different conclusion. This is particularly the case where the practical result of EPA's unlawful approach is to shift this burden to the regulated community. Furthermore, as the result of thirty years' experience, EPA and the states have significant expertise in applying Section 316(b) in this manner. While certain aspects of the program may change -- for example, the use of voluntary mitigation measures will add a new element to be considered -- there is little to suggest that states cannot master these relatively few alterations in the program. Indeed, many states already incorporate mitigation measures in their NPDES permits. <FN 4>

Thus PG&E NEG believes that the site-specific approach provides a practical, as well as legally preferable, method for implementing Section 316(b).

Footnotes

4 As EPA notes on p. 17169 & n. 69, both the NJDEP permit for PG&E's Salem plant and the MDE permit for Potomac Electric Power Co.'s Chalk Point plant incorporate restoration measures.

EPA Response

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Please refer to the response to comment 316bEFR.338.002 for more information on the site-specific compliance alternative.

Comment ID 316bEFR.060.019

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Concerns with the site-specific proposal EPA has offered as its preferred option.

While PG&E NEG fully supports EPA's determination that a site-specific approach must be included in the final regulation, PG&E NEG disagrees in a number of critical respects with the site-specific proposal EPA has offered as its preferred option. These concerns are discussed in Section III.B.3, below.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

No further response is necessary, as subsequent comments have been responded to individually.

Comment ID 316bEFR.060.020

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Inclusion of Voluntary Mitigation Measures as an Alternative Method of Compliance

PG&E NEG agrees in principle with EPA's proposal to allow facilities to use a variety of mitigation measures <FN 5> as an alternative means of satisfying the compliance requirements of Section 316(b) of the Clean Water Act. Mitigation measures, such as restoration or enhancement of submerged aquatic vegetation or tidal wetlands, removal of barriers to fish migration, creation of artificial reefs and fish restocking, will in many cases produce equivalent or greater environmental benefits than the use of technology to reduce impingement and entrainment (I&E) impacts. They do so at lower cost. PG&E NEG also agrees, in theory, with several elements of EPA's preferred option for implementing the mitigation alternative, including:

-EPA's decision to allow affected facilities to opt voluntarily to implement mitigation measures;

-EPA's decision to allow mitigation measures to be used either alone or in combination with other alternatives (including technology-based alternatives);

-EPA's decision to require mitigation measures to achieve a level of performance "comparable" to what could be achieved by using technology; and

-EPA's interest in developing a workable mechanism for mitigation banking.

PG&E NEG believes each of these elements is critical to a flexible, environmentally-protective and cost-effective program for offsetting I&E impacts and must be part of the final proposal. In the following sections, PG&E NEG discusses its reasons for supporting these elements of EPA's proposal and for rejecting alternative proposals on which EPA is soliciting comment.

While PG&E NEG supports much of the mitigation program EPA has laid out in its proposal, PG&E NEG believes EPA has not utilized correct methods for identifying appropriate non-technological measures. Nor has EPA utilized correct methods for determining the appropriate scale or cost of such measures. These objections are detailed below at IV.B.5.

Footnotes

5 For simplicity, the term "mitigation" in this discussion is used as shorthand for the array of restoration and mitigation measures specifically identified in the proposed rule, as well as other methods that might be used to directly or indirectly offset losses from I&E.

EPA Response

EPA believes restoration measures do not necessarily provide a lower cost alternative to cooling water intake technologies for meeting the requirements of the final rule. However, by providing additional compliance flexibility, restoration measures provide additional options to permittees seeking cost-effective solutions.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

All restoration measures must meet the requirements described in the final rule, including those under sections 125.94 and 125.95.

For discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.060.021

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The decision to implement mitigation measures should be a voluntary one made by the affected facility, not EPA

EPA's current proposal would allow a facility covered by the rule voluntarily to propose mitigation measures in lieu of, or in combination with, technological or operational measures in order to meet the applicable performance standards for I&E reductions. See 67 FR 17,166 col. 2-3; 67 FR 17,221 (proposed 40 CFR 125.94(a)(1-2)). PG&E NEG believes that making mitigation measures voluntary is correct as a matter of policy and necessary as a matter of law.

As a matter of policy, making the use of mitigation measures voluntary allows facilities the flexibility to develop the combination of measures that, in the specific circumstances under which that facility operates, will achieve the performance standards with the least amount of disruption to its operations. In some instances, mitigation measures may be able to achieve all or a part of the reductions necessitated by the rule at significantly reduced cost and/or do so without the need for, or risk of, short or long-term disruption to facility operations. In other cases, technology may prove the most reasonable means of meeting the performance standards. By permitting mitigation measures to be used where offered voluntarily, EPA allows for the important, circumstance-specific decision about how the performance standards will be met to be made by the facilities themselves, while ensuring that the regulatory performance standards are met.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

EPA believes the inclusion of the option to use restoration measures in the final rule provides permitting authorities and permittees with additional compliance flexibility. Consideration of restoration measures may lead to a more cost-effective solution. All restoration measures must meet the performance and implementation requirements of the final rule.

Comment ID 316bEFR.060.022

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 2.04.06
Restoration measures in place of technologies

In addition, only voluntary use of mitigation measures is consistent with the language of Section 316(b). PG&E NEG does not agree with EPA's position that mitigation measures can be required by EPA under 316(b) as an aspect of the "design" of a cooling water intake structure. To construe the creation of an artificial reef or operation of a restocking program as an aspect of intake structure "design," as EPA proposes, see 67 FR 17,169 col. 1, defies any reasonable interpretation of the word. Nor is it consistent with the historical use of the term by EPA prior to this rulemaking. <FN 6> To the contrary, when EPA issued its first regulation implementing Section 316(b), it relied on a far more logical interpretation: defining "design" as "the arrangement of elements that make up the cooling water intake structure." 41 FR 17,387, 17,390 (1976).

EPA is not allowed to use statutory construction to claim an authority Congress has not chosen to assign it. See, e.g., Lopez-Flores v. Resolution Trust Corp., 93 F.Supp.2d 834, 846 n. 34 (E.D. Mich. 2000) (noting that agency interpretations, even where entitled to deference, may not permissibly "expand the scope of an agency's authority into the external universe of topics that Congress neglected or purposefully omitted"). Here, the plain language of Section 316(b), supported by the contemporaneous evidence of the 1976 regulation, compels the conclusion that Congress did not assign EPA the authority to directly regulate mitigation measures as aspects of cooling water intake structure "design." EPA's original interpretation--that "design" of a cooling water intake structure does not include restoration of reefs--was correct.

However, PG&E NEG believes that Section 316(b) does authorize EPA to approve and to incorporate into an NPDES permit those mitigation measures voluntarily proposed by a facility, either in lieu of, or in combination with, technology. <FN 7> As discussed further in Section Ill.B.3.c.(i) below, the statutory language of Section 316(b) requires a threshold showing of adverse impact before EPA may impose technology-based requirements. To the extent that a facility proposes to implement mitigation measures to offset its environmental effects, this may reduce or eliminate altogether the "adverse impact" that forms the basis for imposing new technology. <FN 8> This interpretation of EPA's authority under Section 316(b) is consistent with that EPA and other federal authorities have adopted in implementing other, similar statutory provisions.

For example, EPA considers the effect of mitigation measures in determining under Section 404(c) of the CWA whether a project approved by the Corps of Engineers has an "unacceptably adverse effect" and thus must be vetoed by EPA. See, e.g., James City County, Va. v. EPA, 12 F.3d 1330, 1336-37 (4th Cir. 1993) (upholding EPA decision under Section 404(c) which considered mitigation measures offered by proponents of dam/reservoir project in determining whether a veto was appropriate). Courts have also affirmed that the Corps of Engineers may consider mitigation measures in determining whether a project "significantly affect[s] the quality of the human environment" and therefore triggers the Environmental Impact Statement ("EIS") requirement of NEPA. See Payette v. Horseshoe Bend Hydroelectric Co., 988 F.2d 989, 991 (9th Cir. 1993) (specifically noting that the Corps "can consider the effect of mitigation measures in determining whether preparation of an EIS is required"). These examples and others <FN 9> affirm that EPA can appropriately consider voluntarily proposed mitigation measures as offsets against requirements that would otherwise apply based on a facility's adverse environmental impact.

Because PG&E NEG believes that only voluntary use of mitigation measures is desirable policy or legally permissible as an interpretation of Section 316(b), PG&E NEG strongly endorses the voluntary approach set forth in EPA's preferred option. It opposes the alternative approaches that would make mitigation measures necessary in all or certain classes of cases, or would allow EPA (or a delegated state) to demand under 316(b) mitigation measures not identified voluntarily by the facility. See 67 FR 17,169 col. 3 -17,170 col. 1.

Footnotes

6 PG&E NEG recognizes that EPA relied on the definition of "design" proposed here in its final rule implementing Section 316(b) for new sources. See 66 FR 65,256, 65,314-15 (2001). PG&E NEG is not aware that any court has yet reviewed the new source rule and, for the same reasons outlined above, does not believe that EPA's interpretation in that context will be upheld.

7 This situation is analogous to an air emission source's accepting permit limitations to qualify as a "synthetic minor" source.

8 This argument is developed in detail in Anderson & Gotting, 26 Column. J. Evntl. L at 47-53. As Anderson and Gotting note, EPA's earliest documents relating to 316(b), including the 1973 Proposed Rule and the 1973 Development Document, specified that it was the "net" effect of a facility that determined whether there was an adverse impact and whether further technology was necessary to "minimize" it. Id at 47 & n.268.

9 Other cases involving consideration of mitigation measures under the CWA and NEPA are discussed in Anderson & Gotting, at 50-52. Anderson & Gotting also identify cases considering mitigation measures in determining whether a violation of the Endangered Species Act has occurred, id at 52-53.

EPA Response

Permittees must meet the requirements of today's rule through the use of design and construction technologies, operational measures or restoration measures. Although compliance with today's rule is not voluntary, permittees may choose which design and construction technologies, operational measures, and/or restoration measures to present in their application to the permitting authority, subject to the requirements of the final rule. Restoration measures are not required at all sites by the final rule. In some cases, the choice of design and construction technologies and/or operational measures suitable for implementation at a site will be limited, and restoration measures will sometimes be the only feasible alternative. The technologies and/or measures ultimately implemented to meet the requirements of today's rule are subject to the approval of the permitting authority. A permittee may also request determination by the permitting authority of a site-specific performance standard as described at 125.94(a)(5).

For a discussion of EPA's authority to require restoration under the final rule, see the preamble to the final rule.

For additional information on EPA's interpretation of restoration measures as an aspect of cooling water intake structure design, see the preamble to the final rule.

For a discussion of adverse environmental impact threshold requirements, see EPA's response to comment 316bEFR.029.015.

Comment ID 316bEFR.060.023

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

EPA is correct to allow mitigation in lieu of, or in addition to, technology

EPA's proposed rule provides for voluntary mitigation measures to be used in lieu of or in addition to technology. See 67 FR 17,221 (proposed 40 CFR 125.94(a)(1-2)). PG&E NEG agrees that this is the correct approach. A primary justification for the use of mitigation measures is that, by allowing flexibility in how facilities may comply with a given standard, environmental improvement can be achieved more cost-effectively. Any attempt to limit flexibility by requiring, for example, that mitigation measures only be allowed as a supplement to technology, would significantly reduce, or, in some cases, eliminate, the ability of facilities to obtain the benefits of the mitigation alternative. Yet it would achieve no net environmental improvement over an appropriately designed mitigation plan. Such a result serves no policy purpose and is inconsistent with EPA's expressed concern for cost and for the impact of Section 316(b) on facility operations.

PG&E NEG therefore endorses EPA's proposed rule, which would allow for mitigation measures either in lieu of, or in addition to, technology, and opposes the alternative, under which mitigation only would be allowed to supplement technology. See 67 FR 17,146 col. 3.

EPA Response

Facilities may use restoration measures under the final rule either in lieu of or in combination with technologies that reduce impingement mortality and entrainment. All restoration measures must satisfy the requirements described in the final rule, including those in sections 125.94 and 125.95 of the final rule. One of these requirements is that permit applicants demonstrate to the permitting authority that they have evaluated the use of design and construction technologies and operational measures for their facility and have provided an explanation of how they determined that restoration would be the most feasible, cost-effective, or environmentally desirable alternative.

EPA believes the inclusion of restoration measures in the final rule provides permit applicants with additional compliance flexibility.

Comment ID 316bEFR.060.024

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Mark V. Carney

Organization PG & E National Energy Group

EPA correctly requires mitigation to meet a “comparable” level of performance

EPA’s preferred option would allow a facility to use mitigation measures, either alone or in combination with other methods, where it can demonstrate that it will achieve “comparable performance” to that which would result from reducing I&E in accordance with the technology-based standard, or, if this cannot be shown with precision, that the facility will maintain fish and shellfish at a level “substantially similar” to that which would be achieved if the performance standards were met. See 67 FR 17,221-22 (proposed 40 CFR 125.94(d)), 67 FR 17,223 (proposed 40 CFR 125.95(b)(5)). PG&E NEG believes that, properly applied, <FN 10> this approach represents sound policy and an appropriate exercise of EPA’s authority under Section 316(b).

As discussed above, the principal benefit of the mitigation alternative is that it allows facilities another, potentially more cost-effective, way to meet the performance standards. Insisting that mitigation measures meet a higher standard, whether by requiring mitigation to occur at a ratio of greater than 1:1, by requiring a “margin of safety” in mitigation plans, or by imposing mitigation measures to achieve performance levels in excess of those achieved by technology, would unfairly penalize the use of mitigation measures by inflating their cost relative to comparably performing technology. There is simply no apparent reason to require (for example) an extra margin of safety for mitigation measures demonstrated to be effective and good reason to treat mitigation comparably with technology: such disparate treatment would limit the use of mitigation and take away the flexibility that EPA purports to afford permittees in meeting the requirements of Section 316(b).

Footnotes

10 Although PG&E NEG frilly endorses the principle of “comparability” between the results achieved by mitigation measures and those achieved by technology, PG&E NEG does not believe that EPA’s rule, as currently formulated, will necessarily produce that result. As is discussed further in Section IV.B.4, EPA has adopted incorrect methods for evaluating the environmental benefits of mitigation measures. PG&E NEG’s endorsement of the comparability criterion is dependent on the adoption of a method evaluating those benefits that would give a facility full “credit” for all the environmental services generated by a mitigation program.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule are written with a significant amount of flexibility.

Comment ID 316bEFR.060.025

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 2.04.06

Restoration measures in place of technologies

In addition, Section 316(b) does not authorize EPA to require that mitigation measures meet a more stringent standard than technology measures. Section 316(b) authorizes EPA only to require that the identified intake structures features "reflect" the "best technology available for minimizing adverse environmental impact." But that standard does not go to whether such technology should be required in the first place. Section 316(b)'s command is satisfied if mitigation measures achieve results comparable to, and thereby adequately reflect, "best technology" to offset or eliminate the need for a technological approach. It does not follow, however, that the mitigation measures themselves are an aspect of "technology" subject to the BTA standard. <FN 11> As a result, EPA has no authority to impose a standard of performance for mitigation measures that differs from that which would be applied if the facility used the technology-based alternatives on which its proposed performance standards are premised. This is the approach embodied in the "comparable performance" standard EPA has proposed in its preferred alternative.

Footnotes

11 Indeed, EPA appears implicitly to recognize this itself-- there is no suggestion in the proposed rule that the performance standards are based on the use of mitigation as though it were, itself, a "technology."

EPA Response

Under the final rule, facilities utilizing restoration measures must ensure that they perform at a substantially similar level to that which would be achieved through compliance with the applicable impingement mortality and entrainment requirements or alternative site-specific requirements. The level of performance restoration measures must meet does not consider any potentially higher performance levels possible through the sole or supplementary use of restoration projects.

For a discussion of EPA's authority to require restoration under today's rule, see the preamble to the final rule.

For discussion of EPA's interpretation of restoration measures as a technology and an aspect of the "design" of cooling water intake structures, see the preamble to the final rule.

Comment ID 316bEFR.060.026

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

For the foregoing reasons, PG&E NEG endorses the preferred alternative's requirement of "comparable performance" and opposes alternatives that would impose a greater than 1:1 mitigation ratio or "margin of safety" in evaluating the performance of mitigation measures or would require mitigation to achieve a higher level of performance than would be achieved by use of technology -- including any requirement that mitigation be used to offset impacts that would remain after a technology meeting the performance standards has been installed. See 67 FR 17,147 col. 1 (mitigation ratios greater than 1:1; margins of safety); 67 FR 17,169 col. 3 - 17,170 col. 1 (mitigation to compensate for impacts remaining after technology).

EPA Response

Under the final rule, it is the responsibility of the permitting authority to review a permittee's application and decide whether or not restoration measures are an appropriate means for the permittee to comply with the requirements of the final rule, including those described under sections 125.94 and 125.95. It is also the permitting authority's responsibility to determine the nature of a particular restoration measure and its implementation (performance levels, effectiveness criteria, monitoring, reporting, etc.) needed to allow it to meet the requirements of the final rule. Under section 125.95, the rule requires permittees to develop a Restoration Plan and submit several pieces of information to the permitting authority in order to aid both the permittee and the permitting authority in their consideration of the feasibility of a restoration measure. Permittee's must demonstrate the feasibility of the restoration measures to the permitting authority's satisfaction and obtain the approval of the permitting authority before they may proceed with implementation of a restoration measure. Once permittees obtain the permitting authority's approval and implement restoration measures, it is their responsibility to ensure and demonstrate to the permitting authority that the measures meet the requirements of the final rule.

Comment ID 316bEFR.060.027

Subject Matter Code 11.12

RFC: Restoration banking

Author Name Mark V. Carney

Organization PG & E National Energy Group

Banking of “extra” mitigation measures should be allowed

PG&E NEG supports EPA’s consideration of mitigation banking as a mechanism for providing further flexibility in achieving environmentally-beneficial and cost-effective mitigation for I&E impacts. See 67 FR 17,170. As EPA notes, the concept of mitigation banking is already well-established under Section 404 of the Clean Water Act. <FN 12> In this context, mitigation banking has been used for wetland restoration, creation, enhancement and preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses in advance of development actions, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial.

One important effect of banking is that it allows for the consolidation of small, fragmented wetland mitigation projects into one large contiguous site. By consolidating compensation requirements, banks can more effectively replace lost wetland functions within a watershed, as well as provide economies of scale relating to the planning, implementation, monitoring, and management of mitigation projects.

For the foregoing reason, PG&E NEG supports EPA’s proposal to allow mitigation banking under Section 316(b). PG&E NEG notes that many of the issues that will arise in developing a successful banking program are identical to those that arise in the context of trading. PG&E NEG’s views on how those issues should be addressed are discussed in Section III.A.5.

Footnotes

12 Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under Clean Water Act section 404(b)(1) guidelines (Feb. 6, 1990). Also Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks, 60 Fed. Reg. 58605 (November 28, 1995).

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.060.028

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

EPA Correctly Abandons the Wholly Disproportionate Cost Test

EPA's proposed rule takes an important step in scuttling the "wholly disproportionate" cost test for evaluating whether technologies satisfy BTA. See 67 FR 17,221 (proposed 40 CFR 125.94(c)(l). By setting an arbitrary and extremely stringent standard of economic impracticability, the "wholly disproportionate" cost test ensures that in many, if not most, cases costs are imposed on affected facilities that far exceed the benefits to be achieved by the mandated projects. Such a result has no justification in economics because it makes society demonstrably worse off-- potentially by orders of magnitude -- than it would be if the I&E impacts were allowed to continue unabated. EPA is correct to jettison this criterion as a basis for determining the level of regulation that an existing facility should be required to meet.

However, while PG&E NEG agrees with the rejection of the wholly disproportionate cost test, PG&E NEG believes that its proposed replacement -- the "significantly greater cost" test, as it is described in the rule, see id. has many of the same flaws. PG&E NEG discusses those flaws, and its preferred economic criterion, in Section III.B.4.

EPA Response

See response to 316bEFR.045.012.

Comment ID 316bEFR.060.029

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 20.01
RFC: Should EPA include impingement trading?

Trading

PG&E NEG commends EPA for having taken note of the potential of market-based instruments for achieving resource protection and for having begun the process of thinking about how such an initiative could be incorporated within an existing regulatory program. See 67 FR 17,190 col. 1, PG&E NEG believes that a well-designed trading program can provide greater flexibility to permittees and so facilitate the achievement of reasonable targets (not those contained in the current rule) at substantial cost savings by providing greater incentives for voluntary reductions and technology innovation. Experience with trading programs, both in the United States and elsewhere, indicates that a program is particularly likely to be effective in achieving these results where:

-Clear legal authority for trading is provided;

-Well-defined units of trade are established;

-Transaction costs are minimized by avoiding requirements for prior government approval of trades;

-Clear protocols established to quantify units to be traded; and

-Reasonable mechanisms for compliance are established.

Although EPA indicates on page 17,170 that the proposed trading program "differs from previous trading strategies implemented by EPA because it involves trading living resources rather than pollutant loads," PG&E NEG does not believe that trading within the context of entrainment and impingement presents problems that are unique or particularly difficult to resolve. Tradable permit programs have a very long history of use in the natural resources realm - in tradable development rights (TDRs), wetland mitigation banking, and individual transferable quotas (ITQs) for fisheries. Wetlands mitigation banking provides a particularly close analogy, given that there, as here, alteration or loss in one ecosystem is offset by enhancement or creation of another. Many of these programs predate more recent applications of trading mechanisms to reducing pollutant emissions, and a careful review by EPA of those applications would be prudent before it begins to develop an I&E trading program.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.060.030

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Entrainment Only or Impingement and Entrainment

EPA has asked for comment on whether the trading program should include entrainment only or impingement and entrainment. 67 FR 17,170 col. 2-3. PG&E NEG believes that both entrainment and impingement should be included and that trades between impingement and entrainment should also be allowed.

It is clear that implementation of technologies in certain cases may affect both entrainment and impingement impacts. In some cases, the technology may reduce both I&E, while in others one impact may be reduced while the other is increased. Allowing trading of both entrainment and impingement, as well as trading between the two, will significantly increase the cost savings available through the trading program by allowing maximal flexibility to achieve beneficial trades -- including intra-plant trades.

It should also be noted that EPA's arguments against the inclusion of impingement in the trading program are mistaken. EPA suggests that impingement trading may not be necessary, because of the comparatively low cost of making impingement reductions. However, this is precisely why impingement trading and trading between impingement and entrainment should be included. The fact that impingement reductions may generally be less costly suggests that there will frequently be highly beneficial opportunities for trading impingement reductions for entrainment reductions.

EPA's concern that the transaction costs of impingement trading may outweigh the benefits is also misplaced. To the extent that EPA is concerned about facilities' transaction costs, these decisions will be made by the facilities themselves, who presumably will not engage in trading where the costs of participating outweigh the benefits.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.060.031

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 20.03

Spatial scale for entrainment trading

Spatial Scale of Trading

EPA considers various alternatives: limiting trading to specific water bodies, specific watershed, or general waterbody types. 67 FR 17,171 col. 1-2. While there are arguments in favor of each approach, the rebuttable presumption ought to be to establish the largest geographic limits feasible in order to provide maximum flexibility and, as a result, greater cost-effectiveness. Imposition of geographic constraints, limiting the universe of potential trading opportunities, will inevitably result in the price of offsets rising. In some cases, it may make them unavailable altogether. Thus, of the three options proposed for comment, PG&E NEG would favor trades being allowed on the basis of general waterbody type over the more restrictive alternatives. However, adopting any of the constraints as currently proposed in the regulation could hinder market development and diminish the benefits to be achieved from trading.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale of trading. Due to difficulties and uncertainties involved in determining the potential effects of a trading program on ecosystem function, community structure, biodiversity and genetic diversity, EPA believes that it is unlikely to approve any trading programs under § 125.90(c) unless the program limits trades among numbers of the same species within individual watersheds. Although these constraints may reduce the number and type of trades allowed, EPA believes that they are appropriate to ensure that the trading program will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at § 125.94.

Comment ID 316bEFR.060.032

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 20.04

RFC: Potential trading units/ credits

Unit of Trading

EPA has requested comment on the appropriate unit of trading. 67 FR 17,171 col. 2-3. This issue arises within the context of any environmental regulation, not just within the context of trading. At one extreme, risks associated with environmental end-points might seem to be the appropriate units for regulation and thus for trading with any environmental problem. But this is virtually never done, because the implementation costs are excessive. As a result, in the pollution context, regulation typically shifts to the units of regulation prior to risk, which include, first exposure, then ambient concentration, then emissions, then inputs (such as the lead content of gasoline).

Here, EPA has suggested three options -- species density, species counts and biomass --as potential trading units. Each of these has potential advantages and disadvantages, as EPA notes. However, PG&E NEG believes that trading should be chosen not because it is closest to what might seem to be the theoretical ideal of the environmental end-point, but because that level of trading will result in achieving given targets at the lowest cost over time, taking into account not only technological costs of meeting the program requirements but also monitoring feasibility and enforcement costs.

In PG&E NEG’s view, the units of trading most likely to be successful are those that are least restrictive and thus allow for the greatest number of potential trades. An appropriate unit for achieving this result could be based on biomass, perhaps divided into functional groups (i.e. forage fish, piscivores). However, to most accurately reflect the differential impact of entrainment and impingement reductions on populations, this should be measured in terms of age-one equivalents.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading. Trading units in terms of age-one equivalents may prove to be the most implementable solution that takes into account the different life stages entrained; however, the specifics of any potential trading program will be left to the discretion of the permit director, subject to EPA's approval.

Comment ID 316bEFR.060.033

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 20.05

RFC: Include Phase I facilities in trading program

New Facilities and Non-316(b) Facilities/Other Stressors

The scope of trading is another question that arises with virtually any trading program. In general, the more facilities and/or types of impacts that are allowed to engage in trade the better, for precisely the reason that EPA notes in discussing the ability of new facilities to engage in trading: the greater scope for trading will have the effect of lowering compliance costs, which will make it easier for sources to meet performance requirements. The same logic argues for the further extension to other "major environmental stressors" of the water bodies in question, including: habitat alteration, dredging, coastal development, over-fishing, industrial pollution, nutrient pollution, wastewater runoff and climate. If the desire is to achieve real environmental improvements while keeping costs down, then surely greater cost-effectiveness could be achieved by expanding trading beyond power plants to include potential offsets from other sources of the major environmental stressors.

EPA Response

Please see response to comment 316bEFR.005.045 regarding trading among new facilities, comment 316bEFR.077.051 for the discussion on the appropriate spatial scale for trading, and comment 316bEFR.005.046 regarding trading with other stressors.

Comment ID 316bEFR.060.034

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code OPP

General Statement of Opposition

Aspects of Proposal PG&E NEG Opposes

As the foregoing indicates, PG&E NEG supports many aspects of EPA's proposal, at least at a conceptual level. However, PG&E NEG cannot agree with a number of elements of EPA's preferred option as they are presently articulated. While PG&E NEG lauds the concept of including a variety of options for facilities to achieve compliance, the proposed rule is in a number of important respects inconsistent with the language and purpose of Section 316(b), unworkable and overly restrictive.

In addition, EPA has completely failed to provide a valid biological or economic underpinning for its proposed approach. EPA ignores critical information, relies on incorrect data, and repeatedly and without explanation relies on invalid analytical models or misapplications of valid models. Reliance on such defective data is inconsistent with the requirements of the Paperwork Reduction Act and PL 106-554 (the Data Quality Act), 44 U.S.C. § 3500 et seq. In addition, EPA's cumulative errors make it impossible to find that EPA's approach represents a rational, reasoned response to the environmental concerns EPA is authorized to address under Section 316(b). The following discusses in detail aspects of the proposal that PG&E NEG opposes, as well as the flawed assumptions on which the proposal relies.

EPA Response

Please refer to the response to comment 316bEFR.034.002.

Comment ID 316bEFR.060.035

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 7.02
Performance standards

EPA's Proposed Mandatory Performance Standards are Unjustified and the Implementing Regulations are Fundamentally Flawed

Central to EPA's proposed approach is the concept of establishing a performance range for reductions in entrainment and impingement rather than dictating a specific technology or a specific performance number. This approach acknowledges that different technologies (or combinations of technologies and other measures) may be appropriate at different facilities and that even the same technologies may yield different results at different facilities. However, PG&E NEG does not concur with either EPA's selected range of mandated reductions or the performance approach EPA is proposing to implement. PG&E NEG does not believe that 316(b) authorizes EPA to apply the performance standards to all facilities, regardless of the existence of adverse impact, and to make compliance mandatory. Furthermore, the actual performance ranges established are wholly unsupported as a biological matter and unrealistic in practice. Finally, the regulations implementing the proposed standards are rife with ambiguities and are unworkable.

Because the performance standard approach proposed by EPA is inconsistent with Section 316(b), wholly unsupported by biological evidence and unworkably vague as drafted, it must be substantially modified or set aside.

EPA Response

Please see response to comments 316bEFR.307.064 and 316bEFR.311.002. With respect to the legal portion of this comment, EPA believes that the framework it has adopted fully implements the requirements of section 316(b) and ensures that each facility will implement what is, for that facility, the best technology available for minimizing adverse environmental impact.

Comment ID 316bEFR.060.036

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

Imposition of mandatory standards for all facilities is not a permissible implementation of Section 316(b)

Under EPA's proposal, the performance standards would be applicable to all facilities and compliance with the standards would be mandatory except for those qualifying for site-specific evaluation. This approach exceeds EPA's authority under Section 316(b) and must therefore be rejected.

As is discussed in Part III.B.2.c.(i) of these comments, Section 316(b) requires that an actual adverse environmental impact be found before imposition of new technology. In addition, EPA bears the burden of showing (or predicting) the existence of any actual adverse impact. See In the Matter of Public Service Company of New Hampshire, NPDES Appeal No. 76-7, 1 E.A.D. 332, 339 (June 10, 1977) (noting that, under Section 316(b), "the Agency must identify or predict adverse environmental effects and then select the most effective means of 'minimizing' . . . the adverse effects"). By making the performance standards applicable to and mandatory for all dischargers within specified categories, EPA ignores these burdens, imposing technological retrofit requirements on facilities without regard to the existence of adverse environmental impact. As a result, facilities currently having no significant level of adverse impact would nonetheless be forced to engage in expensive retrofits of new technology in an attempt to reduce those already non-significant impacts.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.060.037

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.02

Performance standards

Furthermore, because the performance ranges are fixed and access to the site-specific alternative is limited, many facilities will be denied the opportunity to obtain a case-by-case determination of what technology is truly “best available” under their circumstances. Yet Congress intended that a case-specific balancing of the circumstances of each facility was the appropriate way to implement Section 316(b). See Part III.A.2.a.

PG&E NEG believes that the only permissible way EPA could implement the performance ranges is on a voluntary basis. Facilities wishing to avoid the complexity, cost and uncertainty of a formal demonstration process should be permitted to demonstrate compliance by showing that they currently do, or will, achieve a level of performance falling within an appropriate range. However, any facility should also have the option of obtaining a site-specific determination of BTA.

Because EPA’s proposed performance standards would be mandatory and applicable whether or not EPA has demonstrated any actual adverse environmental impact, they exceed EPA’s authority under Section 316(b).

EPA Response

EPA disagrees with the commenter's assertion that the performance standards exceed its authority under the Clean Water Act. For a further discussion of EPA's authority under the Act, please see section III of the preamble to today's final rule.

EPA disagrees with the commenter's characterization of the performance ranges as "fixed". EPA adopted ranges instead of a single value limit for the performance standards in recognition of the fact that there exists a degree of variability between waterbodies and facilities. EPA also disagrees that today's final rule somehow restricts the determination of Best Technology Available (BTA) for a specific facility. EPA has deferred any decisions regarding BTA for a particular facility to the Director, who is in a better position to make such a determination based on the many variables present at the facility.

Comment ID 316bEFR.060.038

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.03

Available I&E technologies

EPA has not demonstrated that the technologies it relies on are "available" for all facilities or that they will achieve performance within the specified ranges

Were EPA to decide to retain mandatory performance standards in the final rule -- which PG&E NEG opposes -- it would have to reconsider the approach it has taken to developing the performance ranges. In the proposed rule EPA states the proposed performance standards are based on the results that can be achieved using a specified group of technologies. <FN 13> However, EPA has failed to provide an adequate demonstration that the technologies in question are actually "available" -- that is, available commercially at an economically practicable cost <FN 14> -- or that they will be effective to achieve the performance standards at many facilities. To the contrary, it is clearly the case that several of the selected technologies may not be feasible for implementation in many cases. <FN 15> Even where they can be used, they will not necessarily produce performance falling within the range.

The ability to reduce I&E depends on site-specific factors: the shape of the shoreline, the time of year, the existence of natural currents and/or tidal cycles and especially the species present at the site. For example, whether a particular fish becomes impinged can depend on a myriad of factors, including: the swimming ability of the species, the physical condition of the individual fish, the velocity to which it is exposed, avoidance response, visibility, habitat preferences, tidal stage, season, etc. Similarly, whether a particular species is entrained depends on factors such as: seasonality, diurnal migrations, demersal vs. pelagic preferences, ability to swim, diurnal migrations, ability to adhere, etc. Facilities that use cooling water are sited on different types of water bodies, each with its own physical characteristics (flow, substrate, shoreline) and unique animal and plant communities. Similar facilities on the same waterbody can have different impacts depending on how the intake is designed and where it is positioned relative to where the fish spawn and how they behave.

Likewise, the feasibility, effectiveness, environmental impacts and cost of technologies to reduce cooling water intake structure impacts can vary dramatically from site to site. Some technologies cannot be used where there are strong currents, navigation routes, ice, or floating debris. For example, the lack of ambient current cross-flow in Mount Hope Bay, which is the source of cooling water for Brayton Point Station, eliminates consideration of wedgewire screens at the site. Yet, in the proposed regulation, EPA assumes that wedgewire screens can be installed nationally to achieve the performance standard for reductions in impingement. Similarly, fine mesh screens cannot be used in saltwater applications, because the high levels of solids cause them to clog. This eliminates this technology from consideration for Salem Harbor and Brayton Point Stations. EPA assumes fine mesh screens, too, will be available nationally to meet the entrainment performance standard.

In addition, after making site visits to both Brayton Point Station and Salem Harbor Station, the manufacturer of a fabric filter barrier concluded the technology could not be employed at either station. According to Gunderboom, Inc., the manufacturer, the mile-long filter barrier "could not be deployed [at Salem Harbor Station] without enclosing a significant portion of Salem Harbor, interfering with the normal ship traffic, shoreline and shallow water uses of the area." [Gunderboom Inc., May 20, 2002]. With respect to Brayton Point Station, the manufacturer reported that the two and one-half mile long filter barrier “could not be deployed without either occupying the shoreline for over two miles or extending into waters occupied by the shipping channel” and would constitute an “unacceptable blockage” for ship traffic in the Taunton River.” [Gunderboom Inc., September 7, 2001]. Yet EPA assumes that this technology will be available to reduce both I&E at all facilities. <FN 16>

EPA’s assumptions regarding the efficacy of the specified technologies are equally unjustified. In deciding what performance ranges could be achieved, EPA apparently relied on data submitted by various facilities in connection with the regulation for new sources. Nothing in the current rulemaking indicates that the facilities providing the information analyzed their own experiences in a way that would make them valid for general application to existing sources. In particular, there is no indication that the facilities’ calculations utilized the assumptions on which EPA’s rule is based, including EPA’s assumptions as to the I&E baseline and EPA’s apparent interpretation of the ranges as being achievable for all species.

Finally, as is discussed more generally in Part III.B.5 of these comments, EPA has also failed to provide a credible demonstration that that the technologies it has identified can be implemented at an economically practicable cost, even in those circumstances where they can be utilized.

The complete absence of information showing that the specified technologies are generally available, can achieve performance within the ranges under the definitions and conditions imposed by the rule and can be implemented at an economically practicable cost precludes EPA’s reliance on these technologies in establishing the performance standards.

Footnotes

13 The identified technologies for impingement mortality reduction are: fine and wide mesh wedgewire screens; aquatic filter barrier systems; barrier nets; and a group of technologies combining screening with fish diversion and fish return systems. The identified technologies for entrainment mortality are: aquatic filter barrier systems; fine mesh wedgewire screens; and fine mesh traveling screens.

14 Legislative History at 264 (statement of House floor manager Rep. Don H. Clausen) (stating that “best technology available is intended to be interpreted to mean best technology available commercially at an economically practicable cost”).

15 See discussion of feasibility of Gunderboom barriers at Salem Harbor, Brayton Point and Manchester Street below.

16 In fact, to PG&E NEG’s knowledge there is only one large facility currently using the Gunderboom successfully.

EPA Response

EPA has selected performance standards to facilitate a more streamlined approach to the permitting process and to provide a more consistent mitigation target on a national level. By opting for performance standards instead of requiring the deployment of specified technologies, EPA maintains a desired flexibility in the implementation of the rule, thus allowing a facility to select measures that are appropriate to the site conditions and facility configuration.

Additional documentation has been collected and reviewed by EPA to further augment support for the performance standards and added to the Technology Efficacy database. This database, originally designed to act as a centralized bibliography of data EPA has reviewed during the course of the development of the final Phase II rule, has been expanded to allow users to query and compare basic data on technology performance and applicability. EPA recognizes that some may disagree with basing the performance standards on the wide range of data available in the database. While many documents do show some level of success in reducing impingement mortality or entrainment, other studies have shown the deployed technology to be unsuccessful or at best inconclusive. EPA did not view the varying degrees of success in regards to a specific technology as problematic, but rather as evidence that some technologies work in some applications but not in others.

It is for this reason and those set forth in this comment that EPA authorizes various compliance alternatives, including the use of a Technology Installation and Operation Plan. EPA believes that there are economically practicable technologies available that can be used to meet the performance standards at the majority of facilities subject to the final Phase II rule. Because site-specific factors do come into play, EPA has also authorized site-specific BTA determinations based on cost-cost or cost-benefits tests. Adopting requirements that allow for flexibility in implementation instead of technologies also simplifies the process by which compliance can be measured.

EPA notes that many of the studies reviewed during the development of this rule were not analyses of "out-of-the-box" technologies. That is, many of the installations of the various technologies were modified or adjusted to better suit the unique conditions, species, and configurations present at the facility. A key factor in the long-term success of a particular technology is the monitoring, maintenance and adjustments made during the course of its deployment.

Comment ID 316bEFR.060.039

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.02

Performance standards

EPA has not demonstrated the biological need for the proposed performance standards.

EPA's performance ranges lack a defensible biological basis. Numerous errors in EPA's analysis result in a gross overestimation of the number and economic value of I&E losses attributable to cooling water intake structures. This overestimation is then used by EPA to detail in PG&E NEG's analysis of the Brayton Point case study, include the following:

-EPA's calculations improperly assume no survival of any life stage of any species that is impinged. EPA's assumption is erroneous. Many species do survive impingement. (See the discussion under the BPS case study at Section IV.A.4.a below for specific detail on this point.) Therefore, EPA has overestimated the impingement losses.

-EPA's calculations also improperly assume no survival of any life stage of any species that is entrained. As with impingement, the eggs, larvae and juveniles of many finfish species do survive entrainment. The assumption that no organisms survive entrainment results in overestimates of entrainment losses. (See the discussion under the BPS case study at Section IV.A.4.b below for specific detail on this point).

-EPA input erroneous data into the production foregone model it used to calculate a portion of the economic losses associated with I&E. I&E result in losses of individuals of different life stages. Because the ages of individuals within life stages are not known, a defensible method must be used to assign a weight to the individuals in each life stage. EPA incorrectly used the average weight at the midpoint of life stages to compute growth rate for individuals and starting biomass in the production foregone model. This results in inflated estimates of economic losses associated with the impingement and/or entrainment of early life stages of organisms. The standard --and correct approach -- is set forth by Ricker (1975). EPA not only ignored Ricker, but also ignored the available scientific literature. The weights used by EPA for midpoints of the early life stages are also inflated as compared to values reported in the scientific literature and computed from organism volumes and densities. For example, based on data from Buckley et al. 1991, the weight of a winter flounder egg calculated using three separate methods ranges from 2.25 to 2.68 x 10-4 gram wet. USEPA used a weight of 0.997 gram wet, or over 4,000 times heavier. Using data from Buckley 1982, the weight of a winter flounder yolk-sac larvae at first feeding is 1.13 x 10<-4> gram wet (actually less than the egg weight). Yet, USEPA used an average weight of 2.00 gram wet. This is over 12,500 times heavier than the observed weight.

-Finally, it should be noted that EPA used different life history parameters in different case studies, resulting in inconsistent analysis. This is most glaring in the HRC calculations, where the same studies were used to determine the densities of individuals in a given habitat but then different survival rates were used to calculate the number of age-1 equivalents. There is simply no justification for using different survival rates for the same habitat in different case studies.

EPA Response

For a discussion of the basis for the performance standards, please see the preamble to today's final rule, as well as response to comments 316bEFR.311.002 and 316bEFR.074.005.

Comment ID 316bEFR.060.040

Subject Matter Code 7.02
Performance standards

Author Name Mark V. Carney
Organization PG & E National Energy Group

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA's performance standards approach. These errors include the following:

(i) Calculation baseline. EPA's definition of the calculation baseline fails to explain how the baseline level of I&E should be estimated. The definition should specifically provide that the baseline level of I&E -- i.e. that which would occur if the plant were open cycle, with a shoreline intake and using no I&E controls -- is to be calculated in light of current, local environmental conditions, not historical conditions or hypothetical future conditions. It should also make clear that the level of operations assumed is that which the facility would maintain in the absence of any operational controls implemented, in whole or part, for the purpose of reducing I&E. <FN 17>

Footnotes

17 As is discussed below, PG&E NEG does not believe that EPA has authority under Section 316(b) to impose operational restrictions on a facility. However, PG&E NEG recognizes that some facilities have voluntarily adopted operational measures as a result of negotiations with regulatory agencies. The purpose of this comment is to clarify that such operational measures are not part of the "baseline" as the term is used in the proposed rule.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.060.041

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.02

Performance standards

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA's performance standards approach. These errors include the following:

(ii) Species analyzed for compliance with performance standards. The current regulations are ambiguous as to whether the performance standards are intended to apply in the aggregate to all species that are impinged or entrained at existing facilities or to each individual species that is impinged or entrained. PG&E NEG believes that a demonstration of reductions for each individual species would present enormous practical problems and also, because of the wide variability in how species are affected by I&E, make it virtually impossible for many facilities to meet the performance standards. The rule is also unclear about how variations based on time of year (or year to year fluctuations) are to be accounted for. <FN 18>

PG&E NEG believes that UWAG's proposal to allow demonstrations of impingement performance to be made in terms of Representative Important Species ("RIS") or Critical Aquatic Organisms ("CAO") and of entrainment performance to be made in terms of biomass represents a promising alternative method for measuring compliance with the performance standards and also may be a more appropriate method for monitoring performance, including the performance of mitigation measures. In addition to reducing the burden on facilities, use of an RIS or CAO to measure impingement performance would allow distinctions to be made between impacts to biologically important species and impacts to less significant or even nuisance species. <FN 19> However, PG&E NEG believes that the use of traditional methods for selecting RIS and CAO may need to be altered for use in the context of Section 316(b). In particular, PG&E NEG believes it is important that forage species -- which are often more sensitive to impingement -- not be over-represented RIS or CAO. Similarly, use of the biomass standard should not lead to forage species being over-represented.

Footnotes

I8 In the vicinity of Brayton Point Station, for example, the abundance of Atlantic Menhaden can vary by an order of magnitude or more from one year to the next.

19 PG&E NEG also agrees with UWAG that an averaging time of at least two years is necessary to address seasonal and year-to-year variation, with a longer period allowed if the past two years are not representative of the levels of I&E typically experienced.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.060.042

Subject Matter Code 7.02
Performance standards

Author Name Mark V. Carney
Organization PG & E National Energy Group

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA's performance standards approach. These errors include the following:

(iii) Definition of "Entrainable". The proposed regulation does not clearly differentiate between "entrainable" and "impingeable" organisms. In order to provide consistency and certainty to the process, the proposed regulation should define "entrainable" as any organism that will fit through a standard 3/8 inch intake screen.

EPA Response

EPA has modified the definition of calculation baseline to include 3/8-inch mesh traveling screens to provide a more certain means of distinguishing between "entrainable" and "impingeable" organisms.

Comment ID 316bEFR.060.043

Subject Matter Code 7.02
Performance standards

Author Name Mark V. Carney
Organization PG & E National Energy Group

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA's performance standards approach. These errors include the following:

(iv) Level of performance within range. The proposed regulation leaves open the question of whether, or under what circumstances, a facility might be required to demonstrate performance exceeding the lower end of the performance range. PG&E NEG does not agree that this decision should simply be left to the discretion of the director. 67 FR 17,142. The appropriate economic criterion for making this determination would require performance exceeding the lower end of the performance range only where the environmental benefits would justify the costs of the incremental reduction in I&E. See Part III.B.4.

EPA Response

For a discussion on the performance ranges and a facility's obligations to meet them, please see the preamble to today's rule.

Comment ID 316bEFR.060.044

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA’s performance standards approach. These errors include the following:

(v) Measurement of mitigation performance. The regulations as currently drafted are ambiguous as to how mitigation performance will be measured, especially where a facility must make a “qualitative demonstration” that the mitigation measures will maintain the “community structure and function” at a level “substantially similar” to that achievable by application of technological alternatives. PG&E NEG believes that the appropriate way to understand comparability in the mitigation context is at the level of ecosystem services. <FN 20> Thus, the language should be modified to clarify that a facility will meet the comparability criterion if the mitigation measures will provide comparable services and will not require the replacement of every species affected by I&E to the same level as would a technological alternative.

Footnotes

20 See Part IV.B.4.b for further discussion of the use of ecological services as the appropriate unit for measuring mitigation performance.

EPA Response

For a discussion of the basis for EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.060.045

Subject Matter Code 7.02
Performance standards

Author Name Mark V. Carney
Organization PG & E National Energy Group

The language proposed for implementing the new rule includes numerous ambiguities

The foregoing fundamental errors in the substantive requirements of the performance range option are compounded by numerous ambiguities and errors in the proposed regulatory language implementing EPA's performance standards approach. These errors include the following:

(vi) Operational measures. The regulation is ambiguous as to whether EPA is reserving the right to require operational controls in certain instances. For the reasons discussed at length in Part III.A.1., above, PG&E NEG believes that Section 316(b) does not authorize EPA to impose mandatory operational requirements. Section 316(b)'s delegation to EPA to regulate the "location, design, capacity and construction" cooling water intake structures cannot logically be construed to allow regulation of a facility's operations. However, like mitigation measures, operational measures may be offered voluntarily as an alternative means of complying with the performance standards. See Part III.A.3.a. The regulation should make this clear.

EPA Response

EPA agrees and believes today's final rule sufficiently address the concerns of the commenter. EPA has not designated any particular design and construction technology or operational measure as Best Technology Available for minimizing adverse environmental impact, does not mandate any technology or suite of technologies.

Comment ID 316bEFR.060.046

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 13.0
More Stringent Requirements

Alternative Proposals for More Stringent Requirements are Poorly Defined and Unjustified

Although not part of its preferred approach, EPA proposes for comment several alternatives that would impose generally, or allow EPA (or a delegated state) discretion to impose, more stringent requirements for I&E reductions under specified circumstances. These proposals are, in most cases, only vaguely defined, and little attempt is made to explain the rationale for allowing or imposing the additional requirements. Furthermore, imposition of these additional requirements must be viewed with skepticism, given the significant costs that Phase II facilities are already being asked to bear and the fact that the impacts of concern -- primarily to fisheries -- have numerous other causes, including, most significantly, over fishing and pollution. PG&E NEG believes these other causes must also be addressed before significant additional costs can justifiably be imposed on electricity generators. For these reasons and those discussed in more detail below, PG&E NEG opposes the adoption of these alternatives to the proposed rule. <FN 21>

Footnotes

21 Although its relevance is unclear, PG&E NEG notes that, in addition to the proposals discussed in the text, EPA's proposed rule states that "it is unacceptable to impact more than 5% of the organisms within the area of an intake structure." 67 FR 17,151 col. 2. To the extent that EPA intends this as a general statement of policy, PG&E NEG believes it would create yet another avenue for imposing more stringent requirements -- a facility that is unable, for example, to reduce its impacts below this level using the technologies identified by EPA could be required to take additional steps until this level is reached. There is no support provided for the 5% cutoff and PG&E NEG would oppose implementation of such a requirement.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.060.047

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 13.0

More Stringent Requirements

More stringent regulation where a waterbody is affected by multiple stressors cannot be justified as an implementation of Section 316(b)

On page 17,151 of the proposed rule, EPA requests comment on language that would specify that more stringent requirements could be imposed where compliance with the performance standards or, where applicable, a site-specific determination based on the cost-cost or cost-benefit tests, would “not adequately address cumulative impacts caused by multiple intakes or multiple stressors within the waterbody of concern.” Section 316(b) provides no authority for using BTA determinations as a vehicle for addressing impacts other than those caused by the facility seeking to renew its permit. By its terms, Section 316(b) authorizes EPA specifically to ensure that the location, design, construction and capacity of any particular cooling intake structure uses the best technology for minimizing the structure’s adverse environmental impacts. Imposing requirements that are based on impacts of other activities beyond that structure is inconsistent with the language of Section 316(b).

Nor is such an approach likely to be effective. In many, if not most cases, the cumulative impacts from other stressors will be of significantly greater magnitude than those of the affected facility. The impacts also may be the result of years, if not decades, of unregulated or under-regulated activities, as well as lack of enforcement. To the extent that state and local regulatory bodies believe that power plants will be required to take steps to “make up” for impacts caused by other activities (i.e., do more than their fare share to make up for the impacts of others’ activities), there is likely to be little incentive to address those activities.

Finally, Section 316(b) does not authorize, and cannot be reasonably read to authorize, such a profound change in the orientation of the NPDES program. The focus of the NPDES program is on regulating specific point sources through standards and requirements applicable to that source’s specific activities that will reasonably reduce the impact of that source’s activities on the environment. Nothing in the NPDES program authorizes the EPA to use the NPDES process to require a permit holder to shoulder a disproportionate responsibility for the larger environment in which the permit holder operates.

For the foregoing reasons, PG&E NEG opposes EPA’s proposal that more stringent regulation be allowed where a waterbody is affected by multiple stressors.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.060.048

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 13.0

More Stringent Requirements

More stringent regulation to promote recovery of fish stocks is equally unjustified

A second, closely related proposal would allow EPA (or a delegated state) to require more stringent technologies “where not doing so would delay recovery of an aquatic species or community that fish and wildlife agencies are taking active measures to restore, such as imposing significant harvesting restrictions.” 67 FR 17,151. This proposal is unjustified and must be rejected for the same reasons as explained in (a) above -- it ignores the requirement in Section 316(b) that there be a causal connection between the conditions being imposed on the cooling water intake structure and the adverse environmental conditions attributable to that particular source. The language of Section 316(b) is clear on this point -- EPA is to identify BTA to address the adverse impacts of the affected facility’s own cooling water intake structure on the waterbody. Congress did not authorize EPA to require affected facilities to compensate the system for any stresses other than the I&E attributed to that facility from cooling water intake.

PG&E NEG also notes that, based on EPA’s one sentence proposal, it is difficult to see how a test of the kind EPA suggests could be implemented in a manner that is not speculative. PG&E NEG opposes a rule that would authorize EPA or a delegated state to impose potentially draconian additional limits on I&E impacts on the basis of the mere suspicion that those impacts might contribute in some way to a “delay” in that recovery.

For the foregoing reasons, PG&E NEG opposes this proposal.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.060.049

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

EPA's proposals to impose closed-cycle cooling based on waterbody type or waterbody type and flow are unjustified

Two further alternatives to the preferred rule EPA has proposed for comment would require certain facilities, identified by waterbody type or waterbody type and flow, to meet a performance standard based on closed-cycle cooling. Under the first proposal, all facilities on oceans, estuaries and tidal rivers would be required to adopt this performance standard. 67 FR 17,155 col. 2. Under the second, only those meeting certain flow levels would have to do so. 67 FR 17,156 col. 1. For facilities on estuaries or tidal rivers, the standard would apply to facilities withdrawing more than 1% of the volume of one tidal excursion; for facilities on oceans it would apply to facilities withdrawing more than 500 MGD.

EPA has failed to provide adequate biological or economic justification for either proposal. In particular, EPA provides no explanation for why the cutoff levels it identifies are biologically relevant in the waterbody and flow alternative. In addition, as EPA acknowledges, the incremental costs of imposing additional requirements based on waterbody or waterbody and flow would far exceed the incremental benefits of doing so

However, these proposals fail on a more fundamental ground: EPA simply has no authority under Section 316(b) to require closed-cycle cooling. See Part III.A.1. As a result, PG&E NEG opposes both proposals.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.060.050

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA's Site-Specific Alternative is Too Limited and Poorly Defined

Although EPA correctly recognizes the importance of retaining a case-by-case alternative for demonstrating compliance with Section 316(b), the specific site-specific approach EPA adopts in the proposed rule is fundamentally flawed. Before a facility could hope to have EPA consider a site-specific analysis, it would have to demonstrate that its costs of meeting EPA's generic performance standards would either be significantly greater than the costs by EPA in developing the standard or that it proposes significant greater benefits from its site-specific approach. But, even if an applicant can show that its costs are significantly greater than those EPA has determined generically should be spent, the baseline cost for the site-specific standard is the level of costs EPA determined should be spent, not zero. EPA thus will assume in what purports to be a site-specific analysis that there is a benefit to spending what EPA determined should be spent with regard to any site-specific considerations and that the only costs to be justified within the context of the site-specific analysis are those "significantly greater" than those EPA already determined should be spent. The effect of these restrictions and assumptions renders the "site-specific" nature of the determination illusory. EPA has also failed to provide useable definitions of critical terms used in its site-specific alternative.

For these reasons, discussed in more detail below, PG&E NEG opposes the site-specific alternative proposed by EPA and endorses the alternative proposed by UWAG.

EPA Response

EPA disagrees. The commenter incorrectly assumes that the rule will always require a technology to be installed or some expense incurred to meet the performance standards. A facility may choose to seek a site-specific determination of BTA using the cost-benefit test.

Comment ID 316bEFR.060.051

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 7.01.03
Option 3--Site-specific determination

EPA's proposal improperly limits the availability of site-specific alternative

Under EPA's proposal, a facility can only obtain a site-specific determination of BTA if it can demonstrate that the costs it would incur to comply with the performance standards would be "significantly greater" than either: (i) the costs considered by EPA in developing the standards; or (ii) the benefits of complying with the performance standards. 67 FR 17,221 (proposed 40 CFR 125.94(c)(1). PG&E NEG does not believe that EPA can properly limit access to a case-by-case determination of BTA in this manner. As was discussed in Part III.A.2.a. above, the statutory language, legislative history of 316(b) and EPA's own consistent interpretation compel the conclusion that Section 316(b) must be applied on a case-by-case basis. The rule, as currently drafted, makes access to a site-specific determination of BTA effectively illusory for many, if not most, facilities.

EPA's approach also runs afoul of settled precedent by placing the burden of demonstrating significantly greater costs on the facility seeking a site-specific determination of BTA. As EPA has long acknowledged, the burden of establishing BTA in a Section 316(b) determination lies with the Agency. See In Re Central Hudson Gas and Electric Corporation, Opinion of the General Counsel No. 63 at 382 (July 29, 1977) ("[U]nder 316(b) EPA has the ultimate burden of persuasion."). This burden includes the burden of demonstrating that there is a technology available that can be implemented at an economically reasonable cost. Id at 383 (discussing agency's burden to show cost test is met); Legislative History at 264 (Statement of Rep. Clausen) (explaining that "best technology available is intended to be interpreted to mean best technology available commercially at an economically practicable cost").

Nothing in the text of Section 316(b) supports this shifting of EPA's burden to the permit applicant and PG&E NEG opposes EPA's attempt to limit access to the site-specific alternative by the cost-benefit and cost-cost test.

EPA Response

Please refer to the response to comment 316bEFR.060.050 for information about the cost tests.

EPA disagrees regarding the burden of proof. The burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say "you [the facility] must demonstrate to the Director" when stating a requirement.

Comment ID 316bEFR.060.052

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA's proposed rule imposes an unjustifiably stringent level of control

In addition to requiring that an applicant seeking a site-specific determination demonstrate that its costs would be "significantly greater" than those considered by EPA or than the benefits of complying with the performance standards, EPA allows an applicant to receive an alternative determination of BTA only "to the extent justified by the significantly greater costs." 67 FR 17,221 (proposed 40 CFR 125.94(c)(3)). However, requiring a facility to make reductions within the range of performance standards up to the point that costs are "significantly greater" than benefits has no economic justification and will make society worse off. See Part III.B.4.

Because a facility seeking a site-specific determination on the basis of the cost/benefit test would necessarily be required to achieve an unreasonably stringent level of control — one that has no economic justification -- PG&E NEC opposes EPA's requirement that a site-specific termination only be allowed "to the extent justified by the significantly greater costs."

EPA Response

Please refer to the response to comment 316bEFR.060.050 for information about the cost tests.

Comment ID 316bEFR.060.053

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA's proposal is wholly ambiguous as to the decision criteria to be applied

As currently drafted, EPA's site-specific alternative is ambiguous in several critical respects. Most importantly, it lacks an appropriate definition of the term "adverse environmental impact," which is central to how the provision will be implemented. In addition, it provides virtually no guidance to the agency or regulated community as to the decision criteria EPA plans to use in determining whether the cost tests are met and, if they are, what level of reduction will be required. These omissions and ambiguities, discussed in more detail below, render EPA's site-specific alternative unworkable.

EPA Response

No response is required, as the issues raised in this comment are summary in nature and are addressed in individual responses.

Comment ID 316bEFR.060.054

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Adverse Environmental Impact is undefined

As currently drafted, the regulation includes no definition of adverse environmental impact. Instead, EPA has identified several different possible definitions and solicited comments on how it should approach defining the term. In particular, EPA has asked for comment concerning:

-Whether the definition of adverse environmental impact (AEI) should include any I&E impacts or whether AEI should be determined in light of effects observable at a higher level (i.e. population or ecosystem effects); and

-Whether the definition of AEI should incorporate an explicit threshold determination of whether AEI is occurring.

See 67 FR 17,164 col. 2-3. PG&E NEG believes that EPA's site-specific proposal should define AEI as occurring when the loss of fish or other organisms has actual adverse effects at the population or community level and should incorporate a specific threshold level of impact below which I&E effects are presumed not to be adverse.

Such a definition reflects the reality that: (1) as a matter of basic biology, large losses occur naturally and even very large losses may have little or no effect on the vigor of the aquatic populations or community and (2) such losses often have little or no effect on the public's use and enjoyment of aquatic resources. It is also consistent with the concepts relied on by fishery managers charged with the management of fish stocks. This approach views the fishery as a renewable resource that can be managed. It recognizes that the federal government need not try to protect every fish, let alone every fish egg, but should instead preserve the fishery resource itself.

A definition of AEI based on population-level effects is also fully consistent with the language and purpose of Section 316(b). Indeed, EPA's early guidance and permitting decisions strongly support the view that AEI was understood to require that there be a significant impact at the population level before new technological requirements would be imposed. <FN 22>

Footnotes

22 See Anderson & Gotting, 26 Column. J. Envtl L. at 41-42 (discussing guidance documents reflecting EPA's understanding that "adverse impact" meant significant, population-level impacts). In this context, PG&E NEG notes that it could be argued that the requirement of population level impacts is required by the interaction between Section 316(a) and Section 316(b). Under this reasoning, Congress' acknowledgment in Section 316(a) that it is only necessary to protect a "balanced, indigenous population" reflects an upper limit on the scope of Section 316(b) as well -- it would make no sense for Congress to have deliberately established a unique, population-level standard for steam electric generators under Section 316(a) only to re-impose a more stringent level of control under Section 316(b).

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.060.055

Subject Matter Code 10.07.02

RFC: Appropriateness of “significantly greater”

Author Name Mark V. Carney

Organization PG & E National Energy Group

Lack of Decision Criteria for Cost Tests

As currently drafted, the regulations provide no guidance as to how determinations under the site-specific alternative will be made. Completely missing is language interpreting the meaning of the “significantly greater” criterion, which is used to establish both eligibility for the site-specific alternative and the level of control required of a facility granted a site-specific determination. PG&E NEG is concerned that the absence of clear standards will be read as according EPA and delegated states virtually unfettered discretion to determine in individual cases whether or not to perform a site-specific determination and to decide what level of I&E reduction to require. Such a result is both unfair to the regulated community and incompatible with EPA’s stated intent to provide some measure of consistency and regulatory certainty in the proposed rule.

EPA Response

See responses to 316bEFR.006.003 and 018.009. With regard to the level of control required, see 40 CFR 125.94(a)(5)(i) and (ii), which specify the requirements applicable to site-specific determinations. These provisions are discussed in section VII and IX of the preamble to the final rule. EPA believes that the state Director is in a better position that EPA to account for the various physical, biological and other conditions that would be relevant to a site-specific determination of BTA.

Comment ID 316bEFR.060.056

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 17.08

Option: UWAG's recommended approach

PG&E NEG endorses UWAG's proposed site-specific rule

In stark contrast with EPA's site-specific approach, UWAG's suggested alternative would make available to all facilities a clearly defined and economically justified method for making site-specific BTA decisions. UWAG's proposal includes definitions of all relevant terms and comprehensively articulated decision criteria. UWAG's alternative also includes provisions that appropriately focus on the circumstances in which regulation is most justified, by, for example, providing minimum thresholds for regulatory action under Section 316(b) and defining adverse impact based on population-level effects.

For the foregoing reasons, PG&E NEG endorses UWAG's proposal for making site-specific determinations of BTA. 67 FR 17,164 col. 2.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.060.057

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA's Chosen Economic Criterion, the "Significantly Greater Cost Test," Will Make Society as a Whole Worse Off

As noted above, PG&E NEG supports EPA's abandonment of the "wholly disproportionate cost" test as the economic baseline for determining the level of technology that constitutes BTA. However, EPA's alternative economic "bottom line" for this regulatory effort - the "significantly greater cost test" -- is only marginally less inappropriate. Under the proposed test, the alternative that provides the greatest environmental gain would be chosen from a set of alternatives for which the costs are not "significantly greater" than the benefits. In essence, EPA puts a couple of rabbits in the hat and then claims that picking the cheapest rabbit will lead to a rational cost-benefit analysis. But whether the cost of any of the rabbits can be justified is never really part of the analysis. It remains possible, indeed likely, that the set of alternatives (all of the rabbits) considered under this rule could all have costs exceeding their benefits. In that case, all alternatives would make the society at large worse off than would no regulation -- including the one that would be chosen for implementation. <FN 23>

Footnotes

23 Yet another test, "economic practicability," discussed briefly on pages 17,144-17,145, is equally flawed. Concluding that a particular cooling water technology — or any other investment — is or is not "economically practicable" or "affordable" based on its costs relative to an individual firm's or facility's revenues could not be based upon a decision criterion with any normative standing in economics. Such an approach would tell us nothing about whether the technology helps to achieve specific objectives, whether it does so at minimum cost (cost effectiveness), or whether an alternative investment would provide greater net benefits to the company, the environment, or society as a whole. EPA would in essence determine how much money a firm or facility should make by determining how much money (whether in capital or operating costs) a firm or facility should spend on cooling water technology.

EPA Response

See responses to 316bEFR.018.009 and 045.012.

Comment ID 316bEFR.060.058

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Mark V. Carney

Organization PG & E National Energy Group

This is not a rational cost-benefit criterion and for that reason, PG&E NEG opposes it. Instead, the appropriate test for determining the appropriate level of I&E reduction (if any) would be one which protects the natural resources involved to the point where the incremental benefit from increased protection equals the incremental cost of the increased protection. The alternative chosen under such a test will produce the maximum net benefits to society as a whole.

EPA has requested comments on a test employing precisely this criterion, which it describes as “a test based on the concept that benefits should justify costs.” See 67 FR 17,166 col. 2. This is the approach endorsed by PG&E NEG. Requiring that the benefits justify the costs in the manner described in the Proposed Rule will lead consistently to decisions which make society as a whole better off, and will identify the alternative that does so in the greatest magnitude, that is, the alternative that produces the largest net benefits. In economic terms, this is known as the social net present value criterion. It is in everyone’s interest that a technology be adopted if the present discounted value of anticipated net benefits (including environmental benefits) is greater than the anticipated net benefits of alternatives, including the status quo.

For these reasons, EPA should adopt the benefits justify costs criterion as its preferred criterion.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.060.059

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

The HRC and the Forage Fish Replacement Cost Method of Estimating Benefits are Invalid and Cannot be Used

In addition to adopting an economically unsound decision criterion in its proposed 316(b) rule, EPA's estimation of the benefits of the rule contains numerous errors which preclude a rational assessment of whether the rule can be justified under any cost-benefit test. PG&E NEG has reviewed EPA's economic analysis with particular reference to the Brayton Point case study and the majority of its comments on EPA's economic methods therefore appear in Section IV, which discusses that case study in great detail. <FN 24> However, because EPA used the Habitat Replacement Cost method ("HRC") and forage replacement costs to estimate benefits in a number of the case studies relied upon to develop national benefit estimates for the rule, they also merit a more general comment.

In several of the case studies, including the Brayton Point case study, the Pilgrim case study, the J.R. Whiting case study and the Monroe case study, EPA uses estimates of habitat replacement cost as an alternative method of valuing I&E losses. The HRC method uses the cost of restoring or replacing ecological resources at a level sufficient to offset I&E losses -- i.e. through restoration or construction of habitat, stocking of forage fish, installation of fish ladders, etc. -- as a measure of the value of those losses. In addition, in case studies including the Delaware Estuary case study, the Ohio River case study, the Tampa Bay case study and the Brayton Point case study, EPA uses the forage fish replacement cost approach. The forage fish replacement cost method estimates value by the cost necessary to stock lost forage fish due to impingement and entrainment. Both approaches to valuing I&E losses are wholly invalid.

As should be self-evident, the value that resources have to people is unrelated to the costs of restoring or replacing those resources. In fact, such thinking can lead to incorrect conclusions that are damaging to the environment. The fact that it might be quite costly to replace the habitat of the anopheles mosquito in drought-stricken areas, or of the deer tick in Manhattan, does not mean that the mosquito or the tick must each therefore have great value. It might be quite inexpensive to restock a species that is highly valued for commercial or recreational fishing or non-use (i.e. the value that people may derive simply from knowledge of the species' existence in some area), and likewise it may be relatively expensive to restore another species that has been little studied with respect to restoration methods precisely because of its low commercial, recreational, and non-use value. Using HRC or a replacement cost to measure the value would lead to exactly the wrong conclusion: the implication would be that the high-value species has "low value" because of the low costs required to restore it, and the low-value species has "high value" simply because it is relatively costly to restore it.

Use of these demonstrably invalid methods also has no substantive support in EPA's prior practice. Indeed, their use here represents a dramatic departure from prior practice and EPA's own current guidance documents. EPA's official guidance document, "Guidelines for Preparing Economic Analyses" (Office of the Administrator, September 2000), cannot be used to justify either approach. Indeed, the Guidelines specifically discuss the narrow circumstances in which an avoided cost measure may be used to estimate benefits. <FN 25> None of them is present here. Nor has PG&E

NEG found any meaningful support for using these approaches to estimate benefits in the technical support documents developed for this rulemaking. The complete absence of support underscores the irrationality of using these methods to calculate benefits.

Equally telling are the absurd results from application of the HRC method in the Brayton Point case study. The HRC-based analysis of the value of I&E losses at Brayton Point produced an estimate of benefits that was more than 200 times larger than the benefits that EPA calculated using more justifiable (although improperly applied, as is discussed in part N.B.3) valuation methods. The result would have been another two orders of magnitude larger still but for EPA's apparently arbitrary exclusion of one type of restoration (reef construction) which by itself would have added in excess of $1 billion per year to the total. Inclusion of the forage fish replacement cost values likewise introduces a clear upward bias to EPA's estimates.

Because these invalid methods are used to develop the benefits figures relied upon in the national benefits estimate, one result of their inclusion is to dramatically inflate EPA's estimate of the benefits of the regulation. In addition, to the extent that these methods are used to develop benefits estimates in order to demonstrate eligibility for a site-specific evaluation under the benefit-cost test, they will have the effect of improperly denying many if not most facilities a site-specific determination of BTA. As the analysis of the Brayton Point case study shows, the "benefits" estimates produced by the HRC method are truly staggering. Using these estimates, virtually any conceivable level of technological control would be found to be cost-justified and, as a result, a request for a site-specific determination under the benefit-cost test would be denied. This would result in precisely the one-size-fits-all approach (albeit one dressed-up in cost-benefit garb) that Congress specifically did not have in mind when it adopted Section 316(b).

In short, the HRC and the forage fish replacement methods simply have no place in a rational analysis of the benefits of the proposed rule. Nor has EPA even attempted to justify its use of them, in place of the various conceptually valid approaches EPA has approved for use in this context. The "values" calculated based on these methods must be eliminated from all benefit estimates, including those carried out for the Brayton Point Station case study. Further, the HRC and Forage Fish Replacement methods used by EPA should not be used to support the final rule or NPDES permits at any PG&E NEG stations.

Footnotes

24 PG&E NEG has also reviewed the analysis performed for UWAG, which found numerous errors in the choice of facilities used as the basis for the national estimates and in the biological and economic assumptions used to develop national benefits estimates for the proposed rule. See UWAG comments, Section V.D.-E. PG&E NEG endorses those comments.

25 The Guidelines identify two circumstances in which "averting behavior" may be appropriately used to estimate the value of an environmental benefit. The first occurs where individuals have actually proven willing to pay (voluntarily) a certain amount to substitute for environmental services. See Guidelines, p. 99. The second occurs where an individual or entity, again voluntarily, undertakes an action that exempts it from a pre-existing environmental obligation. See id In this latter circumstance (also not applicable here), the avoided cost of the environmental obligation can provide an estimate of the value of the action taken by the individual or entity.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

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Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

EPA Fails to Provide a Credible Demonstration that the Proposed Rule, as a Whole, is Economically Practicable, Especially for Nonutilities

As EPA acknowledges, Section 316(b) requires EPA to demonstrate that its rule implementing the statutory provision is economically practicable. See 67 FR 17,144-45. In the proposed rule, EPA states that it has considered the costs of its proposed rule both in terms of revenues generated by facilities affected by the proposed rule and in terms of revenues generated by the firms that own such affected facilities. It concludes that the costs of compliance with the proposed rule would be very low and that "the proposed rule would not lead to the early retirement of any existing generating capacity, and would have very small or no energy effects." 67 Fed. Reg. 17145, col. 2-3. PG&E NEG questions both EPA's methods and its conclusions.

With respect to EPA's approach, PG&E NEG notes that EPA's cost test based solely on percentage of revenues required to meet the standards or any other requirement under 316(b) provides no indication about whether the expenditures are warranted or worthwhile in terms of the environmental benefits achieved. Nor is it a reliable guide to whether the costs are affordable. Indeed, if that were the test of whether a facility could bear the cost of an additional regulatory burden, EPA could easily justify burdens that in the aggregate force the company out of business, by "dedicating" only one or a few percent at a time. For such a measure to have any meaning at all, it would have to take into account existing and sustainable margins in the market segment and the aggregate of other incremental costs that may be imposed on the enterprise, including those necessary to meet additional regulations such as air emission controls, site security upgrades, toxics use reduction, and others. EPA has not done this. And even if it had, such a test would fall short of establishing that the cost is "economically practicable," a term used by Congress to convey the need that the benefits justify the costs. CF section 304(b)(1)(B) ("best practicable" must include "consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved); See also 118 Cong. Rec. 33,696 (1972).

Furthermore, PG&E NEG believes there is simply not sufficient data in the record to support the conclusions EPA draws. While EPA acknowledges that its proposed rule affects both traditional steam electric utility and steam electric nonutility power producers, EPA glosses over the significance of this distinction in terms of its proposed rule. Traditional steam electric utilities own and operate rate-based facilities; their costs are generally disclosed; and so long as those costs are prudently incurred, they are recovered by the utility through its rates. Steam electric nonutility power producers own and operate competitive generating facilities (that they in many cases bought from traditional utilities); their capital and operating costs are generally not public; and whether and the extent to which they recover those costs are a function of market conditions, including access to capital. EPA has not adequately taken account of these important differences between utility and nonutility power producers.

This important gap in the record is to an extent acknowledged by EPA itself. It stated with respect to its survey of nonutility power producers, "EPA did not utilize company-level data from Form EIA-

867 because the confidential nature of this data prevented EIA from releasing it." 67 Fed. Reg. 17132, col. 3. It would seem that under these circumstances EPA was required to articulate in its rulemaking record a proxy for it (by, for example, aggregating the data). Nor did EPA perform any meaningful analysis as to whether current market conditions are such that the investment contemplated by the proposed rule would more likely than not be made by affected nonutility power producers in light of uncertainties surrounding their ability to recover those costs from the market, including a reasonable rate of return on their private investment. In the absence of any recognition of real-world market conditions, how could EPA conclude that the proposed rule would not lead to the early retirement of any existing generating capacity? In short, the record does not support the conclusions EPA attempts to draw.

EPA Response

Please refer to the response to comment 316bEFR.005.021 in subject matter code 9.01 for a discussion on EPA's use of a cost-to-revenue test to determine economic practicability.

EPA also notes that in the context of Section 316(b) of the Clean Water Act, the concept of economic practicability refers, among other things, to the rule's impacts on the economic viability of facilities and firms subject to the regulation. Benefits are irrelevant to the determination of economic practicability for Section 316(b) regulation. The commenter's reference to "best practicable" is drawn from the context of "Best Practicable Technology" as defined in the Clean Water Act; this concept of "practicable" is not the same concept as "economic practicability" as considered herein for the development of the Section 316(b) regulation.

The commenter further states that EPA did not properly take account of differences between utilities, which own and operate rate-based facilities, and nonutilities, which own and operate competitive generating facilities. EPA disagrees with this comment. EPA believes that in a deregulated market, the distinction between utilities and nonutilities is no longer relevant. While such a distinction may have been important in the past, when only a few unregulated nonutilities competed with regulated utilities, this is no longer the case. The share of Phase II facilities that are owned by unregulated entities has increased from 2 percent in 1997 to 31 percent in 2001. By the time the final rule will take effect, even more Phase II facilities that currently operate under a rate-based system will be operating in a competitive market. Furthermore, EPA does not believe that nonutilities will be differentially impacted compared to utilities, even in the case that deregulation might not have taken effect in all markets by the time this rule is implemented. Competitive pressures, even in regulated environments will reduce the ability of utilities to pass on costs to their consumers.

EPA further notes that the IPM used to conduct the energy market analyses in support of the Phase II rule is based on the assumption of deregulated wholesale markets. As a result, uncertainties surrounding the ability to recover compliance costs from the market are explicitly incorporated into the model and accounted for in EPA's analysis.

The commenter alleges that there is a "gap in the record" with respect to nonutilities because EPA did not use company-level data from Form EIA-867. EPA disagrees with this comment. EPA notes that not using Form EIA-867 data did not create a gap in the record. Rather, the refusal by the Energy Information Administration to release this data to EPA resulted in the need to collect similar data through an industry survey. EPA did just that. As a result, EPA used a different data source, rather than no data, in the Phase II analyses.

For these reasons, EPA disagrees with the assertion that the record does not support EPA's conclusions.

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Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 10.03.05
Brayton Point

COMMENTS ON BRAYTON POINT STATION CASE STUDY

The Brayton Point Station case study prepared by EPA in support of the proposed regulations is premised on numerous faulty assumptions, erroneous analytical methods, and flawed calculations. It places undue -- but substantial -- reliance on several reports prepared by Mark Gibson of the Rhode Island Department of Environmental Management which, among other flaws, use and present data in a misleading way that distort the impacts of the Brayton Point Station, misrepresents the actual condition of Mount Hope Bay, and mischaracterizes the recovery of winter flounder in Narragansett Bay. Beginning from this flawed premise, it employs invalid and improperly applied methods to calculate the losses attributable to I&E at Brayton Point Station and then estimate the economic value of those losses.

The cumulative effect of EPA's errors is to produce a grossly excessive estimate of the benefits of the proposed performance standards for Mount Hope Bay that has no basis in sound science. Reliance on such defective data is inconsistent with the requirements of the Paperwork Reduction Act and PL 106-554 (the Data Quality Act), 44 U.S.C. § 3500 et seq. In addition, EPA's use of such deeply flawed methods can provide no rational basis of support for the proposed rule or the Station's pending permit renewal application. The principal flaws are discussed below.

A. Erroneous Factual Assumptions

The conclusions set forth in the case study flow from numerous factual assumptions. Unfortunately, most of these "facts" are demonstrably wrong.

1. The winter flounder in Mount Hope Bay did not decline due to the conversion of unit 4 to once-through cooling.

On p. F1-2 of the case study, EPA states that the decline of winter flounder in Mount Hope Bay was caused by the conversion of Unit 4 to once-through cooling in 1984. The Unit 4 conversion was not completed and operational until 1985. During this time, each of the other three units were off-line for various reasons. It was not until 1987 that all four units were running simultaneously. Hence, it was not until 1987 that the effects of the unit 4 conversion (thermal and flows) began to be experienced in Mount Hope Bay. <FN 26>

By 1987, the winter flounder were already steeply in decline. <FN 27> The steep decline was apparent not just in Mount Hope Bay, but in Narragansett Bay, Peconic Bay, Niantic Bay and numerous other water bodies up and down the entire coast of the United States. There can be no argument that Brayton Point Station affected any waterbody other than Mount Hope Bay -- in fact, Mr. Gibson, whose work is repeatedly cited in the "case study," plainly agrees that Brayton Point Station does not affect these other water bodies. That is precisely why he compares the abundance of winter flounder in Mount Hope Bay with their abundance in Narragansett Bay and adjacent coastal waters. In short, it is wrong to conclude that the winter flounder in Mt. Hope Bay declined due to the conversion of Unit 4 to once-through cooling.

2. Winter flounder have not fared much better in Narragansett Bay than in Mount Hope Bay and are not experiencing a superior recovery in Narragansett Bay

Contrary to the assumptions in the case study and in Mr. Gibson's reports, <FN 28> there is not a significant difference between winter flounder abundance in Mount Hope Bay and in Narragansett Bay. This becomes obvious when one examines closely the sampling stations throughout Mount Hope Bay and Narragansett Bay, as has been done by Professor Joseph DeAlteris, Ph.D. <FN 29> Using the same analytical methods as were used in Gibson (2002), <FN 30> Professor DeAlteris compared data collected in the immediate vicinity of Brayton Point Station ("upper Mount Hope Bay" or "UMHB") with data collected from the lower 2/3 of Mount Hope Bay ("lower Mount Hope Bay" or "LMHB"), Professor DeAlteris then compares the data from those sites with data collected from Narragansett Bay.

Professor DeAlteris analyzed the data over several different time periods between 1972 and 2000. His analysis reveals that during some time periods the rate of increase in winter flounder abundance was higher (positive) in UMHB than in either LMHB or Narragansett Bay. Similarly, for some time periods, the trend in abundance of winter flounder was lower (negative) in UMHB than in LMHB or Narragansett Bay. Most striking, however, was Professor DeAlteris' finding that winter flounder abundance trends in Lower Mount Hope Bay resemble those in Narragansett Bay. These findings flatly refute key assumptions in Mr. Gibson's work and in the case study. Contrary to what Mr. Gibson claims, only in an area of 5 square miles of Mount Hope Bay (UMHB) is there is any evidence that flounder declined more steeply there than the lower 10 square miles of Mount Hope Bay and the 146 square miles of Narragansett Bay, and even that was observable only in the longest of the time series analyzed, 1972-2000. <FN 31>

As Professor DeAlteris explains, the errors in Mr. Gibson's work flow from a mischaracterization and misuse of data. Mr. Gibson uses only a small subset of available data (that collected by Marine Research Inc. in UMHB) to reach a conclusion about the trend of winter flounder abundance in all of Mount Hope Bay. He then misleadingly compares that data with data collected in Narragansett Bay, Rhode Island Sound, and Block Island Sound combined. <FN 32> In short, Mr. Gibson's comparison is completely unreliable and misleading.

3. The abundance trends of other groundfish near the Station resembles their abundance trends elsewhere in Mount Hope Bay and in Narragansett Bay

In a subsequent report, Mr. Gibson takes his erroneous conclusions about winter flounder abundance and hypothesizes that it extends to all groundfish in all of Mount Hope Bay. <FN 33> This hypothesis is based on sheer speculation and is in fact refuted by the data. Professor DeAlteris again used Mr. Gibson's own method of analysis and Mr. Gibson's own agency's data to perform an independent analysis comparing abundance trends between UHMB, LHMB and Narragansett Bay for winter flounder, windowpane, hogchoker, tautog, and scup. That analysis found no meaningful difference between the trends for windowpane, tautog, or scup abundance in UMHB, LMHB, or Narragansett Bay. For winter flounder and scup, there was limited evidence of a differential decline in UMHB, but no evidence of a differential decline in the lower two-thirds of Mount Hope Bay. Overall, the clear weight of evidence eliminates Brayton Point Station as a factor in the declines of all species in the lower 2/3 of MHB. It also casts serious doubts on Mr. Gibson's claims that the station has seriously impacted the abundance of these five species in UMHB. In fact, in a few instances the trends were more favorable for UMHB --closest to the Station -- than for Narragansett Bay, farthest from the Station.

Mr. Gibson and the case study have overestimated the impacts of Brayton Point Station on Mount Hope Bay. Furthermore, there is no support for the statement at page F1-1 of the case study that winter flounder experiencing a superior recovery in Narragansett Bay compared to Mount Hope Bay. In fact, Mr. Gibson's own data demonstrates that the abundance trends of winter flounder in two-thirds (10 square miles) of Mount Hope Bay resemble their abundance trends in Narragansett Bay.

4. EPA erroneously assumes that no organisms survive either impingement or entrainment

EPA's analysis assumes that no organisms survive either impingement or entrainment. Yet Brayton Point Station and other power plants have provided EPA over the years with data and studies proving conclusively that substantial percentages of organisms can and do survive I&E. EPA's assumption of zero survival grossly overstates losses from I&E.

a. Impingement Survival

The capacity for organisms to survive impingement at any station's intake is dependent on a number of factors, including the general hardiness of the species, the age of the individual impinged, the construction of the traveling screens, and station operation. PG&E NEG (1987) measured survival of impinged organisms at Brayton Point Station during 1984 — 1986. The study found that many finfish species have very high rates of impingement survival (>90%; e.g., winter flounder, windowpane, hogchoker, bluefish, tautog, and threespine stickleback). Numerous other species were found to have high rates of survival (>50%; e.g., American sand lance, scup, seaboard goby, weakfish, and white perch), although some of the less hardy species did not survive impingement well (<10%; e.g., alewife, Atlantic menhaden, bay anchovy, and rainbow smelt). PG&E NEG also measured survival of impinged organisms at Manchester Street Station from January 1996 to February 1997. <FN 34> Latent (48-hour) survival rates for all finfish observed, excluding Atlantic menhaden, averaged 71.8%; survival rates ranged from 38.0% for Atlantic Silverside to 97.4% for three-spined stickleback. The survival rate for Atlantic menhaden was approximately 6%; menhaden have long been recognized to be very sensitive to any type of handing, particularly impingement. Winter flounder initial survival rates at the low pressure (LP) return line ranged from 96.6% to 98.2% and 93.5% at the high pressure (HP) return line. Latent survival rates were 95% at the LP return line and 92.2% at the HP return line.

In light of the above, EPA's decision to not consider impingement survival in the calculation of impingement losses likely resulted in gross overestimation of the station's impacts on the ecosystem and potentially misguide mitigation efforts.

b. Entrainment survival

Similar to impingement, the capacity of an organism to survive entrainment is dependent upon the age/size of the organism, the species' hardiness, biocide use at the station, abrasion and pressure changes during station passage, and the temperature of the water. Survival of organisms entrained at

Brayton Point Station was assessed during 1997 (May-August) and 1998 (March-July) using state-of-the-art sampling equipment (induced flow larval table). Over the 1997 and 1998 study periods, a total of 29,830 fish representing 26 taxa and 17 families were identified. High rates of survival were observed for a number of species held 96 hours after passage through the Station's cooling water system. For example, approximately 30% of post-yolk sac winter flounder that passed through the Station's cooling water system were alive four days after passage. In fact, a number of late-season sample dates showed better than 80% survival of postyolk sac winter flounder. Many species exhibited even better survival, including: Atlantic cod (50%), Atlantic silverside (50%), northern pipefish (36-79%), sculpins (43%), and Unidentified (52%). Alternately, some species exhibited low rates of survival after passage through the Station. This group includes some of the less hardy species, such as American sand lance (0.4%), Atlantic herring (0.0%), bay anchovy (0.0%), and clupeid (0.0%).

In addition, EPRI (2000) reviewed 36 discrete entrainment survival studies from 21 power stations. It documented high rates of survival (>50%) for some species (e.g. striped bass and white perch) and lower rates (~25%) for other more fragile species (e.g. herring and anchovies). Macroinvertabrates were found to have high survival rates (70-90%).

As the foregoing makes clear, an accurate assessment of entrainment losses must be based on entrainment mortality and not the total number entrained. To not consider entrainment survival in the calculation of entrainment losses would grossly overestimate the Station's impacts on the ecosystem.

B. Erroneous Analytical Methods

1. EPA used data not representative of current I&E at Brayton Point Station

In its case study, EPA used I&E data collected prior to 1985 to calculate current losses attributable to the Station. This approach overestimates I&E losses for many species because abundance of most demersal fishes has decreased significantly since 1984. Furthermore, in most cases the data to perform a correct analysis exists. Entrainment data for winter flounder collected between 1993 and the present is available to estimate current entrainment losses and impingement data is available for all species from 1972 to the present.

As justification for refusing to base its analysis on current I&E impacts, EPA offers two explanations: 1) it assumes that the station should be responsible for possible future losses, and 2) it assumes that populations will recover to past levels in the future. <FN 35> These statements are without basis and are contradicted by statements in EPA's proposed rule. For example, on page 17143 of the preamble of the proposed rule EPA states "Owners and operators may use existing data for the Study as long as it adequately reflects current conditions at the facility and in the waterbody from which the facility withdraws cooling water." Because fish abundance has declined since 1985 -- for many reasons that are unrelated to Station operations -- the numbers EPA used are not representative of current levels of impacts. EPA's failure to adjust the numbers to reflect the general decline in fish abundance in the area creates an upward bias on EPA's measurement of I&E. Incredibly, on p. F3-1 of the case study EPA claims that these inflated numbers may underestimate the true levels because the fishery was already in decline by 1984. This represents a blatant attempt to mislead the reader as to the impacts under consideration. There is simply no basis under 316(b) for considering any impacts other than those that would be caused by a facility under present environmental and ecological conditions.

2. EPA incorrectly used the average weight in its production foregone model

In applying the Production Foregone Model, EPA made two critical errors in their application of the production foregone model. <FN 36> EPA apparently used average weights at the midpoints of successive life stages to compute growth rate, and EPA used the midpoint weight to compute initial biomass. Both of these errors tend to inflate the estimates of production foregone. Ricker (1975) shows the correct form of the production foregone equation. In addition to ignoring Ricker, EPA also ignored the scientific literature and used overestimated average weights at the midpoints of life stages for nearly all early life stages (eggs and larvae) of entrained organisms. As compared to values reported in the scientific literature and computed from organism volumes and densities, weights of many early life stages used in EPA's production foregone model are in some cases 30, 95, and even 40,000 times higher than is biologically reasonable. This has, in turn, led to highly inflated estimates of lost production. EPA needs to re-evaluate its production foregone estimates with biologically realistic measures of life stage weights.

The magnitude of errors in EPA's implementation of the production foregone model become quite apparent when they are compared to those calculated correctly -- i.e., using the initial and final weights of a life stage to compute growth rate, using initial weight to computer initial biomass, and using biologically reasonable early life stage weights. This analysis demonstrates that EPA overstated the total production foregone losses for fourteen of the sixteen fish species analyzed, often by tens to hundreds times higher than the correct values. EPA must re-calculate its production foregone estimates.

3. EPA uses invalid economic methods to estimate the value of losses due to I&E

EPA's errors in estimating the production foregone from I&E at Brayton Point Station are compounded by numerous errors developing an estimate of the economic value of the losses. <FN 37> The appropriate methods for estimating losses to fishery resources are well understood. These begin by translating raw estimates of losses into losses of species and life stages that are actually valued by society. <FN 38> Once I&E losses have been converted to losses of species having societal value, appropriate methods are chosen to assign an economic value to those losses. This value is typically understood to have two components: use value, which captures the value society places on fish caught for commercial or recreational purposes, and non-use value, which captures other values people may actually place on the existence of a fishery resource, apart from any intent to catch or otherwise directly use the fish.

Use value for commercial fishing is analyzed in terms of the values the market assigns to the fish, while use value for recreational fishing can be determined using one or more methods that seek to derive an implicit value from the behavior of recreational fishermen. By contrast, nonuse values generally are derived by the use of (contingent valuation and other related) survey methods, which seek to elicit what people would be willing to pay for knowledge of the existence of the eggs, larvae and fish, apart from their use.

Although EPA's benefits analysis mentions the foregoing concepts, it fails to apply them or misapplies them in a manner that results in gross overestimation of the value of Brayton Point Station's losses and thus of the benefits that would result from I&E controls on the Station. First, as discussed above, EPA's economic analysis is premised on a biological analysis that is emphatically not accurate and which in fact dramatically overestimates actual current losses of socially valuable species due to I&E. EPA then compounds those errors by employing invalid economic methods, or misapplying valid methods, as discussed below. <FN 39>

a. Use values for commercially caught fish include unjustified estimates of economic surplus

For fish that are commercially fished, valuation begins with the value the market assigns -- that is, the dockside price. EPA begins by deriving this value, but then attempts to convert the dockside market value of reduced commercial landings into estimates of lost economic surplus. This is, in theory, defensible; however it is, as EPA notes (on page A9-5 of the Case Study Analysis), "an extremely complex process..." -- one which, in this case, EPA does not bother to perform. Instead, EPA employs a flawed substitute approach based on a set of rules-of-thumb that have no justification in economic theory. The results overstate the economic losses to the commercial fishery.

EPA first estimates that the producer surplus (benefits to fishermen) fall in the range of 40-70% of dockside revenues. This estimate is far too high. EPA completely ignores the most relevant study (Norton et al., 1983), which found producer surplus in Atlantic Coast fisheries to be closer to 15% of dockside revenues. Furthermore, given that commercial fisheries are known to pay between 40-60% of their revenues to labor alone, EPA's figures make no sense.

Having derived this inflated value, EPA then purports to estimate additional impacts up the market chain (i.e. to processors, consumers, etc.); however the numbers EPA employs are entirely arbitrary. Using unsupported rules of thumb, EPA simply multiplies the price-based valuations by a minimum of 1.8 and a maximum of 3.2 to establish its estimated range of social benefits. In addition to using invalid methods, EPA fails to explain what basis it has for concluding that there will be any significant effects up the market chain. Given the miniscule size of the reductions in available fish expected to result from Brayton Point Station's I&E (particularly relative to the size of the relevant markets), there is no reason to anticipate induced price changes, and hence there is no reason to expect additional impacts up the market chain.

If EPA were unwilling to expend the time and resources to calculate economic surplus correctly, a more sensible approach would have been simply to take 15% of the incremental revenues as the initial level of benefits. Because these will be dissipated by new entry, however, the long run profit changes will be nil. Thus, the 15% should be decreased to zero over a period of years. In keeping with the spirit of EPA's approach, this reasonable estimate could represent lower bound. For an upper bound, one could simply use the new dockside revenues themselves. This would have provided a realistic upper bound -- indeed a highly conservative upper bound -- on the economic surplus lost from I&E. The approach EPA employed is arbitrary and clearly overstates the lost value by a very significant margin.

b. EPA's use values for recreational fishing rest on questionable benefits transfer methods

For purposes of valuing impacts on recreational fishing in the Brayton Point Case Study, EPA relies upon the benefits transfer approach. A benefits transfer uses the results of previous studies of recreational benefits conducted for other fisheries in other locations as a proxy for value at the site under consideration. Although the use of benefits transfer can be justified, it is critically important to use scientifically sound studies involving circumstances closely similar to those of the case in question. EPA's approach does not do this.

Of the four studies referenced by EPA in the Brayton Point Station case study only one --Hicks et al. (1999) -- is an appropriate choice for a benefits transfer approach for Mount Hope Bay. The Hicks study is particularly relevant here for a number of reasons. First, it is recent. In addition, it provides estimates of the value of a marginal increase in catch for relevant species groups and was derived using data for the affected geographic area. <FN 40>

However, while EPA acknowledges Hicks, EPA arbitrarily decides to treat the Hicks values as simply a "lower bound," Case Study, p. F4-4, and then uses three other studies, having dubious relevance -- but producing significantly higher values -- to establish the upper bound. None of these three studies cover the correct geographic range and each of them is problematic as a source for estimating values for Mount Hope Bay. <FN 41> EPA provides no explanation for its decision to include these values, which were up to six times the Hicks et al. values, when it had, in Hicks, an appropriate, methodologically sound source of values for the relevant area. <FN 42>

c. Forage fish values are exaggerated through the use of an invalid replacement cost method

As was noted at the beginning of this section, forage fish appropriately enter into the valuation process at the biological stage: losses in forage fish are converted to equivalent losses of adult species that people actually use and values. Hence the correct way to value impacts on forage species is to include these species in a properly specified stock-recruitment model of the fisheries in question.

Unfortunately, EPA relies -- in part -- on estimates of the replacement costs of forage fish, based on the cost of obtaining the fish from a hatchery, as an estimate of their value. The use of replacement costs as a measure of value has no economic justification -- like the HRC method, discussed in Part III.B.5. above, and Part IV.B.3.c., below, it is a measure of cost and cannot serve as a proxy for the value people actually accord the fish in nature. The value obtained from this method is also virtually certain to represent a dramatic overstatement of the actual value of the forage fish. These values must be excluded in calculating the benefits of I&E reductions at Brayton Point Station.

d. Nonuse values are estimated using an unjustified 50% rule of thumb

The Brayton Point case study also includes an estimate of non-use value. Here again, EPA did not attempt to conduct an appropriate, site-specific estimation of non-use value. Instead, it simply adopted a rule-of-thumb according to which non-use values are assumed to be equal to 50 percent of recreational use values.

Use of this rule of thumb, which is based on research by Fisher and Raucher (1984), cannot be defended. To begin with, the notion that there should be any consistent relationship between use and non-use values is fundamentally flawed. In theory, the ratio between use and non-use values can be any number from zero to infinity, depending on the unique attributes of the environmental good in question. Furthermore, this type of benefits transfer approach is wholly inappropriate where, as here, the study relied upon involved circumstances having no relevance to the specific application.

Although application of this rule of thumb adds comparatively little to EPA's benefits estimate it lacks any reasoned basis. There is certainly no justification whatsoever for EPA's claim that its 50% rule-of-thumb provides "conservative" estimates (67 FR 17,193). These estimates should be disregarded.

EPA takes note of another alternative (Case Study Analysis, page A9-1l) for estimating non-use values in the absence of original empirical research, and correctly rejects that approach in its 316(b) analysis. This is an additional benefit transfer approach, in which willingness-to-pay estimates for non-use value per household are employed, drawing upon the problematic 50% rule of thumb described above, but applying it on a per-person or per-household basis. Although such an approach was used some two decades ago by an environmental advocacy organization when examining a resource for which it was reasonable to believe there was significant non-use value, <FN 43> there is simply no basis in economic theory or accepted practice for this method.

As EPA itself recognizes, two critical problems with this approach are: (1) identifying the appropriate willingness-to-pay measure per household for non-use value for the specific fishery and/or other ecological impacts of concern; and (2) identifying the appropriate number of households to which the benefit-transfer number should be applied. EPA takes note of these issues, and consequently does not employ this approach. The first problem means that this approach is subject to the same problems as EPA's general use of its 50% rule of thumb, but has even greater liability because it has no basis whatsoever in economic literature. The 50% ratio was derived from aggregate use and non-use values, not from per capita or household-level measures. More important, the second issue means that any application of this approach will necessarily involve essentially arbitrary judgments which can thereby lead to results which are easily manipulated, highly biased, and hence fundamentally misleading. EPA is to be commended for having rejected this approach in its 316(b) analysis.

e. Using habitat replacement costs as a method for valuing the benefits of the rule is wholly invalid

Using the methods discussed in (a)-(e) above, EPA estimates that the annualized economic value of the losses due to I & E at the Brayton Point Station (and thus of the benefits that would result from eliminating I&E) range from $169,899 to $308,257 -- a range that, itself, likely overstates actual loss value by a factor of two. <FN 44> Apparently not satisfied with the above numbers, EPA then goes on to conduct a further estimate using the completely invalid Habitat Replacement Cost (HRC) method of analysis. Use of this method has been discussed, and, it is hoped, thoroughly discredited in Section III.B.5., above. In short, this claimed method of benefit estimation is without foundation and is completely misleading. As discussed below, it also imparts an extraordinary bias to EPA's final benefits estimate.

Table F5-39 (Case Study Analysis, page F5-35) sums up the total habitat replacement costs that would — according to EPA — be required to replace the species affected by entrainment and impingement due to cooling water withdrawals at the Brayton Point Station. The total is over $1 billion annually <FN 45>. Perhaps recognizing the absurdity of this result, EPA then eliminates (with no clear justification) the largest single component, artificial reef construction, leaving $28 million of costs annually -- a result that is nonetheless 200 times greater than that EPA obtained using more traditional (if improperly applied) methods.

EPA then merges the HRC analysis with the earlier results in Table F6-1. In this table, EPA takes the midpoint of the standard estimates of benefits from Chapter F4's benefits transfer analysis and labels these as the minima of ranges of impingement and entrainment benefits. Then it takes the annualized HRC estimates from Chapter F5, and labels these as the maxima of ranges of impingement and entrainment benefits. This makes no sense. The minima of the ranges of "benefits" are the mid-points of EPA's benefit estimates and the maxima of the ranges are EPA's cost estimates (for what is probably the most costly possible method of achieving the rule's objectives).

Significantly, the misleading results reported by EPA in Table F6-1 in the Case Study Analysis are carried over (apparently with adjustments for year 2001 dollars) into the Proposed Rule, Exhibit 19, on page 17199 of the Federal Register. There, EPA reports annual average baseline losses (for Brayton Point Station) due to impingement of $9,000 to $890,000, and $200,000 to $28.3 million due to entrainment. By contrast, the correct range -- employing the defensible aspects of EPA's first approach -- updated to year 2001 dollars, and approximated by rounding as in EPA's reported figures in the Federal Register would be $4,000 to $5,000 for impingement, and $105,000 to $131,000 for entrainment. <FN 46>

In sum, EPA's methods of valuation, premised on erroneous biology and compounded by repeated estimation errors -- capped by the inclusion of results from the indefensible, wholly invalid, and grossly exaggerated HRC method -- provide a fantastically biased and ultimately useless basis for evaluating the true benefits obtained by reducing I&E impacts at Brayton Point Station.

4. EPA's Method for Identifying Appropriate Mitigation Measures and Selecting/Pricing Habitat Restoration is Flawed

PG&E NEG supports EPA's proposal to allow affected facilities to select among appropriate mitigation measures to offset I&E losses. Such mitigation measures could include habitat restoration/enhancement projects, fish restocking projects, and the like. However, EPA's approach to identifying, costing out, and applying such mitigation techniques in the BPS case study at chapter F-5 is flawed in numerous critical respects. These errors result in the development of a set of proposed mitigation/enhancement measures that have no rational relationship to the many of the I&E impacts they are intended to offset and that, if implemented, would be unnecessarily and excessively costly. In addition, EPA's approach betrays a fundamental misconception of the value of the services mitigation measures provide. In order for EPA's use of mitigation measures in the proposed rule to be valid, EPA must address the errors discussed below. <FN 47>

a. EPA's method fails to identify appropriate habitat restoration/enhancement techniques

Before one can select a technique which will result in a net gain to the species of concern, one must first identify what ecological factors are limiting the population size and its production (i.e., the "limiting factors"). Impaired habitat may deprive some species of a critical source of food but may deprive other species of shelter for spawning or protection from predators. Until one identifies the relevant limiting factors, one cannot make an appropriate selection among restoration/enhancement projects. So, for example, as to winter flounder, EPA's choice of a mitigation project completely misses the mark. Failing to do the preliminary analysis, EPA simply asserts that restoration of tidal wetlands will help the winter flounder population in MHB to recover.

EPA is wrong. Tidal wetlands do not provide critical habitat for either winter flounder or window pane flounder. The fact that these species can be found in salt marshes does not mean they need access to salt marshes in order to thrive or survive. The flounder population has not dwindled due to a loss of tidal wetlands, but as a result of other stresses and direct causes of mortality, including over fishing and an increase of predators. Those stresses need to be reduced in order for there to be a net gain to the species. Under these circumstances, the better approach for offsetting I&E losses of flounder would be through a restocking program, not tidal wetlands restoration.

Alternatively, there may be ways to reduce loss of flounder to predation pressures by increasing the food supply for the flounder predators. Most marine animals are opportunistic feeders. Hence, increasing the productivity and availability of other fish similar in size to flounder could adequately replace that ecological service provided by the flounder.

EPA is similarly wrong in its approach to tautog. EPA once again fails to adequately analyze the problem and, as a result, identifies the wrong solution. Artificial reefs of the type established for lobster in Narragansett Bay, no matter the cost, are not useful for increasing the productivity of tautog. Only adult tautog would use this habitat, and their numbers are more likely limited by over-fishing, rather than habitat. Eggs, larvae, and juvenile tautog, which are limited by suitable habitat, prefer shallow vegetated areas such as areas of eelgrass and seaweed (SAV) that provide both a food supply and shelter from predators.

Thus, an appropriate restoration project would be to increase production of juveniles by increasing SAV habitat in shallow water. Water quality and conditions are likely more suitable for SAV in the Sakonnet River than in MHB proper.

b. EPA failed to consider the various ecological services provided by habitat restoration/enhancement projects in its case study of BPS

In the case study, EPA attempts to identify one habitat project that specifically enhances each species entrained or impinged by the station. This approach completely fails to account for the fact that each project can enhance ecological productivity in many ways. Each project has the potential to increase the food supply for a variety of organisms while also providing safe spawning areas and/or protection from predators for many other organisms. By providing multiple benefits, each project can serve a number of ecological functions. In this way, even if a particular project does not increase the productivity of one target species, it may nonetheless serve as an adequately compensatory project for offsetting the I&E losses of that species by providing the EQUIVALENT ecological services provided by that species.

For example, age-one equivalent flounder, which serve primarily as prey for other species, and secondarily as recruits to the fishery, may not be directly aided by the creation of SAV. Yet, that SAV produces other species that serve as prey for the fish predators, as well as additional food for flounders and the food web generally. Small fish production in such a habitat should be considered suitable for offsetting the I&E losses of age-one equivalents that would otherwise be taken by predators by virtue of providing the equivalent services. Only the fraction of the age-one equivalents that would otherwise be recruited to the spawning stock and make a difference to the next generation of the species would need to be replaced one-for-one. Moreover, this would only be warranted if the population is limited by the size of the spawning stock.

In short, the purpose of habitat restoration/enhancement is to provide a net improvement in fish production and not to offset each individual one-for-one with the same species affected by I&E. EPA has failed to consider provision of ecologically equivalent services to those provided by the I&E losses.

c. EPA has failed to calculate properly the net production gained by habitat restoration/enhancement techniques. EPA improperly used species abundance as a proxy for production

In the proposed regulation at page Al 1-6 of Chapter A, EPA admits that estimating the production to be gained by a mitigation project is the appropriate method for determining the necessary size/scale of the project (which in turn determines the cost of the project). But instead of conducting those estimates, it chooses an inappropriate and inaccurate proxy, using abundance estimates corrected to age-one individuals instead of production data. To do this, EPA assumed a production-to-biomass ratio of 1:1 (biomass being the standing abundance of a species at any given time). This requires EPA to make the erroneous assumption that the abundance observed at the moment in time when a sample is collected actually represents all of the individuals that will be produced that year for the age sampled. The assumption is wrong because the abundance or production of individuals at a given moment in time does not accurately reflect their abundance over time during the year.

Short-lived species reproduce multiple times in a year or at varying times during the year. This would include stickleback and other forage fish. Likewise, the abundance of species with protracted spawning seasons is not accurately represented by its abundance at a given moment in time. Furthermore, many species use different types of habitat as they grow during their first year of life. Again, an abundance sample in a single habitat at one moment of time will not accurately reflect the annual production of age-one equivalents of such species.

Young winter flounder do not preferentially use salt marshes as nursery grounds. <FN 48> Thus, EPA’s reliance in the case study on the abundance observed in salt marshes is not indicative of their production. In fact, EPA has erroneously included abundance measurements made in open water areas in its estimation of production in tidal wetlands. Hence, EPA’s conclusions about the amount of tidal wetland restoration it believes is necessary to offset BPS / I&E losses is not at all reliable.

The proper method is to compare the production foregone attributable to I&E with the production to be gained by all of a given species’ age groups as a result of the mitigation project under consideration. Even if data are lacking in the form of production rate per unit area, estimates of production can still be made using population modeling similar to the production foregone model advocated by EPA in Chapter A-5.

Footnotes

26 In fact, the additional entrainment impacts resulting from Unit 4’s operation would not have shown up until two years later still. EPA’s analysis relies on an adult trawl index which measures 2 year olds and above, yet entrainment affects eggs and larvae. As a result, additional losses of this life stage, even if they began in 1987,would not have been observable in the adult trawl index until 1989.

27 Meng, L. and J.C. Powell, 1999. Linking juvenile fish and their habitats: an example from Narragansett Bay, Rhode Island. Estuaries 22(4): 905-9 16. A copy of this article is provided in Appendix IV to these comments.

28 Gibson, M.R. 1996. Comparison of trends in the finfish assemblage of Mt. Hope Bay and Narragansett Bay in relation to operations at the New England Power Brayton Point Station. Rhode Island Division of Fish and Wildlife. June 1995. A copy of this article is provided in Appendix V to these comments.

29 Part of the PG&E NEG's comments is based on DeAlteris, J., Trends in Abundance of Five Fish Species in Mount Hope Bay: A Response to M. Gibson's Assessment of the Effect of Brayton Point Station on Fish Stocks in Mount Hope Bay (July 1, 2001). Professor DeAlteris' report has been separately submitted to the docket. However, a copy is provided in Appendix VI to these comments.

30 Gibson, M.R. 2002. Winter flounder abundance near Brayton Point Station, Mt. Hope Bay revisited: separating local from regional impacts using long term abundance data. Rhode Island Division of Fish and Wildlife. March 2002. A copy of this article is provided in Appendix VII to these comments

31 One of the key problems in determining whether the decline in winter flounder abundance in UMHB is different from the decline in Narragansett Bay is that no single sampling program samples all of Narragansett Bay's waters (which includes Mount Hope Bay) simultaneously. However, the program covering the largest geographic area with a single sampling gear, which includes Narragansett Bay and LMHB, shows no difference in the rate of decline of winter flounder over any time period examined in the two areas.

32 Trends in fish abundance in the coastal areas of Rhode Island Sound and Block Island Sound cannot be used as a baseline for comparison with MHB because these areas contain different habitat types and include fish spawned in other areas of New England and elsewhere along the Atlantic coast.

33 Gibson, M.R. 2002. Ex-Vessel Fishery Production Foregoing in Mt. Hope Bay as a Result of Operations at USGEN of New England's Brayton Point Station, Rhode Island Division of Fish and Wildlife. March 2002 A copy of this article is contained in Appendix VIII to these comments.

34 Letter, with report attached, from Robert E. Dehart, Jr. to Angelo S. Liberti (RIDEM) dated August 26, 1997, re: The Narragansett Electric Company, Manchester Street Station, RIPDES Permit No. RI0000434 — Post-Impingement Survival Study Report. A copy of these documents are provided in Appendix X to these comments.

35 EPA states in the Brayton Point Case Study (Page F 1-2) that in order to "evaluate the potential benefits of the proposed rule, EPA estimated expected I&E at Brayton Point under current (emphasis added) operations based on an analysis of I&E rates before the accelerated fish population declines that followed the 1984 conversion of Unit 4, as discussed in Chapter F3." Specifically, EPA combined current operations with a time series of I&E data for Brayton Point Station collected between 1974 and 1983. EPA points to their conclusions (page F3-1 of the case study) that fish populations in Mount Hope Bay are currently depressed well below historical levels as justification for the comparison (i.e. current operations to fish populations from several decades ago).

36 This Part of the comments is based on Englert, T., Comments on the 316(b) Rule (critique of EPA Production Foregone Model), August 5, 2002. Englert's comments have been separately submitted to EPA's docket. However, a copy is provided in Appendix XII of these comments.

37 This Part of the comments is based on Stavins, R., Comments on the 316(b) Rule (critique of EPA's economic analysis), July 19, 2002. Professor Stavins' comments have been separately submitted to the docket. A copy is provided in Appendix XIII to these comments.

38 For example, because fish eggs and fish larvae are not actually used, the loss of eggs and larvae must be converted into equivalent lost adults of an age that may be caught by commercial or recreational fishermen. Similarly, losses of forage species are significant only to the extent that their loss causes reductions in species that are fished.

39 One further cause for concern with EPA's economic analysis is that it is not clear that EPA appropriately took account of the role of time. Before a technological improvement to an intake can begin to have beneficial effects, it must be constructed and go on-line. Furthermore, it may take time for the effects of I&E reductions to be felt in the population. From our review of the case study, it is not clear that EPA recognized the existence of such delays, and discounted the benefit stream appropriately.

40 Hicks et. al. considered data for Atlantic states from Virginia to Maine.

41 The other studies used are: Agnello (1989), McConnell and Strand (1994) and Tudor (2002). The Agnello study, using the travel cost approach, relies on an early (about 1981) and inaccurate database and uses combined data for all states from Florida to New York. Although EPA apparently believes that the McConnell and Strand values were based on a RUM

model, they were in fact derived from a contingent valuation experiment. McConnell and Strand calculated marginal values for groups of species for each state between from Florida to New York. Significantly, these benefits are based on the square root of an "expected" catch, an approach that does not correspond directly to the historic catch rate, making them suspect for EPA's intended purpose. The Tudor study reports per-trip values for Delaware Bay sites. It is unlikely that the Tudor study would be useful to EPA because the results suggest a negative value for improvements in bottomfish (Section 316(b) Case Studies, Table B5-5).

42 if EPA used the appropriate values per fish, it will still have to correct errors in their computations. For example, EPA mistakenly values changes in recreational catch of tautog using the small game values and of weakfish using the bottom fish values. Hicks et al. properly group tautog with bottom fish and weakfish with small game. EPA also alludes to using the Tudor et al. study in subsequent analysis. If they use the existing model (Section 316(b) Case Studies, table B5-5), then the improvements in bottom fish recreational catch will have a negative value.

43 The resource in question was California's Tuolumne River, the major body of water flowing through Yosemite National Park. See: Stavins, Robert N. The Tuolumne River: Preservation or Development? Berkeley, California: Environmental Defense Fund, October 1983. A copy of this article is provided at Appendix XVI to these comments.

44 If the most questionable elements are removed from EPA's calculations, the range becomes $95,731 to $112,565, for a midpoint value that is less than half of the EPA midpoint. These numbers reflect elimination of the following questionable elements from EPA's calculations: EPA's 50%-rule-of-thumb non-use value estimates; the multiplier for extrapolating economic surplus from dockside revenues; and EPA's use of hatchery costs and foregone production ratios for estimates of forage species value in lieu of direct estimates of these values as part of an overall stock-recruitment model (which would feed directly into commercial and recreational valuations). If EPA's production foregone estimates of forage fish values are included, then the range would be $99,204 to $117,469. If EPA's 50% rule-of-thumb for non-use value are included, then the range becomes $107,579 to $133,371.

45 The average value of a tautog based on artificial reef costs is approximately $32,000 per age 1 equivalent.

46 In Table F6-4, EPA provides what it characterizes as a summary of omissions, biases, and uncertainties. Incredibly, EPA concludes that every simplifying assumption and omission has led to understatement of benefits (or to irresolvable uncertainty). This is not at all accurate. To the contrary, the upward biases involved in EPA's reported estimates of the annual economic values of losses caused by impingement and entrainment at Brayton Point Station (and thus the benefits of reducing those losses) are massive.

47 Part of the comments relies on French McKay, D., Comments on the Section 316(b) Rule (critique of EPA's Habitat Replacement Cost method), August 5, 2002. Professor French McKay's comments have been separately submitted to the EPA rulemaking docket. A copy is provided in Appendix XVII to these comments.

48 Meng, L. and J.C. Powell, 1999. Linking juvenile fish and their habitats: an example from Narragansett Bay, Rhode Island, Estuaries 22(4): 905-916.

EPA Response

EPA disputes the commenter's assertion that its analysis of average annual I&E at the Brayton Point Station (BPS) contains "numerous faulty assumptions, erroneous analytical methods, and flawed calculations."

First, regarding the decline of winter flounder and other finfishes in Mt. Hope Bay, the Agency notes that an evaluation of population trends was not a part of its benefits analysis for the 316b Phase 2 rule. However, EPA has reviewed materials prepared by EPA Region 1 on this issue. The Agency concurs with Region 1's conclusion that Mark Gibson's analyses demonstrate that the decline of winter flounder in Mt. Hope Bay is statistically greater than the decline in Narragansett Bay. Additional discussion of this issue is provided in EPA Region 1's 2002 NPDES permit determinations for BPS and the related Responses to Comments document (available at http://www.epa.gov/region1/braytonpoint/index.html)

Regarding entrainment survival, please see EPA's response to Comment 316bEFR.306.506 and Chapter A7 of Part A of the Regional Analysis Document (DCN #6-0003).

Regarding impingement, please see response to comment 316bEFR.029.105.

Regarding the years of data used by EPA to estimate average annual I&E at BPS, please see response to Comment 316bEFR.005.037.

Regarding EPA's production foregone calculations, please see response to Comment 316bEFR.305.003.

Regarding EPA's benefits analysis, please see response to Comment 316bEFR.005.029 on commercial fishing benefits, response to Comment 316bEFR.075.504 on recreational fishing benefits transfer, response to Comments 316bEFR.005.035 and Comment 316bEFR.029.113 on replacement costs and the HRC method, and response to Comment 316bEFR.005.034 on the 50% rule of thumb, response. For discussion of ecosystem services and the HRC method, please see the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

Comment ID 316bEFR.060.062

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Application Requirements for Facilities Near Renewal

EPA's proposed rule would create extensive new application requirements for Section 316(b). Meeting these requirements could prove onerous for facilities that are close to their permit renewal date. This is especially important given the amount of time that will be required to produce the studies minimally necessary to demonstrate BTA under the new rule. Even where a facility already has performed a § 316(b) demonstration, where the data are still representative of current conditions in the waterbody, and where no additional construction or modification of the intake structure or installation of screens will be required, a permittee still might require six months to analyze existing data to demonstrate compliance with the performance standards.

UWAG has already commented at length on this question and PG&E NEG does not believe the issue merits extended discussion here. However, PG&E NEG does concur with UWAG that, to the extent that EPA's final rule includes some or all of these new application requirements, EPA must be flexible in making sure that facilities close to their renewal date are not faced with an impossible burden in trying to meet the new procedural requirements.

EPA Response

EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements and speeding permitting. See response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.060.063

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Effective Date of Regulation's Substantive Provisions

In the proposed rule, EPA specifically states that the proposed rule "is not intended as guidance for determining the best technology available" at existing sources currently undergoing renewal of their permits. 67 FR at 17,124 col. 3. To the contrary, EPA directs permitting authorities to continue make BTA determinations on a "best professional judgment" ("BPJ") basis until the rule is final and acknowledges that those determinations "may be more or less stringent than today's proposal." Id. Given the significant changes that EPA is proposing to make in its implementation of Section 316(b), PG&E NEG questions does not believe this blanket approach is appropriate or permissible.

As courts have realized, unfairness can result when an agency, aware of imminent changes to its implementation of a statute that may be beneficial to the regulated industry, nonetheless continues to issue permits based solely on the older, more stringent standard. In Natural Resources Defense Counsel v. EPA, 863 F.2d 1420 9th Cir. 1988), for example, the court concluded that EPA correctly declined to make a "best professional judgment" determination of the best available technology for produced when it knew that a national standard would soon be issued that would likely be less stringent. Id. at 1427. Had EPA not done so, the court found, it would have created a disparity between the present applicants and those in the future that "would lack any apparent scientific or equitable basis." Id. The court found the case for delay to be particularly strong "[g]iven the large commitment of resources that would be necessary" to comply with the BPJ standard and the fact that the CWA's anti-backsliding provisions would likely preclude the facilities in question from seeking relief once the national rule became final. Id See also Puerto Rico Sun Oil Co. v. USEPA, 8 F.3d 73, 78 (1st Cir. 1993) (EPA could not rationally apply Puerto Rico's existing mixing zone standard in the face of clear evidence that Puerto Rico was in the process of repudiating the standard and adopting a different one).

A similar situation could occur here. Although the proposed performance standards may in some cases suggest a higher level of I&E reductions than have been required in BPJ permits under Section 316(b), they also suggest a greater flexibility in meeting those standards, including the opportunity to propose voluntary mitigation measures. If a facility currently in renewal were denied the benefits of these flexibility provisions, it could conceivably be forced to embark on costly technology-based measures, despite the fact that EPA has already taken the position that those measures are only one option for complying with Section 316(b).

For this reason, PG&E NEG believes that, in order to present this type of unfairness, each facility should have the option of complying with either the existing site-specific process or the new rule.

EPA Response

See response to comment 316bEFR.060.006.

Comment ID 316bEFR.060.064

Author Name Mark V. Carney
Organization PG & E National Energy Group

Subject Matter Code 21.03
Monitoring requirements

Compliance Monitoring

If EPA retains its numeric performance standard option, there will need to be a period of time for monitoring whether the existing configuration or the new technology is meeting the 80-95% and 60-90% reduction criteria. EPA proposes at least a two-year period of verification monitoring. PG&E NEG believes a period of two years as a minimum is needlessly inflexible. At some facilities, less than two years of monitoring will be required. This would be the case, for example, if a plant had collected copious data already and if no change to the plant was required by the new rule. On the other hand, two to five years of monitoring might be required at some estuarine sites where fish populations vary widely from year to year.

As recommended by UWAG, after a verification monitoring period (up to two years for most plants, and possibly more for plants with highly variable aquatic communities), the data should be analyzed to determine whether the newly installed technology is indeed achieving 80-95% reduction in impingement mortality and 60-90% reduction in entrainment. As long as the data showed performance within these ranges, the technology should be deemed to comply with the rule. For example, if the entrainment reduction technology was predicted to reduce entrainment by 85% but in fact achieved only 80%, that should be sufficient.

Assuming the data showed performance within the ranges, then no further biological monitoring should be required. Instead, the permittee should be required thereafter simply to monitor and document that it continued to operate and maintain the technology. If, on the other hand, the initial monitoring showed that the technology was not achieving reductions with the performance standards, on the other hand, then there seems to be no fair alternative but to provide for a period of additional study to determine what went wrong and what should be done to fix it, including the replacement of the technology with something different if necessary (and if the cost is not “significantly greater” than the benefit).

Most importantly, EPA should clarify that, if the agreed-upon technology is implemented and properly operated, failure to meet the performance standards by itself would not make the facility potentially liable to non-compliance fines. Given the difficulty of predicting precisely how a technology will perform, any other result would be patently unfair.

EPA Response

Please see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.060.101

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Production foregone or biomass lost due to impingement and entrainment (I&E) is a critical component of USEPA's analysis and plays an important role in USEPA's justification of the proposed 316(b) rule for existing facilities. One of the case studies used by USEPA is the Brayton Point Station. PG&E NEG and its consultants recently completed their own detailed analysis of production lost due to I&E at the Brayton Point Station in support of a permit application. USEPA states they got much of the biological information they used to compute production lost from the documents prepared and submitted by PG&E NEG.

PG&E NEG and its consultants who prepared the documents relied on by USEPA carefiully reviewed the production lost calculations performed by USEPA for the Brayton Point Station Case Study. Based on correspondence with USEPA and attempts to reconstruct USEPA's results, PG&E NEG concludes that USEPA made two major errors in their calculations of production lost. The errors by USEPA resulted in production lost estimates being overestimated for 14 of the sixteen fish species analyzed. For several species, USEPA's estimates of production lost were hundreds of time higher than the correct values.

Production lost is commonly used to quantify the losses due to I&E. Production is addition of biomass to the population. Biomass at any given time is the sum of the weights of all individuals alive at that time. Because the weights of all individuals at a given time are often not known, biomass is often computed as the number alive times the mean weight of an individual. Production is the rate at which biomass is added to a population, and is the net result of individuals dieing over time while surviving individuals increase their body weight. Production forgone or lost is the amount of biomass that would have been added to the population if the individuals had not been entrained or impinged. These individuals would have grown in body weight, while eventually dieing from other causes. There is a well-known formula for taking the numbers of individuals entrained or impinged of a given age class or life stage, and computing the future production of these individuals over their life time. Unfortunately, USEPA incorrectly implemented this formula.

The production lost formula uses information on the initial biomass of individuals and on growth and mortality rates. USEPA made two mistakes in their implementation of the production lost formula. The first mistake arose because USEPA used mean weights of individuals at the midpoint of life stages to compute the growth rate used in the formula, and used midpoint weights to compute initial biomass. The correct use of the formulas compute growth rate from the initial and final weights of the life stage, and use initial weight of the life stage to compute initial biomass. USEPA's implementation of the production lost formula is biologically wrong and mathematically incorrect. The second mistake made by USEPA was their estimates of mean weight at the midpoint of early life stages were too heavy, sometimes thousands of times too heavy, for many species.

The combined effect of these two errors by USEPA is frequent overestimation, sometimes by hundreds of times, of the production lost due to I&E for the Brayton Point Case Study. USEPA must reevaluate its production lost calculations and mean weights, replace their existing estimates of production lost with correct values, and determine how the revised estimates affect the 316(b) rule.

EPA Response

Please see EPA's response to Comment 316bEFR.305.003 regarding production foregone.

Comment ID 316bEFR.060.102

Author Name Mark V. Carney

Organization PG & E National Energy Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Attachment 1: (Review of EPA's Application of Production Foregone Model) <FN1>

Introduction

In support of its new Section 316(b) regulations, USEPA developed a series of case studies. As an example of a power plant located on an estuarine system, Part F of the 'Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule" locument addresses the Brayton Point Station (BPS), located on Mount Hope Bay, Massachusetts. The owner of BPS, PG&E NEG, and its consultants have recently completed their own Section 316(b) assessment of this facility and are thoroughly familiar with the methods and data used by USEPA. Based on this familiarity, we note ;everal problems with the USEPA assessment, in particular with the findings of the production Foregone Model application (J)ages A5-6 through A5-7 and F4-8).

The Production Foregone Model (PFM) is a procedure for quantifying the amount of)roduction that would have resulted had individuals not been lost through entrainment md impingement. Production is defined as the total addition of biomass that would occur luring a specified period of time, and is based on individuals increasing their body weight via growth rate and dieing through time. Mathematically, production (P) is calculated as:

[see hard copy for equation]

The instantaneous growth rate (G) is defined as,

[see hard copy for equations]

An estimate of the mean biomass, B, may be obtained in several different ways; in principle it is the total weight of the population divided by the number of individuals alive at the time. As both weight and number of individuals change over time, both functions need to be integrated with respect to time. Ricker (1973), among other authors, gives the following:

[see hard copy for equation]

The instantaneous mortality rate (Z) is defined as,

[see hard copy for equations]

Because G and Z change over the life of a fish, accurate estimation of P requires that the calculations be carried out separately for a particular age class or size class. This can be noted by adding a subscript to Equation 1 to denote a specific age or size class,

[see hard copy for equation]

Further, as Rago (1984) notes, we are interested in the production foregone by the entrainment and impingement of fish. In other words, given that an entrained or impinged fish is of agej (or life stagej), what would that fish have produced over its remaining life span? To address this, Equation 7 may be recast as the sum of production from the current age or life stage to the final age or life stage,

[see hard copy for equation]

Our examination of the USEPA analysis suggests two serious flaws in their approach to estimating production foregone. First, we believe that USEPA incorrectly computed the instantaneous growth rate (G) and mean biomass (B) used in Equation 1. Second, USEPA used biologically unrealistic values for early life stage weights. Each of these points is addressed in detail below.

Incorrect Application of Average Weight

USEPA, after Rago (1984), used the following formula for computing production losses:

[see hard copy for equation]

Note that NiWi (the average biomass) is substituted for B0 (the initial biomass) of Equation 4. For entrainment and impingement calculations, Wi and Ni are computed recursively,

[see hard copy for equations]

Our attempts to reconstruct USEPA's production foregone estimates using Equation 9 were unsuccessful. In response to our written comments, we were provided with communications (ca. 6/17/02) which indicated that USEPA had used the average weight between successive life stages to obtain the instantaneous growth rate, i.e.,

[see hard copy for equation]

and where Wi = (wi + wi+1)/2 and Wi+1 = (wi+1 + wi+2)/2. The average weights wi, wi+1, and wi+2 are the start weights of life stages i, i+1, and i+2. Inspections of their results also suggest that Wi was also used to compute initial biomass. Thus, USEPA used Wi in two places in Equation 9: to compute G and in NiWi to estimate B. For example, if a larva was entrained, USEPA computed the average weight of the larva (Wi) as the average of the predicted mean weight at the beginning of the larval stage and the predicted mean weight at the end of the larval life stage. To obtain the average weight for the subsequent life stage, i.e., Wi+1, the average of the predicted mean weight at the beginning of the juvenile stage (= weight at end of larval stage) and the predicted mean weight at the end of the juvenile life stage were averaged. The resulting value of Wi was inserted into Equation 9 and the values of Wi and Wi+1 were used to compute G via Equation 12. This is incorrect. The correct calculation would use the starting and ending weights of the larval stage to compute G, and the starting weight of the larval stage as Wi. USEPA's erroneous use of mean weights, in some cases, greatly inflated the resulting values of production lost. Average biomass based on the weight of an individual observed at the midpoint of a life stage will invariably be greater than the weight at the inception of the life stage, and instantaneous growth rate (G) based on the midpoint weights of a life stage and the next life stage is biologically incorrect.

If this is what was actually used, then there is potential for serious error in the production loss estimates. Depending on the relative magnitude of the instantaneous growth and mortality rates, both to each other and to the preceding life stage, the resulting estimates may be substantially over- or under-estimated. (It should be noted that, because we could not reproduce USEPA's results even after their explanation, we cannot say with any certainty how they actually did the calculations. We have requested further clarification, but to date have not received any response to our request.)

Biologically Unrealistic Weights

USEPA made a series of unrealistic assumptions for the weights of individuals in the early life stages that are then used in the Production Foregone Model and USEPA failed to make use of available scientific literature. For almost all early life stages, USEPA overestimated, sometimes grossly, the average weight of the individuals at the midpoint of life stages. This, in turn, led to highly inflated estimates of lost production.

Production estimates are highly sensitive to the average weight of an individual selected for each life stage. Yet, for eggs and early larval stages these values are not readily available in a form directly usable in the PFM. Scientific studies rarely report the average wet-weight of any egg or larvae. Such weights would be difficult to measure accurately due to the overwhelming contribution of moisture. Weights for these small organisms are generally reported as dry-weight, i.e., the organisms have been dried to remove all moisture. These weights are no longer comparable to the wet-weights reported for larger organisms. It is not entirely clear how USEPA overcame this lack of comparable wetweight data. Tables F1-1 through F1 -18 of the Case Study provides wet-weights and cites the PG&E NEG's Brayton Point Station 316(b) Demonstration as the source, yet PG&E NEG did not provide wet-weights in their Demonstration.

There are several methods, however, that can yield reasonable estimates of early life stage wet-weights, particularly for eggs. These include (1) volume of the organism coupled with the assumption that the biological material has nearly the same weight as water, (2) that dry-weight is a constant proportion of the wet-weight, or (3) compute the average wet-weight by dividing the ovary wet-weight by the total number of eggs present. Additional computational details for the three methods follow.

Method #1
For eggs, volume (V) may be calculated as V = pi di d2 d3 /6 where d1 = major axis, d2 = largest minor axis, and d3 = smallest minor axis. For spherical eggs this reduces to V = pid3/6 where d = diameter. The volume of small fish larvae may similarly be computed by multiplication of length x depth x width. The volume may be expressed as weight assuming that 1 cm3 = 1 gram.

Method #2
Wet weight can be calculated from dry weight based on the fact that dry weight is approximately 20% of the wet-weight (McGurk 1986). Our analysis (see below) is in close agreement with this figure, yielding 19.3%.

Method #3
By dividing the ovary wet weight by the total number of eggs, the average egg wet weight may be obtained. The information necessary for this method is often available from studies of fish fecundity.

Some allowance should be made for the weight of the ovary tissues other than eggs. In the following example, we have assumed 10% for this weight.

An example of all three of these methods is presented in Table 1.

Table 1: Winter Flounder Egg Weight
[see hard copy for table]

Using the average weight from all three methods, the expected weight of a single winter flounder egg is 0.000244 grams or 0.000000538 lbs. USEPA's reported value in Table F1-18 was 0.0022 ibs, or over 4,000 times heavier than the actual weight!

As newly hatched larvae do not feed exogenously, but rely on yolk reserves, it is expected that the initial yolk-sac larvae weight will be similar to that of the egg stage. As the yolk-sac is absorbed, larval weight may actually decrease somewhat. For winter flounder, data from Buckley (1982) illustrate this point (Table 2).

Table 2: Winter Flounder Yolk-Sac Larvae Weight
[see hare copy for table]

Buckley et al. (1991b) reported that the initial average weight of laboratory reared winter flounder yolk-sac larvae from upper Narragansett Bay was 29.7 microg, while those from lower Narragansett Bay averaged 25.6 microg. Assuming that dry weight is 20% of wet weight, corresponding wet weights would be 0.000160 g and 0.000128 g, (or 3.53x10^-7 and 2.82x10^-7 lbs) respectively. USEPA assumed an average weight of 0.00441 lbs for Stage 1 (= yolk-sac larvae). This is approximately 12,500 to 15,600 times heavier than the actual weight.

Weight at length relationships for post yolk-sac winter flounder larvae are available from several sources, including Laurence (1979), Beyer and Laurence (1980), and Rose et al. (1996). Using the relationship,

[see hard copy for equation]

from Lawrence (1979), the expected weights for post yolk-sac larvae (ca. 3.1 to 8.2 mm) may be calculated and compared to the values assumed by USEPA (Table 3).

Table 3: Winter Flounder Post Yolk-Sac Larvae Weight
[see hard copy for table]

The comparison in Table 3 demonstrates that USEPA grossly overestimated the weights for all post yolk-sac larvae stages of winter flounder. The largest discrepancy is for the Stage 2 larvae, surpassing the discrepancy for the yolk-sac larvae (Stage 1).

By re-arrangement of Rose et al.'s Equation 9, the expected weight for juvenile winter flounder (ca. 9 to 137 mm) may be obtained:

[see hard copy for equation]

This equation yields an expected weight for an averaged size juvenile (ca. 73 mm) of 0.942 g or 0.00208 lbs. The USEPA value of 0.033 lbs is 15.8 times greater than the actual value.

Discrepancies in early life stage weights are not restricted to winter flounder, but appear in nearly all species. Below (Table 4) are several examples of this problem in other pecies (winter flounder is sometimes included for comparisons).

Table 4: Comparison of Expected Egg Weight with Values Assumed By USEPA
[see hard copy for table]

Of the eighteen species modeled by USEPA, egg weights for fifteen (83%) were overestimated. In some cases, such as the previously examined winter flounder and tautog, this overestimation was by several orders of magnitude. Only butterfish, silver hake, and striped killifish egg weights were underestimated.

Larval stages were also overestimated. For example, the expected weight for tautog larvae is shown in Table 5.

Table 5: Tautog Larvae Weight
[see hard copy for table]

Assuming an average size of approximately 15 mm (size range is 2.2 mm at hatch to 30 mm TL at end of PYSL), the average weight is 0.000233 lbs (the average of 10 mm and 20 mm weights in Table 5). The weight used by USEPA, 0.022 lbs, is almost 95 times heavier that the actual weight.

A similar analysis may be conducted for scup larvae (Table 6):

Table 6: Scup Larvae Weight
[see hard copy for table]

Scup hatch at about 2 mm in length and become juveniles at about 20 mm in length. Assuming an average size of approximately 11 mm for larvae, Laurence's equation predicts an average weight of 0.0163 g or 0.000036 lbs. The assumed USEPA weight of 0.0011 lbs for scup larvae is 30 times heavier. (Even assuming the weight for the 20 mm individual, the USEPA weight is over 3 times heavier.)

USEPA needs to re-evaluate its Production Foregone estimates with biologically realistic measures of mean weights of individuals.

Combined Influence of Errors

The two errors by USEPA combine to yield an overestimate of the production losses resulting from BPS. To demonstrate the magnitude of this overestimation, we have computed production losses using the correct weights in the production formula and biologically realistic values for weights at midpoints of life stages. As can be seen in Table 7, USEPA overstated total production losses by at least 300 times!

For 14 of the sixteen species, the incorrect calculations used by USEPA resulted in overestimation of the production lost. For several species, USEPA's estimate of production lost was hundreds of times higher than the production lost based on realistic weights and the correct use of the production formula.

Table 7: Comparison of USEPA and LMS 1974-83 Average Production Foregone Estimates for Brayton Point Station
[see hard copy for table]

USEPA must reevaluate its calculations of production lost and its estimates of mean weights, replace their existing estimates of production lost witlkcorrect values, and determine how the revised estimates affect the 316(b) rule.

Footnotes

1 The following analysis…

EPA Response

Please see EPA's response to Comment 316bEFR.305.003 on production foregone.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jonathan Lewis

On Behalf Of:

Clean Air Task Force

Author ID Number:

316bEFR.061

Comment ID 316bEFR.061.001

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

In particular, these comments focus on the EPA's stated concern <FN 6> that the implementation of a more protective standard for cooling water intake structures at existing power plants would adversely affect national energy reliability. In the proposed rule, the EPA relies on a forecast that grossly miscalculates the rate of electric generating capacity development in the United States over the next several years. The amount of generating capacity that has either recently come online or is under active development exceeds even the long-term estimates relied upon by the EPA in this rulemaking. The Agency's concerns about the effect a protective Phase II CWIS rule would have on energy reliability are therefore misplaced, as they are founded on completely obsolete projections.

Footnotes

6 See, e.g., 67 Fed. Reg. 17121, 17188 (April 9, 2002).

EPA Response

EPA agrees that more recent capacity developments exceed the estimates embedded in the IPM. Please refer to section VII of the preamble for information regarding EPA's decision to reject cooling towers as the basis for today's rule.

Comment ID 316bEFR.061.002

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code NEW

Comment on new (Phase I) facility rule

Under an agreement reached by the parties in the ongoing case of Riverkeeper, Inc. v. Whitman, <FN 10> the rulemaking process under Section 316(b) was divided into three phases. <FN 11> Phase I of the rulemaking, which pertained to CWIS at new power plants and industrial, facilities, was proposed in August 2000 <FN 12> and finalized in December 200l. <FN 13> As mentioned above, the Clean Air Task Force and ten other organizations submitted comments on the Phase I proposed rule. The EPA's Phase I proposal would have required closed-cycle recirculating cooling systems only at the most ecologically sensitive waterbodies and would have allowed once-through cooling everywhere else. We urged the Agency to require all new facilities to install dry-cooling or its functional equivalent and wrote that the proposed regulation failed to comport with the Clean Water Act's requirement that cooling water intake structures employ the best cooling technology available for minimizing adverse environmental impact. In the final version of the Phase I rule, the EPA adopted uniform protections for all types of waterbodies, but failed to establish dry cooling as the Best Technology Available (BTA) as required by Section 316(b) of the Clean Water Act.

Footnotes

10 No. 93-Civ.0314 (AGS) (S.D.N.Y.)

11 Under Phase I, the EPA is required to issue a final rule governing new facilities that employ a cooling water intake structure by November 9, 2001. Under Phase II, the EPA must propose regulations for existing utilities and non-utility power producers whose intake capacity levels exceed a given minimum threshold by February 28, 2002; final regulations are due August 28, 2003. Finally, under Phase III, a proposed rule governing any remaining unregulated facilities that employ a cooling water intake structure is due June 15, 2003, and a final rule is due December 15, 2004.

12 65 Fed. Reg. 49060 (August 10, 2000) (notice of proposed rulemaking for Phase I (new facilities)).

13 66 Fed. Reg. 65255 (December 18, 2001) (final rule for Phase I (new facilities)).

EPA Response

EPA appreciates the commenter's concerns regarding the Phase I rule. The rule was finalized on November 9, 2001 and is no longer open for public comment. Please refer to the Phase I docket (W-00-03) and the Phase I Comment Response Document (DCN 3-0091) for further information.

Comment ID 316bEFR.061.003

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The Phase II CWIS Rule: Existing Power Plants

The EPA proposed Phase II of the CWIS rule on April 9, 2002. <FN 14> The Phase II rule applies to existing facilities that (a) both generate and transmit electric power or that generate electric power for sale to another entity for transmission; (b) use one or more cooling water intake structures to withdraw water from the waters of the United States; (c) require a Clean Water Act NPDES permit; and (d) withdraw at least 50 MGD and use at least 25% of water withdrawn solely for cooling purposes. <FN 15> Eligible facilities are required to comply with performance standards established by EPA as the best technology available for minimizing adverse environmental impact. In its proposed rule, the Agency offers three alternative methods by which an eligible facility can demonstrate compliance with those standards: <FN 16>

-A facility may demonstrate that its existing design and construction technologies, operational measures, and/or restoration measures already meet the EPA's proposed minimum performance standards. <FN 17>

-A facility may select design and construction technology, operational measures, restoration measures, or some combination thereof, and then demonstrate that the selected approach would meet the performance requirements proposed by the EPA.

-A facility may calculate the cost of complying with the presumptive standard and compare those costs either to the EPA's estimated compliance costs or to a site-specific determination of the benefits of meeting the presumptive standard. If the facility's costs are significantly greater than the EPA' s estimated cost or the site-specific benefits, the facility would become subject to a site-specific BTA determination.

An existing power plant would be allowed to use any of these three approaches to demonstrate compliance with the proposed rule.

Footnotes

14 67 Fed. Reg. 17121.

15 Id. at 17128.

16 Id. at 17143.

17 To comply with the performance standards proposed by the EPA, a facility must either demonstrate that its intake capacity is commensurate with the use of a closed-cycle cooling system or seek to comply with limits on the net impingement mortality and entrainment caused by the facility. Id. at 17140. The second choice, which is considerably less stringent, represents the actual minimum performance standard.

EPA Response

Please refer to the response to comment 316bEFR.038.007.

Comment ID 316bEFR.061.004

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 8.0

Waterbody Type

Under the EPA's Phase II proposal, the performance standard required of eligible facilities will differ according to the type of waterbody from which a given facility withdraws its cooling water. Oceans, estuaries, tidal rivers and the Great Lakes will benefit from stricter limits on impingement and entrainment than will freshwater rivers, streams, and other lakes. In the Phase I rule, the EPA proposed a similar scheme that would have regulated facilities differently depending on the type of the source waterbody. In our comments on the Phase I proposal, we joined other environmental organizations in criticizing this approach, recognizing that all - waterbodies have ecological value and support potentially vulnerable ecosystems. <FN 18> EPA wisely abandoned this method in its final Phase I rule and we urge the Agency to do the same here.

Footnotes

18 Clean Air Task Force, et al., "Phase I Comments," supra note 5, at 6-7.

EPA Response

EPA recognizes that all waterbodies have some ecological value, but disagrees that all waterbody types merit the same level of protection. Today's rule implements performance standards that would apply different requirements for facilities located upon different waterbody types. EPA considers location to be an important factor in addressing adverse environmental impact and one expressly included in the language of section 316(b). When cooling water is withdrawn from sensitive biological areas, there is a heightened potential for adverse environmental impact, since these areas typically have higher concentrations of impingeable and entrainable aquatic organisms. Therefore, the final rule includes performance requirements that vary, in part, by waterbody type. For example, estuaries and tidal rivers have a higher potential for adverse impact because they contain essential habitat and nursery areas for a majority of commercial and recreational species of fish and shellfish. Therefore, these areas warrant a higher level of control that includes both impingement and entrainment controls.

Comment ID 316bEFR.061.005

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Moreover, in the Phase II rule, the EPA has failed to propose performance and technology standards that truly reflect the best cooling technology available for existing power plants. For all of these facilities, <FN 19> BTA must be the functional equivalent of a closed-cycle recirculated cooling system. Closed-cycle cooling systems offer substantial protection against adverse environmental impact and can be installed at existing power plants at a reasonable cost. If the EPA adopts a technology-based BTA standard, it must designate closed-cycle cooling as that standard. Likewise, if the Agency defines BTA according to a performance standard, the resulting standard must require power plants to reduce their cooling water intake capacity to a level commensurate with closed-cycle cooling.

Footnotes

19 We believe that the EPA should develop a single BTA standard, to be applied uniformly to all eligible existing power plants. Existing facilities that are eligible for regulation under Phase II are described above and at 67 Fed. Reg. at 17127-128. The EPA defines an "existing" facility as "any facility that commenced construction before January 17, 2002 and (1) any modification of such a facility; (2) any addition of a unit at such a facility for purposes of the same industrial operation; (3) any addition of a unit at such a facility for purposes of a different industrial operation, if the additional unit uses an existing cooling water intake structure and the design capacity of intake structure is not increased; or (4) any facility constructed in place of such a facility if the newly constructed facility uses an existing cooling water intake structure whose design intake flow is not increased to accommodate the intake of additional cooling water." Id. at 17128.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.061.006

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 17.04

Option: Closed-cycle for oceans, tidal rivers or estuaries

In the proposed rule, the Agency discusses — but ultimately rejects — two alternative BTA standards. The first alternative standard, referred to in the preamble as the “waterbody/capacity based option,” <FN 20> would require facilities that withdraw water from an estuary, tidal river, or ocean, and that meet specified intake flow requirements, to reduce their intake capacity to a level that can be attained by a closed-cycle cooling system. <FN 21> Although the “waterbody/capacity based option” would represent a significant improvement over the proposed rule, we are concerned about its failure to protect all waterbodies.

Footnotes

20See, e.g., Id. at 17185.

21 Id.

EPA Response

EPA believes that today’s final rule represents the best option for minimizing adverse environmental impacts brought by cooling water intake structures (see final rule preamble section VI. Basis for the Final Regulation for more details). For EPA’s rationale behind rejecting the waterbody/capacity based option, please refer to the final rule preamble.

Comment ID 316bEFR.061.007

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Author Name Jonathan Lewis

Organization Clean Air Task Force

The second alternative BTA standard considered by the EPA would require all eligible Phase II existing facilities to reduce intake capacity commensurate with the use of closed-cycle, recirculating cooling systems. <FN 22> We urge the EPA to adopt this standard, also described as the “all closed-cycle option,” <FN 23> when it finalizes the Phase II rule. <FN 24>

Footnotes

22 Id. at 17154.

23 Id. at 17185.

24 There are significant benefits associated with closed-cycle cooling. These benefits are more fully discussed in comments on the Phase II CWIS proposal developed by Riverkeeper, Inc. and submitted to EPA docket on August 7, 2002.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.061.008

Author Name Jonathan Lewis
Organization Clean Air Task Force

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

According to the Agency's own calculations, a rule which requires closed-cycle cooling at all existing power plants would have only minor economic consequences, <FN 25> and when inspected closely, it becomes clear that the EPA's analysis of the market-level impacts on energy production overstates the matter. The Agency's analysis overestimates the effect that the few plant closures that would be attributable to a closed-cycle rule would have on energy reliability because it does not fully and accurately account for the current boom in electric generating capacity development. The EPA suggests that an additional 6560 MW will be retired if it requires existing plants to install closed cycle cooling (or its functional equivalent). <FN 26> But that amount of retirement is rendered almost inconsequential when considered against the flood of new electric capacity that will come online over the next five years — nearly 177,593 MW according to one conservatively derived estimate. <FN 27>

Footnotes

25 See 67 Fed. Reg. at 17 187-17189.

26 As compared to the Agency's proposed rule. 67 Fed. Reg. at 17188 (Exhibit 13).

27 See Memorandum from Erin O'Neill to Jonathan Lewis, National Forecast of New Generating Capacity— Table 1 (August 5, 2002) (attached as Appendix C) (hereinafter "O'Neill Memorandum").

EPA Response

EPA disagrees with the statement that its analysis of market-level impacts overstated economic consequences of the all cooling tower option. Please refer to section VII of the preamble for information about EPA's decision to reject cooling towers as the basis for today's rule.

Comment ID 316bEFR.061.009

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

The Agency's proposed rule does not reflect the best technology available as required by law. None of the various compliance options will ensure that existing power plants will reduce intake capacity to levels commensurate with those that would be achieved by closed-cycle, recirculated cooling systems. <FN 28> It has been demonstrated that reducing the intake capacity of a facility is typically the most important factor in minimizing adverse environmental impact. <FN 29> "When water is extracted from healthy natural waters, to an overriding degree the numbers of organisms killed. . . increases with the volume of water pumped." <FN 30> Accordingly, in order to minimize adverse environmental impact, the BTA standard for existing power plants should require that those facilities reduce their intake capacity to levels commensurate with closed-cycle cooling systems. Closed-cycle cooling systems can reduce mortality from entrainment and impingement by 98% when compared to conventional once-through cooling systems. <FN 31> The proposed rule, by contrast, requires that plants reduce impingement mortality by only 80% and entrainment by only 60%.

Footnotes

28 A facility that demonstrates that its intake capacity is commensurate with the use of a closed-cycle cooling system meets the requirements of the proposed rule as a matter of course. 67 Fed. Reg. at 17140. However, such reductions in intake capacity are not required. Facilities may instead seek to comply with less stringent limits on impingement mortality and entrainment. Id.

29 See Pisces International Ltd., Technical Evaluation of US Environmental Protection Agency Proposed Cooling Water Intake Regulations for New Facilities, at 27 (November 2000).

30 Id

31 67 Fed. Reg. at 17142 (citing Chapter 5 of EPA, Technical Development Document for the Final Rule for New Facilities (EPA-82 1 -R-O 1-036) (November 2001)).

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.061.010

Author Name Jonathan Lewis
Organization Clean Air Task Force

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Pursuant to the Phase II proposal, the determination of what technologies and processes constitute BTA would hinge on the type of waterbody used by a facility as the source of its cooling water. The EPA proposes, for example, to afford most freshwater bodies only minimal protection. If a facility located on a freshwater river or stream consumes five percent or less of the annual mean flow of the source river or stream, that facility must reduce fish and shellfish impingement mortality by 80-95% (as compared to conventional once-through cooling systems). <FN 32> If the intake flow is greater than five percent of the annual flow, the facility must also reduce entrainment by 60-90%. <FN 33> Similarly, a facility that withdraws it cooling water from a lake or reservoir would have to reduce impingement mortality by 80-95% for fish and shellfish, and, if it expands its design intake capacity, the increase in intake flow must not disrupt the natural thermal stratification or turnover pattern of the source water. <FN 34> The Great Lakes and saltwater bodies benefit from standards that are somewhat stronger, albeit still inadequate. Existing power plants that withdraw cooling water from the Great Lakes, tidal rivers or estuaries, or from the ocean must reduce fish and shellfish impingement mortality by 80-95% and to reduce entrainment by 60-90%. <FN 35>

When measured against the reductions available from closed-cycle cooling, the Agency's targets for impingement and entrainment limits are impermissibly lax. According to EPA data, "closed-cycle, recirculated cooling systems (e.g., cooling towers or ponds) can reduce mortality from impingement by up to 98 percent and entrainment by up to 98 percent when compared with conventional, once-through cooling systems." <FN 36> The proposed Phase II rule, in contrast, permits unlimited entrainment at most freshwater sources, and would require only a 60% decline in impingement mortality (relative to a conventional once-through cooling system) at waterbodies the Agency has deemed to be particularly sensitive. Similarly, the proposed rule would require existing facilities using once-through cooling to reduce impingement mortality by only 80%, despite the fact that considerably steeper reductions are achievable using closed-cycle systems. Due to the staggering number of organisms that are impinged and entrained by the cooling systems at existing facilities, the quantitative difference between an 80% reduction in impingement mortality and a 98% reduction is significant. Furthermore, under the proposal, facilities will have the option of using restoration measures "in lieu of or in combination with reductions in impingement mortality and entrainment." <FN 37> As long as facilities takes steps to maintain fish and shellfish populations at a level "comparable" to that which would be achieved with the installation of closed-cycle cooling, the actual numbers of organisms impinged and entrained are irrelevant to the Agency. <FN 38>

By mandating that intake capacity levels reflect the true BTA for existing power plants - i.e., closed-cycle cooling or its functional equivalent — the EPA would ensure that intake capacity levels are reduced by 96% when compared with once-through cooling systems. <FN 39> As a result, mortality from impingement and entrainment at that class of facilities would be reduced by as much as 98% - a significant improvement over the current proposal. Furthermore, it is only by doing so that the EPA will satisfy its statutory obligation to establish a standard that minimizes adverse environmental impact.

These significant reductions in mortality associated with closed-cycle cooling or its functional equivalent could be achieved with negligible effect on the supply and reliability of electricity around the country, as discussed in Part IV below.

Footnotes

32 Id at 17140; proposed 40 CFR § 125.94(b). It is important to note that a facility would comply with the proposed performance standards by meeting the minimum value in the proposed ranges, i.e., a 60% reduction in entrainment and an 80% reduction in impingement mortality. See 67 Fed. Reg. at 17141.

33 67 Fed. Reg. at 17140; proposed 40 CFR § 125.94(b).

34 Id.

35 Id.

36 Id. at 17142 (citing Chapter 5 of EPA, Technical Development Document for the Final Rule for New Facilities (EPA-82 1 -R-0 1-036) (November 2001)).

37 Id. at 17146.

38 Id.

39 See RICHARD OTTINGER, ETAL., THE ENVIRONMENTAL COST OF ELECTRICITY 281 (1990).

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.061.011

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

The EPA's Reliance on Capital and Operating Costs as a Basis for Rejecting the All Closed-Cycle Cooling Option is Misplaced.

A.Cost Is Not a Valid Consideration in Establishing the Best Technology Available

Congress intended Section 3l6(b)'s Best Technology Available standard to be highly protective of the nation's waterways. With respect to each of the criteria listed in Section 316(b) - location, design, construction, and capacity — the standard of protection selected by the EPA as BTA must in fact be the best cooling technology available to existing power plants for minimizing adverse environmental impact. Notably, cost is not among the factors enumerated in Section 316(b), and may not be considered by the Agency when setting BTA. The EPA, however, impermissibly compared the capital and operational costs of various regulatory options while determining BTA for existing power plants. In fact, the EPA wrote that it "did not select closed-cycle, recirculated cooling systems as the best technology available for existing facilities because of the generally high costs of such conversions." <FN 40>

Section 3 16(b) of the Clean Water Act, 33 U.S.C.S §1326(b), reads:

(b) Cooling water intake structures. Any standard established pursuant to section 301 or section 306 of this Act § 1311 or 1316] and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

The conspicuous absence of cost from the list of factors for which the EPA must determine BTA is neither trivial nor accidental. Congress has repeatedly demonstrated that it knows how to direct the EPA to consider costs when establishing a control standard. Section 316(b), on the other hand, requires the EPA to identify the best technology available without reference to economic considerations. <FN 41> In Whitman v. American Trucking Associations, the Supreme Court ruled that the projected cost of compliance is not a relevant factor in environmental rulemaking unless the underlying statute explicitly enumerates cost as a valid consideration. <FN 42> The Court's unanimous decision validated a similar position taken years earlier by the D.C. Circuit Court of Appeals in Lead Industries Association v. EPA. <FN 43> The underlying statute here, Section 316(b), lacks any clear "textual commitment of authority to the EPA to consider costs. <FN 44> Accordingly, the EPA' s is not authorized to consider cost when establishing BTA. <FN 45>

Footnotes

40 67 Fed. Reg. at 17155.

41 Compare 33 U.S.C.S. § 1326(b) (statutory language governing cooling water intake structures makes no reference to cost) with 42 U.S.C.S. § 741 1(a)(l) (2001) (statutory language in the Clean Air Act governing new source performance standards specifically lists cost as a factor for consideration).

42 531 U.S. 457, 468 (2001).

43 647 F.2d 1130, 1150 (D.C. Cir. 1980) ("We are unable to discern here any congressional intent to require, or even permit, the Administrator to consider economic or technological factors in promulgating air quality standards. And when Congress directs an agency to consider only certain factors in reaching an administrative decision, the agency is not free to trespass beyond the bounds of its statutory authority by taking other factors into account.").

44 See Whitman, 531 U.S. at 468.

45 Id.

EPA Response

See response to comment 316b.NFR.206.014.

Comment ID 316bEFR.061.012

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Section 316(b) Requires the EPA to Establish BTA According to Location, Design, Construction, and Capacity

The straightforward language of Section 316(b) clearly requires the EPA to set BTA so that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Intake capacity, or the volume of cooling water pumped by a facility, varies significantly depending on the type of cooling technology utilized. As discussed in Part II above, a reduction in intake capacity is the most effective method by which a facility can minimize adverse environmental impact caused by its cooling water intake structures. <FN 46>

Therefore, the cooling system that most effectively reduces intake capacity is also the most likely to minimize adverse environmental impacts. Compared with once-through cooling systems, closed-cycle cooling systems offer reductions in intake capacity on the order of 96-98%. <FN 47> Reductions in capacity generally result in reduced impingement and entrainment, thereby minimizing adverse environmental impact. <FN 48> The "all closed-cycle option" discussed (but rejected) in the EPA' s proposed Phase II rule would require power plants to "reduce their design intake flow to a level that can be attained by a closed-cycle recirculating cooling water system." <FN 49> By reducing intake capacity by as much as 98% as compared to once-through cooling, closed-cycle cooling can truly minimize the adverse environmental impact associated with cooling water intake structures at existing power plants.

Under the EPA's proposed CWIS standard for existing power plants, facilities are not required reduce their intake capacity. Instead, the proposed rule would permit existing power plants to continue using once-through cooling, provided they use alternative means such as ecosystem restoration to meet the rule's targets for impingement mortality and entrainment. <FN 50> The Agency's proposed standard simply fails to meet the Act's requirement that the CWIS standard itself must reflect the best technology available for minimizing adverse environmental impact. Technologies and processes that offer greater environmental protection not only exist, they are commonly used. Numerous power plants around the country employ closed-cycle cooling water intakes structures, leaving no question that closed-cycle cooling is a readily available technology. Because a rule that requires closed-cycle cooling or its functional equivalent would provide more protection against adverse environmental impacts, the EPA's proposed standard, by definition, does not reflect the best technology available.

The Agency's "all closed-cycle option," by comparison, would satisfy Section 316(b)'s requirement that the EPA implement a stringent BTA standard for existing power plants. Closed-cycle cooling systems significantly reduce intake capacity, thereby ensuring that the environmental impacts caused by cooling water intake structures are minimized. Unlike the various stratagems allowed under the proposed rule, the "all closed-cycle option" would require significant reductions in intake flow, thereby taking advantage of the direct relationship between an intake structure's capacity and the number of organisms that are entrained and impinged. <FN 51>

Footnotes

46 See Riverkeeper, Inc., et al., Comments on EPA's Proposed Regulation for Cooling Water Intake Structures at New Facilities Under Section 316(b) of the Clean Water Act, at 15 (November 9, 2001); Pisces International Ltd., supra note 29, at 27.

47 See OTTINGER, ETAL., supra note 39, at 281.

48 Section 316(b) requires the EPA to select the best technology available to minimize adverse environmental impact. According to the Agency, "minimize means to reduce to the smallest amount, extent, or degree reasonably possible." 67 Fed. Reg. at 17130. Webster's Dictionary, however, does not join the EPA in using the word "reasonably" to qualify what is "possible." See 'Webster's Ninth New Collegiate Dictionary 756 (1991) ("minimize v, 1: to reduce or keep to a minimum;" "minimum mi, 1; the least quantity assignable, admissible, or possible.") We remind EPA that the boundaries of its discretion in determining what degree of minimization is "reasonably possible" are delimited by the four criteria relevant to BTA: location, design, construction, and capacity. See Lead Industries, 647 F.2d at 1150. Cost is not one of the factors listed by Congress and is therefore irrelevant to the EPA's BTA determination.

49 67 Fed. Reg. at 17187.

50 67 Fed. Reg. at 17143.

51 See Pisces International Ltd., supra note 29, at 27.

EPA Response

The Agency disagrees with the following statement, which is the thesis of the comment: "…a reduction in intake capacity is the most effective method by which a facility can minimize adverse environmental impact caused by its cooling water intake structures."

The determination of what is the "most effective method," in the Agency's belief, must incorporate a variety of factors. As such, the Agency's determination of the "most effective method" for minimizing adverse environmental impact in the case of the Phase II existing facility rule must acknowledge the technical feasibility, the potential energy market impacts, the relative costs of technologies, and the relative effectiveness of said technologies, among other secondary factors. Although the "Location, Design, Construction, and Capacity" of an intake are the four major technical means by which aquatic impacts can be controlled, the judgment as to which means is "most effective" is based on those factors that the commenter specifically asserts are not appropriate for this regulation. The commenter's premise – that the cooling system that most effectively reduces intake capacity is also the most likely to minimize adverse environmental impacts – is unworkable. Dry cooling technology is not even a feasible technology for retrofit installations at the vast majority of power plants in the scope of the rule. As such, the "cooling system that most effectively reduces intake capacity" is inherently an improbable candidate for best technology available.

A technical oversight on the commenter's part further undermines their assertions. When the commenter asserts that closed-cycle cooling reduces water intake by 96 to 98 percent, they are mistaken. In freshwater environments the statement is a bit optimistic. However, with saltwater (that is, in the locations most in need of protective entrainment standards, in the Agency's opinion) the water intake reductions range from 85 to 92 percent. This is on par with the entrainment reduction achieved (60 to 90 percent) with the "most effective" technologies available for existing facilities, which form the basis of the final rule (see the discussion of technology efficacy in the Technical Development Document). As such, the commenter fails to realize that the Agency is promulgating a rule that will achieve entrainment reductions on the order of recirculating wet cooling tower systems without the impractical costs, technical feasibility concerns, power impacts, and aesthetic concerns.

Furthermore, the commenter demonstrates a fundamental misunderstanding of what qualifies a technology for “best technology available” when he states, “numerous power plants around the country employ closed-cycle cooling water intakes structures, leaving no question that closed-cycle cooling is a readily available technology.” This statement does not adhere to basic principles of determining candidates for “best technology available.” Through exhaustive research, the Agency determined that 4 plants had performed this engineering feat. Two of these projects occurred at plants larger than 500 MW in size. This, in no way, could be considered “numerous”. This fact alone leaves questions as to whether or not it is a readily available technology. Additionally, there are high costs, energy impacts, technical hurdles, and potential land-acquisition issues that the commenter fails to consider.

The Agency disagrees with the commenter that there exists in Section 316(b) a “requirement that the EPA implement a stringent BTA standard for existing power plants.” As the commenter pointed out in their thesis statement, the Agency must determine the most effective means for minimizing adverse environmental impact and not the “most stringent BTA standard”. The Agency refers to comment response 316b.NFR.206.014 for further discussion of its legal authority to consider cost in determining the “most effective” of the best technology’s available.

Comment ID 316bEFR.061.013

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Requiring Closed-Cycle Cooling at Existing Power Plants Will Have a Minimal Effect on Electricity Reliability.

In the preamble to the proposed rule, the EPA relies partly on market projections for the electric generating industry in its attempt to explain why two alternative regulatory approaches, the “waterbody/capacity-based option” and the “all closed-cycle option,” were not adopted despite the additional protection they would provide against adverse environmental impact. <FN 52> The Agency’s predictions about how these alternative options would affect the electricity market is an impermissible attempt to analyze their compliance costs. <FN 53> Moreover, as set forth in greater detail below, the Agency’s own data suggest that the market impacts of implementing a rule that required closed-cycle cooling at all eligible facilities (the “all closed-cycle option”) would be insignificant, particularly with respect to electric generating capacity. Furthermore, the EPA overstates the impact of such a rule because its analysis is based on a flawed and outdated market forecast that fails to accurately account for the enormous growth in generating capacity currently under development.

Footnotes

52 See 67 Fed. Reg. at 17188.

53 See Part III.A above.

EPA Response

See response to comment 316bEFR.061.001.

Comment ID 316bEFR.061.014

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

The EPA‘s Own Projected Market Impacts from a Closed-Cycle Cooling Rule Are Minimal and Are Not a Sufficient Basis for Rejecting the “All Closed Cycle Option” as BTA.

According to EPA data, a rule that “requires that existing facilities with a design intake flow [of] 50 MGD or more reduce their total design intake flow to a level that can be attained by a closed-cycle recirculating cooling water system” would have only a minimal impact on the electricity market in the United States. In the preamble to its Phase II proposal, the Agency estimates that the “all closed-cycle option” would result in the closure of only 6560 MW of capacity by 2013 — less than one percent of the total baseline capacity. <FN 54> In its description of the market impacts associated with the “waterbody/capacity-based option,” <FN 55> the EPA describes regional capacity closures of 1.1% and 1.3% as “an insignificant percentage of total baseline capacity in those regions.” <FN 56> Certainly, then, the closure of less than one percent of total capacity under the “all closed-cycle option” (as projected by the EPA) is also insignificant.

Using the EPA’s projections, it is nearly impossible to accurately compare the market impacts associated with the “all closed-cycle option” to those market impacts associated with the proposed rule. The EPA relied on ICF Consulting’s Integrated Planning Model (1PM 2000) to project compliance-related data for both of the alternative regulatory options discussed Section VIII. B. of the proposal — the “waterbody/capacity-based option” and the “all closed-cycle option.” <FN 57> As discussed in the preceding paragraph, the Agency used 1PM 2000 to estimate capacity closures of 6560 MW by 2013 under the “all closed-cycle option.” <FN 58> Due to time constraints, however, the EPA was unable to develop comparable projections for the performance standards it actually proposed. <FN 59> Instead, the Agency concluded, rather crudely, that based on data it collected for the alternative options, “there would be no significant impacts on any NERC region associated with the proposed rule” in 2008. <FN 60> Even if we assume that by “no significant impacts” the EPA means that electrical capacity closures attributable to the proposed option would be zero, the “all closed-cycle option” would result in capacity closures of no more than 6560 MW — less than 1% of baseline capacity— when compared with the proposed rule.

The Agency’s analysis of facility-level impacts further demonstrates that the effects of the “all closed-cycle option” on plant closures would be benign. According to the EPA, a net of only five facilities would close as a result of the rule. <FN 61> The Agency again fails to provide similar facility-level data for its proposed option. Assuming that the proposed option would result in zero plant closures, however, the facility-level impacts projected by the EPA under the “all closed-cycle option” — i.e., the closure of five facilities that generate less than 1% of total baseline capacity — would still be negligible.

Footnotes

54 The EPA projects a total baseline capacity in 2013 of 922,740 MW, of which 6560 MW is 0.7%. 67 Fed. Reg. at 17188 (Exhibit 13).

55 The “waterbody/capacity-based option” would require facilities that withdraw water from particularly sensitive waterbodies (i.e., estuaries, tidal rivers, or oceans) and which meet minimum intake flow requirements, to achieve intake

capacity levels commensurate with those levels attained by a closed-cycle, recirculating cooling systems. Id. at 17185.

56 Id at 17186.

57 See Id. at 17185-189.

58 Id at 17188.

59 Id. at 17181.

60 Id. at 17184.

61 Id. (Exhibit 14).

EPA Response

See preamble and other documents in the record for a discussion of EPA's reasons for rejecting cooling towers as the basis for this rule.

Comment ID 316bEFR.061.015

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

The EPA Overstates the Market Impacts that Would Be Attributable to a Closed-Cycle Cooling Rule.

The EPA, furthermore, overestimates the market impacts of a Phase II rule that requires closed-cycle cooling. The model used by the EPA to evaluate projected market impacts of the various regulatory options underestimates the dimensions of the remarkable surge in power plant development currently underway in the United States. While the Agency figures that an additional 6560 MW of capacity would be retired if all eligible existing power plants were required to install closed-cycle cooling or its functional equivalent, that loss in generating capacity is significantly less than the amount by which EPA underestimates long-term total capacity.

The EPA bases its projections on IPM 2000, "a long-term general equilibrium model of the domestic electric power market which simulates the least-cost dispatch solution for all generation assets in the market given a suite of user-specified constraints." <FN 62> In 2000, when the IPM 2000 began its modeling run, the full scale of the current power plant development surge was not yet apparent. As a result, the amount of new development projected by the model is far too low.

The pace of recent construction demonstrates the extent to which IPM 2000 has underestimated the enormous, unprecedented surge in power plant development. The RDI NEWGen database is a proprietary database that contains detailed information on the status of new plant development projects across the country. The database is updated monthly and provides the most timely and accurate method of tracking actual power plant development. According to the April 2002 update of the RDI NEWGen database, 77,690 MW of capacity has come online since the beginning of 2000, when the IPM 2000 was developed. <FN 63>

Furthermore, future capacity development can be accurately projected based on actual construction and development information. By analyzing data from the April 2002 update of the RDI NewGen database and taking into account various project and business criteria, the NorthBridge Group <FN 64> has assessed the likelihood that power plant development projects across the country will be completed. NorthBridge assigned a probability of completion to each category of new projects and included low, base, and high scenario estimates that cover a range of plausible market conditions over the next several years. The projections developed by NorthBridge assume that many of the projects under active development will be delayed or abandoned due to market or regulatory factors.

NorthBridge's conservative analysis of the NewGen database demonstrates the problem with IPM 2000's projections. The EPA's IPM 2000 Base Case projects that 97,519 MW of new capacity will be added between 1999 and 2005. <FN 65> In stark contrast, as of April 2002, 88,328 MW of capacity has become operational since the beginning of 1999 and a further 122,829 MW of capacity is currently under construction. An additional 49,160 MW generating capacity is under advanced development and is likely to go online by the end of 2005. <FN 66> In all, 260,317 MW of additional generating capacity will have been developed between the beginning of 1999 and the end of 2005, which is 162,798 MW greater than the amount of additional capacity projected by IPM 2000 to come online during the same period. <FN 67> The development of generating capacity has accelerated dramatically over the past few years and is expected to peak at over 60,000 MW per year in both 2002 and 2003. <FN 68> In each of these peak years (2002-2003) the amount of new generating capacity that will be added exceeds the total amount of capacity brought online over the entire decade of the l990s. <FN 69>

NorthBridge's projected new capacity additions — based on the RDI NEWGen database and checked by Energy and Environmental Analysis, Inc. (EEA) <FN 70> — indicate that national electrical generating capacity additions through 2006 will exceed the additions projected by IPM 2000 through 2015. <FN 71> More to the point, the amount of new capacity almost certain to be online by 2006 exceeds IPM 2000's projected total capacity additions through 2013 by an amount— 95,000 MW — that is more than fourteen times larger than the amount of capacity the EPA estimates would be retired under a Phase II CWIS rule that required the installation of a closed-cycle cooling system or its functional equivalent. <FN 72>

The decrement that the EPA attributes to the "all closed-cycle option" — 6560 MW — is miniscule in comparison to the amount by which the Agency is underestimating generating capacity additions over the next several years. Even under IPM' s erroneous generating capacity projections, the "all closed-cycle option" would have only a minimal impact on the electricity market. The recent surge in power plant development, reflected in NorthBridge's analysis of the RDI NEWGen database, has rendered the retirement of 6560 MW by 2013 insignificant. The EPA should revise its analysis of the "all closed-cycle option" to recognize that the electricity market can readily afford the negligible loss in generating capacity that would result from a Phase II CWIS rule requiring closed-cycle cooling or its functional equivalent.

Footnotes

62 Id. at 17181.

63 See Clean Air Task Force, The NorthBridge Group, and Energy and Environmental Analysis, Inc., Electrical Power Generation Update 8 (May 2002) (analyzing the April 2002 RDI NEWGen database update) (hereinafter "Electrical Power Generation Update") (attached as Appendix B).

64 The NorthBridge Group is a firm specializing in economic and strategic consulting for the electric and natural gas industries, including regulated utilities.

65 See EPA, Documentation of EPA Modeling Applications (V.2.1) Using the Integrated Planning Model (March 2002) (Table 4.3, page 4-4; and Table 9.7, page 9-19).

66 See Clean Air Task Force, et al., "Electrical Power Generation Update," supra note 63, at 15.

67 Id.

68 Id. at9.

69 Id.

70 Much of the new capacity being developed will be generated by natural gas-fired power plants. Accordingly, FEA examined NorthBridge's updated capacity estimates in light of possible gas supply constraints. FEA found that the gas supply should be sufficient to meet the demand associated with the actual and projected increase in new natural gas capacity. Furthermore, the infrastructure needed to convey the additional supply of natural gas is already growing to meet demand. See Clean Air Task Force, et al., "Electrical Power Generation Update," supra note 63, at 25.

71 See EPA, Documentation of EPA Modeling Applications (V.2.1) Using the Integrated Planning Model (March 2002) (Table 4.3, page 4-4; and Table 9.7, page 9-19).

72 Subtracting 165,317 MW (see EPA, Documentation of EPA Modeling Applications (V.2.1) Using the Integrated Planning Model (March 2002) (Table 4.3, page 4-4); 67 Fed. Reg. at 17188 (Exhibit 13)) from 260,317 MW (see Clean Air Task Force, et al., “Electrical Power Generation Update,” supra note 63, at 15).

EPA Response

Please refer to the responses to comments 316bEFR.061.001, 316bEFR.061.008 and 316bEFR.061.014 in subject matter code 9.03.

Comment ID 316bEFR.061.016

Author Name Jonathan Lewis
Organization Clean Air Task Force

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

Closed-Cycle Cooling Would Have Little Negative Effect on System Reliability

The retirement of 6560 MW of generating capacity nationwide will not threaten the reliability of the national electricity system. In fact, the rapid addition of new capacity will ensure that reserve margins continue to grow. The NorthBridge Group estimates that in 2006 there will be 971,289 MW of installed capacity nationwide. The growth in installed capacity will correspond to increases in the reserve margins — i.e., the difference between installed capacity and projected peak demand — in each of the ten North American Electric Reliability Council (NERC) regions. <FN 73> Moreover, in all but two of the ten NERC regions, projected 2006 reserve margins will exceed 20%. <FN 74>

Accordingly, the reliability concerns of the 1990s have been largely rectified by the surge in power plant development. The pace of development has allowed all NERC regions to project adequate planning margins for 2002. <FN 75> Regional reserve margins will further benefit from the additional capacity generated by power plants that have come online in the past year, plants that are under construction, and plants that are in advanced development, and are projected to be substantial in most regions by 2006. <FN 76> The retirement of 6560 MW of generating capacity over the next eleven years — the amount which the EPA estimates would be attributable to the implementation of the "all closed-cycle option" — will not threaten these margins in any appreciable manner.

In the preamble to its Phase II proposal, the EPA estimates that 0.7% of the projected total installed generating capacity in 2013 would be retired under the "all closed-cycle option." <FN 77> This percentage was derived by dividing 6560 MW (the estimated amount of retired capacity by 2013 under the "all closed-cycle option") by 922,740 MW (IPM's projected total capacity in 2013). Accordingly, the EPA had exaggerated the ratio of estimated capacity retirements to projected total capacity-because, as discussed above in Part IV.B., its model, IPM 2000, severely underestimates capacity additions. Actual total capacity in 2013 will far exceed the IPM 2000 projection of 922,740 MW; consequently, 6560 MW will account for even less than 0.7% of total capacity in 2013.

The EPA cannot responsibly rely on IPM 2000 projections in its analysis of the market-level impacts of a rule that would require existing power plants to reduce their intake capacity to levels commensurate with closed-cycle cooling systems (i.e., the "all closed-cycle option"). Actual installed capacity will already have surpassed IPM's 2013 projections by end of 2003. <FN 78> The amount of capacity the EPA expects would be retired under its rejected "all closed-cycle option" is dwarfed by the amount the Agency, using IPM data, underestimates future installed generating capacity. An analysis of more realistic capacity projections will demonstrate to the EPA that the electricity system's reliability will not be negatively impacted by the loss of 6560 MW.

Footnotes

73 Id. at 24.

74 Id.

75 Id. at 22.

76 Id.

77 67 Fed. Reg. at 17,188 (Table 13).

78 See “O’Neill Memorandum,” supra note 27, at Table 1.

EPA Response

Please refer to the response to comment 316bEFR.061.001 in subject matter code 9.03.

Comment ID 316bEFR.061.017

Author Name Jonathan Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

The Energy Penalty Associated with Closed-Cycle Cooling Is Not Significant.

The EPA has expressed concern about the energy penalties associated with cooling systems that use less water, including closed-cycle cooling. <FN 79> The use of a different type of cooling system can affect the temperature maintained at a facility's steam condensing surface. Everything else being equal, an increase in the temperature of the condensing surface generally corresponds to a decrease in the generating efficiency of a plant. <FN 80> Although there is a slight energy penalty associated with closed-cycle cooling as compared to once-through cooling, that difference is so small as to be irrelevant to the Agency's rulemaking process.

The EPA estimates that the national average energy penalty for fossil fuel plants is only 1.7% of plant output for facilities using closed-cycle cooling when compared to facilities using once-through cooling. This difference is not significant enough to justify the EPA in finalizing a rule that would allow power plants to continue using once-through cooling systems that withdraw hundreds of millions of gallons per day.

The estimated energy penalty of 1.7% is so low that it poses very little threat to energy reliability. As discussed in Part IV.C above, regional reserve margins will exceed 20% in eight of the ten NERC regions by 2006. <FN 81> As a practical matter, then, energy reliability is not at issue here, and the larger environmental requirements of the Clean Water Act should govern the EPA's decision. Rather than relying on false assertions of reliability issues as an excuse to avoid n-more stringent environmental controls, the Agency should instead focus on adopting a CWIS rule that truly minimizes the adverse environmental impacts associated with cooling water intake structures. <FN 82>

Footnotes

79 EPA, Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule —Chapter 5: Energy Penalties of Cooling Towers 5-1 (April 2002) (EPA-82 I -R-02-003).

80 Id. at 5-6.

81 Clean Air Task Force, et. al., "Electrical Power Generation Update," supra note 63, at 24.

82 See CWA §316(b).

EPA Response

Please refer to the response to comment 316bEFR.061.001 in subject matter code 9.03.

Comment ID 316bEFR.061.018

Author Name Jonathan Lewis
Organization Clean Air Task Force

Subject Matter Code 17.02
Option: Reduce capacity comm. with closed-cycle

Conclusion: EPA Should Require Closed-Cycle Cooling as BTA for Existing Power Plants.

We look forward to reviewing more detailed, more protective standards for cooling water intake structures at existing power plants. As a technical matter, EPA's proposal currently lacks the specificity and the analysis befitting a rule of this importance. In particular, the Economic Analysis in Section VIII of the rule needs to be expanded so that all of the options being considered by the Agency are subject to the same level of scrutiny. <FN 83> Those options, moreover, should be analyzed using accurate data about the amount of actual and projected installed generating capacity.

Substantively, the Agency's proposed rule fails to satisfy EPA's statutory mandate to implement CWIS standards that reflect the best technology available to minimize adverse environmental impact. The proposal does not require facilities to reduce their intake, capacity, but instead allows them to continue using outmoded once-through cooling systems. Accordingly, under the proposed rule, existing power plants can continue to consume hundreds of millions of gallons of water per day provided they take steps to mitigate the resulting impingement and entrainment. Because other more protective cooling technologies are in fact readily available, EPA cannot credibly describe its proposed standard as BTA.

The EPA's own "all closed-cycle option," an option that would require power plants to reduce their intake capacity to levels commensurate with closed-cycle cooling, does satisfy the stringent requirements of Section 316(b). Closed-cycle cooling, a process used by numerous facilities, allows a power plant to withdraw only 2-4% as much water as it would using a once-through cooling system. Reductions in intake capacity correspond to reductions in impingement and entrainment, thereby minimizing the adverse environmental impacts associated with cooling water intake structures.

Furthermore, the "all closed-cycle option" would have a negligible impact on energy reliability. Due to the enormous surge in power plant development currently underway, regional power market reserve margins are increasing and are expected to be substantial in most regions by 2006. <FN 84> The amount of electric capacity coming on-line in the near future will dwarf the miniscule loss in capacity that the EPA would attribute to the implementation of the "all closed-cycle option."

We urge the EPA to adopt its "all closed-cycle option" as BTA for existing power plants. In doing so, the Agency would fulfill its duty under the Clean Water Act "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." <FN 85>

Footnotes

83 See 67 Fed. Reg. at 17181 et seq.

84 Clean Air Task Force, et al., "Electrical Power Generation Update," supra note 63, at 22.

85 CWA § 101(a), 33 U.S.C.S. § 1251(a).

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Michael W. Stroben

On Behalf Of:

Duke Energy

Author ID Number:

316bEFR.062

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), NEI (316bEFR.020), UWAG (316bEFR.041)

Comment ID 316bEFR.062.001

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code SUP

General statement of support

The proposed rule covers a wide range of legal, technical, scientific and economic issues, On the whole, Duke Energy is encouraged that the EPA recognizes that to be successfully implemented; § 316(b) regulations for existing facilities must not dictate a single technology fix. The factors affecting entrainment and impingement are site-specific, species-specific, and consequently widely varied. A one-size-fits-all categorical performance standard based solely on the type of water body, location of the intake structure, and volume of water withdrawn, would not be an appropriate or necessary response to mitigating the impact of cooling water intake structures.

EPA Response

EPA notes the comment. Today's final rule maintains the flexibility for the permittee in determining the most cost-effective approach to meeting the performance standards.

Comment ID 316bEFR.062.002

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Michael W. Stroben

Organization Duke Energy

Site-Specific Approach

EPA's proposed § 316(b) rule for existing facilities is based primarily on "performance standards." The performance standards that EPA has selected correspond to an impingement mortality reduction target of 80-95% and a total entrainment reduction target of 60-90%. EPA bases these reduction targets on data from several existing facilities where various intake technologies are in use (i.e., wedgewire screens, fine mesh screens, fish returns, and aquatic filter barriers). EPA also proposes that if the costs of meeting the performance standards are significantly greater than" either the technology costs EPA considered, or the benefits to society, an alternative "site-specific" approach is justified.

It is encouraging that the EPA recognizes that site-specific conditions play an important role for power plants. Regional differences in meteorology, topography, and hydrology greatly influence the site characteristics of an existing power plant. A technology that may be suitable for one power plant may not be suitable for another. In addition, an approach that does not recognize and account for the multitude of site-specific factors that affect impingement and entrainment of aquatic organisms is not scientifically valid.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.062.003

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 7.02

Performance standards

Underlying EPA's proposed performance standards for reductions in impingement mortality and total entrainment is the simplifying assumption that entrainable eggs and larvae and impingeable fish are concentrated in certain areas of a waterbody; and that they are uniformly distributed through the water column in those areas. Data collected over the past 30 years indicates that this assumption is not correct. This issue is explained in detail in comments filed by the UWAG, EEl and EPRI.

The power plants that Duke Energy operates are located on various types of waterbodies and aquatic environments. These facilities employ a variety of intake structure locations, technologies, and operational characteristics. Subjecting each of these facilities to the same one-size-fits-all technology driven by a single impingement mortality or total entrainment performance standard would clearly not be a cost effective approach. A site-specific approach that factors in each facility's unique characteristics is critical to Duke Energy's and the electric generating sector's ability to cost effectively implement the § 316(b) regulations.

EPA Response

EPA believes it has presented ample evidence demonstrating a significant decrease in the level of entrainment when intake flow is minimized in relation to the flow of the source waterbody. The documents DCN# 2-013L-R15 and 2-013J support the propositions that flow is related to entrainment and organisms are distributed somewhat uniformly throughout the waterbody.

EPA has discussed the range of technologies used to establish the performance standards (see Sections VII.B.2 and B.3 of the preamble to today's rule). Available data indicate that, when considered as a suite of technologies, barrier, and fish handling technologies are available on a national basis for use by Phase II existing facilities. These technologies exist and are in use at various Phase II facilities and, thus, EPA considers them collectively technologically achievable. For example, currently, 14 percent of Phase II existing facilities potentially subject to this final rule already have a closed-cycle recirculating cooling water system. In addition, 50 percent of the remaining potentially regulated facilities have some other technology in place that reduces impingement or entrainment. Thirty-three percent of these facilities have fish handling or return systems that reduce the mortality of impinged organisms. The fact that these technologies are collectively available means that one or more technologies within the suite is available to each Phase II facility. Economic practicability is discussed in Sections VII.B and XI.B of the preamble. See also response to comment 316bEFR.041.701.

Comment ID 316bEFR.062.004

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 7.02

Performance standards

Performance Standards

As stated above, the EPA has proposed performance standards that correspond to an impingement mortality reduction target of 80-95% and a total entrainment reduction target of 60-90%. EPA devised these ranges after examining a limited number of "case studies" across the country. Duke Energy supports detailed comments submitted by UWAG and EPRI that data from these limited number of case studies should not be extrapolated across the country. A technology installed at one power plant can perform differently than that same technology installed at a different power plant, even on a similar waterbody type. Given site-specific differences in the effectiveness of a technology, the performance standards devised by EPA should only be used as a guide when determining which technologies may be deployable and effective at a given power plant.

Permit writers should also have flexibility when implementing § 316(b) requirements, and not be required to establish numeric standards. Given natural spatial and temporal variability in aquatic populations, it would be extremely difficult for permittees to comply with a numeric standard and for state regulatory agencies to enforce numeric limits. As an alternative, compliance and enforcement should be predicated on meeting certain non-numerical requirements. For example, compliance with the installation of a technology, operational modifications, a routine maintenance plan, or the establishment of an environmental restoration program could all be enforced more readily by the permit writer.

EPA Response

Please see response to comment 316bEFR.062.004.

Comment ID 316bEFR.062.005

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Definition of Adverse Environmental Impact (AEI)

The first step in a § 316(b) determination should be the determination of whether or not an Adverse Environmental Impact (AEI) is occurring due to the location or operation of a cooling water intake structure at an existing facility. The EPA's proposed rule does not define an AEI. This is a fundamental flaw because without such a definition, it is impossible to determine Best Technology Available (BTA) requirements.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.062.006

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Michael W. Stroben

Organization Duke Energy

Again, Duke Energy believes that the BTA determination for existing cooling water intake structures should be made on a site-specific basis taking into consideration whether or not an AEI is occurring, or is likely to occur. A BTA determination should not be based on arbitrary, one-size-fits-all performance standards that are not based on sound science.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.062.007

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

The need to determine if a facility is or is likely to cause an AEI is especially important when it comes to managing man-made reservoirs (for example, reservoirs built in the southeastern U.S.). It is not uncommon for state resource management agencies to stock non-native fish species for recreational purposes. In addition, "exotic" and/or nuisance species are often introduced to the reservoir system either accidentally or by an unauthorized means. The combination of these two activities creates a totally artificial aquatic ecosystem. These artificial ecosystems are subject to relatively rapid aquatic population swings as new species, or greater numbers of an existing species, are added. Therefore, the determination of whether or not an AEI is occurring should only focus on "Representative Indicator Species" (RIS), meaning certain species that are impingeable or entrainable, and representative of species in the waterbody that need to be protected. Likewise, any monitoring program that is designed and implemented should focus only on impacts to RIS. This will ensure that studies are more focused and cost effective.

In southeastern reservoirs, the forage fish population is often sub-tropical and cannot survive cold winter temperatures. Forage fish living outside of the thermal discharge area are highly susceptible to stress, weakening, and die-offs resulting from cold-shock. During this period, they are also more susceptible to being impinged or entrained because of their weakened condition. Once-through power plant cooling systems are actually beneficial in these circumstances because they provide an over-winter refuge for these forage species. Those that do survive the cold winters have such a high fecundity that they easily re-populate during the spring spawning period and the cycle starts over. This ability to compensate for the high degree of mortality experienced during the winter is totally ignored by EPA in its proposed rule. Instead, the EPA would argue that severely weakened or dead fish being collected at the intake structure is an adverse impact. From a scientific standpoint, this argument is not logical and would be counter to goals of the state resource management agencies. This also points out the need for a rule based on site-specific conditions.

A reasonable definition of AEI should be based on the consideration of all important environmental factors and should focus on the overall health of representative species on a population and community level, and not just on numbers of organisms impinged or entrained. A full discussion of this issue, as well as possible definitions, can be found in comments filed by UWAG, EEl and EPRI.

EPA Response

EPA has rejected all proposed definitions of adverse environmental impact which limit the scope to population or communality level impacts. Please see the response to comment 316bEFR.011.004 for more details. Today's final rule sets performance standards to reduce impingement mortality and entrainment of all life stages of fish and shellfish. EPA believes that the all-species approach may be appropriate under certain circumstances, while the use of representative species may be optimal in other cases. The Agency has therefore concluded that the Director must determine whether a clearly defined all-species approach or representative species approach is appropriate. The Director may choose to require evaluation of all species or of certain representative species. In the case of moribund species, the Verification Monitoring Plan includes a proposal on how naturally moribund fish and shellfish that enter the cooling water intake structure would be identified and taken into account in determining compliance with the performance standards in § 125.94. In this case, the Director will review the proposal making certain to analyze whether the operation of the cooling water intake structure is responsible for the moribund fish and shellfish.

Comment ID 316bEFR.062.008

Author Name Michael W. Stroben
Organization Duke Energy

Subject Matter Code 10.07.02
RFC: Appropriateness of "significantly greater"

Evaluation of Economic Impact

As stated previously, EPA's proposed rule allows for a site-specific approach if: a) the actual cost of implementing BTA is significantly greater than the cost EPA estimated for that technology (cost-cost test), or b) the actual cost of implementing BTA is significantly greater than the benefit received (cost-benefit test).
EPA's proposed rule lacks a definition for the term "significantly greater than." Therefore, "significantly greater than" as it applies to EPA's proposed rule is subjective and is likely to create significant problems during a BTA determination. Duke Energy proposes that the cost of implementing a technology is "significantly greater than" its benefits if the net cost of installing and operating the technology exceeds the net benefit. This definition should ensure that net benefits to society are maximized.

EPA Response

EPA does not agree that significantly greater mean costs simply exceed benefits. See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.062.009

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 10.1

General: cost tests

In addition, there are significant flaws in how EPA has determined the cost of retro-fitting various technologies at existing power plants and in how EPA determined the benefits to society from impingement and entrainment reductions. These issues are addressed in detail in comments submitted by UWAG, EEl, and EPRI.

EPA Response

The Agency notes that this comment simply references the general comments from UWAG, EEI, and EPRI regarding cooling tower retrofit costs. The Agency has not based the final rule on cooling tower retrofits.

Comment ID 316bEFR.062.010

Subject Matter Code 7.02

Performance standards

Author Name Michael W. Stroben

Organization Duke Energy

Baseline Characterization

EPA's proposed rule describes a hypothetical intake structure that is to serve as a "baseline" from which impingement and entrainment reductions are measured. The hypothetical intake structure is defined as a "shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls." The performance of an existing intake structure will then be judged against this hypothetical intake structure. In concept, this is good because existing facilities will be given a "credit" for control measures that are already in place. In practice, however, it will be difficult to come up with the "baseline condition." EPA needs to provide better guidance on how to measure the baseline level of impingement mortality and entrainment for various types of intake structures and waterbody types.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.062.011

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 3.03

Definition: Waters of the U.S.

The use of Cooling Impoundments

Many facilities have constructed cooling impoundments whose primary purpose is to provide intake water used for heat exchange and for the treatment of thermal discharges. These impoundments would not exist if not for the steam electric power plant. In these instances, and for the purposes of this rule, EPA should consider these impoundments as closed-cycle cooling and they should be exempted from further § 316(b) requirements.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.062.012

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 3.01

Definition: Existing Facility

Existing Facilities with Multiple Intake Structures

The EPA needs to clarify that if an existing power plant with multiple water intake structures uses a combined total of 50 million gallons per day (MGD), or more, the entire facility should fall under the Phase II § 316(b) Rules. Without this clarification, it is conceivable that a power plant would fall under both the Phase II Rules and the Phase III Rules. An example would be a facility that had two cooling water intake structures; one with a design capacity of more than 50 MGD and one with a design capacity of less than 50 MGD. If both intake structures supply cooling water to the same facility, the facility should be included in only the Phase II Rulemaking.

EPA Response

As specified in § 125.91 of the final rule, Subpart J requirements (i.e., Phase II) apply on a facility basis, not an intake-by-intake basis. Thus, for any Phase II existing facility subject to Subpart J, all cooling water intakes at that facility are subject to regulation under Subpart J requirements as applicable. Also see definition of "facility" in 40 CFR 122.2.

Comment ID 316bEFR.062.013

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The Role of Environmental Restoration

Duke Energy is encouraged that EPA recognizes that environmental restoration is one way of satisfying § 316(b) requirements. Duke Energy has a long history of using restoration at its power generating facilities to achieve net environmental benefits and we strongly encourage EPA to keep this option in the final rule; as long as it is done on a voluntary basis by the permittee. Restoration activities should include, but not be limited to support for fish hatcheries and stocking programs, wetlands restoration or creation and other types of habitat improvement, and the support of environmental studies that help state and federal resource agencies manage aquatic resources.

EPA Response

The final rule gives permitting authorities the flexibility to make decisions on the appropriate nature of a restoration measure on a case-by-case, site-specific basis. All restoration measures, however, must meet the requirements of the final rule.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.062.014

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 21.06.01

Implications for nuclear facilities

Nuclear Safety

Duke Energy maintains a strong presence in the nuclear energy industry through ownership and operation of three steam electric nuclear plants in North and South Carolina. The proposed § 316(b) rule for existing facilities poses retrofit and safety concerns at these power plants. Duke Energy is encouraged that the EPA recognizes these concerns and is proposing to allow the Nuclear Regulatory Commission (NRC) to intervene during the National Pollutant Discharge Elimination System (NPDES) permitting process if it finds that nuclear reactor safety could be jeopardized. Because impacts to nuclear safety from intake structure retrofits or operational changes are largely unknown at this time, it is imperative that this language remain in the final rule for existing nuclear facilities. Detailed comments on impacts specific to the nuclear industry have been submitted by the NEI.

EPA Response

Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

Comment ID 316bEFR.062.015

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

Implementation of Final Rule

EPA needs to devise a well thought out plan on timing issues associated with implementation of its proposed § 316(b) rule. As an example, for permittees who have already applied for a permit renewal when the § 316(b) rule becomes final, and are in the period of agency review of the application, the permittee should not have to resubmit its application because of the new rule. Instead, the next five-year permit term should be the time in which the permittee complies with the new rule. Likewise, if a permittee is within a year of submitting a renewal application, there will not be time to complete any impingement or entrainment studies for that renewal. Therefore, the permittee should be given the upcoming five-year permit term to perform the necessary environmental or BTA assessments with compliance required in the subsequent five-year renewal period.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.062.016

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

EPA has indicated that it will be developing a guidance document(s) that will aid permittees in designing and implementing impingement and entrainment monitoring plans at existing facilities. However, it is unclear as to when this information will be available. To help permittees more clearly understand EPA's intentions, implementation of final § 316(b) rules for existing facilities should coincide with the availability of this guidance document(s).

EPA Response

EPA plans to develop guidance on implementing today's final rule; however a date of availability has not yet been determined.

Comment ID 316bEFR.062.017

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

In addition, once a permittee is given § 3 16(b) approval, the permitting agency should be empowered to re-approve the existing intake unless significant operational changes or changes in aquatic populations that are not due to resource agency activities warrant an earlier review period.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. See response to comment 316bEFR.041.126 for a discussion.

Comment ID 316bEFR.062.018

Author Name Michael W. Stroben

Organization Duke Energy

Subject Matter Code 9.06

Burden to facilities (general)

Burden of Implementation

In the proposed § 316(b) rule for existing facilities, the EPA requests comment on the burden associated with a site-specific approach. Duke Energy believes that the majority of the burden rests on the permittee and not the permit writer. The permittee is responsible for designing and conducting any necessary environmental studies, reviewing and summarizing data, and presenting results to the permit writer for their review. The permittee is responsible for performing any cost-cost tests, or cost-benefit tests. The permittee is also responsible for the implementation of any required technologies, monitoring programs, and/or environmental restoration activities. The permit writer is responsible for ensuring compliance with agreed upon § 316(b) requirements. Clearly, the majority of the overall burden rests with the permittee.

Many states, including North Carolina, agree that the site-specific approach is the most workable for their permitting agencies. Refer to the enclosed copy of a February 22, 2002 letter from Michael P. Easley (Governor, NC) to The Honorable Christine Todd Whitman (Administrator, US EPA). In the letter, Governor Easley urges the EPA to "provide a framework for site-specific decision making — one that allows North Carolina to make the critical plant control decisions and will not arbitrarily reopen past regulatory decisions that we have found to be effective."

EPA Response

The final rule includes regulatory pathways for site-specific compliance. Therefore, the commenter's recommendation to adopt a site-specific approach has been met. However, the Agency believes that in assessing the share of burden between permittee and permit writer the commenter has underestimated the requirements and responsibilities of the permit writer. The commenter states that the sole responsibility of the permit writer is "ensuring compliance with agreed upon section 316(b) requirements." The commenter fails to acknowledge that the permit writer is responsible for reviewing and approving any necessary studies, reviewing and approving data, and analyzing the results of potentially multiple presentations from many facilities. The permit writer is further responsible for evaluating, reviewing, and approving any cost-cost tests, or cost-benefit tests. In addition, the permit writer is responsible for approving the implementation of any required technologies, monitoring programs, and/or environmental restoration activities. Clearly, the overall burden is shared between permittee and permit writer, in the Agency's opinion. Nonetheless, the permit writer lacks the resources of the majority of the permittee and the question of "equitable" burden is not addressed by the commenter. The Agency asserts that in site-specific decision making that the permit writer has greater burden than in other cases analyzed by the Agency. Regardless, the Agency determined that the site-specific alternatives were tantamount to an equitable regulation to the permittees, and has determined that the burden to permit writers is acceptable. See the Information Collection Request 2060.02 supporting the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Joseph L. Citta, Jr.

On Behalf Of:

Nebraska Public Power District

Author ID Number:

316bEFR.063

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.063.001

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

NPPD doesn't agree that a closed-cycle recirculating cooling system is an available technology for facilities that currently have once-through cooling water systems. For most existing facilities it is neither financially nor spatially feasible to replace a once-through with a closed-cycle cooling water system. EPA indicates in the proposed rules that it considered other technology-based options. These options are: 1. Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems for All Facilities, 2. Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type, 3. Intake Capacity Commensurate With Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow, and 4. Impingement Mortality and Entrainment Controls Everywhere. Further EPA itself notes that even for option 3 (the most limited application of closed-cycle recirculating cooling water systems), the incremental costs of this option significantly outweigh the incremental benefits.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.063.002

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 7.01.03

Option 3--Site-specific determination

NPPD strongly supports the inclusion of the third method for establishing the best technology available (BTA) for minimizing adverse environmental impact. This "site-specific" determination of BTA is an important option for a facility to have available for use in cases where its costs of compliance with the applicable standards are significantly greater than EPA's estimated costs or the benefits of complying with the standards at the facility's site.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.063.003

Subject Matter Code 7.02
Performance standards

Author Name Joseph L. Citta, Jr.
Organization Nebraska Public Power District

NPPD supports the EPA's decision that the 316(b) Phase II rule will determine the cooling water intake performance standards for a new electric generating unit constructed at an existing facility.

EPA Response

Whether a facility is a new facility subject to Phase I or an existing facility subject to Phase II will be determined based on whether or not it meets the definition of existing facility at 125.83.

Comment ID 316bEFR.063.004

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

NPPD supports EPA's determination that no further entrainment reduction is necessary for a facility that withdraws from a freshwater river or stream less than 5% of the annual mean flow.

EPA Response

EPA notes the comment and has included this provision in today's final rule.

Comment ID 316bEFR.063.005

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 7.02

Performance standards

The proposed rule, in compliance option 2, allows a facility to implement design and construction technologies, operational measures, and/or restoration measures that meet the proposed performance standards. These performance standards for reduction in impingement mortality and entrainment are expressed as a range of percentage reduction. The NPPD position is that the Director shall interpret any performance within the range for the appropriate waterbody type as meeting the proposed performance standard.

EPA Response

EPA has decided to give the Director the authority to determine methods of evaluating compliance. Thus, the Director will specify species and life stages of concern. The Director may choose to require evaluation of all species or of certain indicator species; or the Director may elect to verify compliance using biomass as a metric. The Director may also authorize compliance to be determined based on a Technology Installation and Operation Plan. EPA believes that as each situation will be somewhat unique, it should be left to the Director to determine the appropriate compliance approach.

Comment ID 316bEFR.063.006

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 21.09

Permit applications/implementation schedule

The proposed rule states that 316(b) requirements for Phase II existing facilities would be implemented through the NPDES (National Pollutant Discharge Elimination System) permit program. Facilities subject to the proposed rule would comply with Phase II rules when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued. This implementation plan presents some significant scheduling problems for facilities where NPDES permits expire in the next several years. A NPDES permit renewal application is due 180 days prior to expiration. The proposed rule states this application would include new information requirements for a facility: physical data to characterize the source waterbody in the vicinity where the cooling water intake structures are located; data to characterize the design and operation of the cooling water intake structures; information describing the design and operating characteristics of the cooling water systems and how they relate to the cooling water intake structures at the facility; and all facilities (except those that already use a closed-cycle, recirculating system) must submit a Comprehensive Demonstration Study.

The Comprehensive Demonstration Study has seven components: proposal for information collection; source waterbody flow information; impingement mortality and entrainment characterization study; design and construction technology plan; information to support proposed restoration measures (only for facilities proposing to use restoration measures); information to support site-specific determination of best technology available for minimizing adverse environmental impact (only for facilities choosing a site-specific standard); and a verification monitoring plan. For the first component of the study, a facility would be required to submit a proposal to the Director for review and approval stating what information would be collected to support the study. Several of these components could likely require source waterbody studies conducted over multiple seasons and more than one year to obtain representative data. The data acquired will also require some time for analysis and the development of a report. The NPPD position is that any facility subject to Phase II with a NPDES permit expiring 3 years or less after the issuance of the final rule should not be subject to these requirements until the subsequent NPDES permit renewal. This staggering of the imposition of the requirements for the final Phase II rule will also allow States to better plan for the resources necessary for their implementation.

EPA Response

EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements. See response to comment 316bEFR.034.005 for a discussion.

EPA has also clarified the timing for submittal of the required studies. See response to comment 316bEFR.034.066 for details.

Comment ID 316bEFR.063.007

Author Name Joseph L. Citta, Jr.
Organization Nebraska Public Power District

Subject Matter Code 21.03
Monitoring requirements

EPA requested comment on minimum frequencies for verification / compliance monitoring, specifically, for at least two years following initial permit issuance, impingement samples at least once per month over 24 hours and entrainment samples at least biweekly over 24 hours during primary period of reproduction, larval recruitment, and peak abundance. The NPPD position is that once the best technology available to meet the required performance standards (or site-specific requirements) has been determined and installed, a facility should only have to conduct monitoring to show the equipment (or other measures) are operated or utilized in accordance with permit conditions. Verification / compliance monitoring will be satisfied by monitoring the operations of the best technology available.

EPA Response

Please see EPA's response to comment 316bEFR.021.007.

Comment ID 316bEFR.063.008

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

The proposed rule indicates that at each NPDES permit renewal, the same Phase II information requirements will be in place. The NPPD position is that once best technology available has been implemented for a facility, unless there have been significant changes to the waterbody / aquatic community, that technology remains best technology available. To interpret otherwise would mean a facility could be faced with the design and installation of a new best available technology at each NPDES permit renewal. A facility should not be required to submit a comprehensive data study with each permit renewal.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. See response to comment 316bEFR.041.126

Comment ID 316bEFR.063.009

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 21.01.01

Source water physical data

With respect to the source water physical data, the comprehensive demonstration study, and any other biological studies, NPPD believes that the Director should be given authority to determine which studies, and their parameters, are necessary and to determine which species are of concern.

EPA Response

EPA agrees that the Director should determine the specific study requirements after reviewing the facility's Proposal for Information Collection. Study requirements will be determined in accordance with the compliance alternative selected. EPA believes the Director is best positioned to make decisions about the specific species that should be monitored, the frequency of monitoring, averaging times, etc., that support the compliance alternative selected, however a facility may propose these parameters in the Proposal for Information Collection for review and approval by the Director.

In addition, source water physical data is required of all applicants under 122.21(r)(2). As discussed in the preamble to today's rule, source water physical data are needed to characterize the facility and evaluate the waterbody type and species potentially affected by the cooling water intake structure. The Director would use this information to evaluate the appropriateness of the design and construction measures, operational measures, and/or restoration measures proposed by the applicant. Thus, in today's final rule, EPA is requiring source water physical data to be submitted by all applicants.

Comment ID 316bEFR.063.010

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

NPPD supports EPA's recognition of the importance of restoration measures in maintaining a healthy fishery. Because the State Director is the most familiar with local water body conditions and history, the NPPD position is that it be at the Director's discretion as to whether and what extent restoration is a part of best technology available for a facility to meet the performance standards of the Phase II rule. The flexibility of this option allows ample opportunity to enhance fishery populations especially in Nebraska where the source water for facilities comes from a variety of water bodies and site-specific fishery concerns.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority for restoration measures, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.063.011

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.03

Definition: Waters of the U.S.

A number of public power electric generating facilities use cooling ponds or reservoirs that have been constructed off of a main watercourse channel. Water withdrawn from the cooling reservoir is used for noncontact cooling and discharged back into the reservoir from which it can be withdrawn and recirculated. Such man-made cooling reservoirs or ponds are supplied with makeup water pumped from a nearby source, such as a river. Such cooling water ponds often provide a valued asset due to the enhanced aquatic habitat and recreation opportunities that they offer.

A cooling pond or reservoir meets the definition of a “closed-cycle recirculating system" which as set forth in Section II, Scope and Applicability of the Proposed Rule [Page 17129] section G “means a system designed, using minimized makeup and blowdown flows, to withdraw water from a natural or other water source to support contact and/or noncontact cooling uses within a facility. The water is usually sent to a canal or channel, lake, pond, or tower to allow waste heat to be dissipated to the atmosphere and then is returned to the system view source water (make up) water is added to the system to replenish losses that have occurred due to blowdown, drift arid evaporation."

Although closed-cycle, recirculating cooling is not one of the technologies on which the presumptive standards are based the proposed rules recognize that the use of a closed-cycle, recirculating cooling system would readily achieve such standards. For that reason, the proposed rule, 124.84(b)) would allow the performance standard to be satisfied by reducing the “intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system."

Based on the above, NPPD readily concludes that those existing facilities, which are located on and use cooling water from a closed-cycle, cooling pond are in compliance with the proposed Phase II rule. This conclusion appears to be further bolstered in EPA’s assessment of ” impacted facilities [page 17142] in which EPA concludes based on an analysis of survey data that "the proposed rule would not require any changes at approximately 89 large existing facilities with recirculating wet Cooling systems (e.g., wet cooling towers or ponds).”

However, what appears to be clear cut is muddled in the discussion on cooling ponds vis a vis “waters of the United States." Under Section C, Is My Facility Covered If It Withdraws From Water of the U.S., EPA states that they "do not intend this proposal to change the regulatory status of cooling ponds." EPA further clarifies that “cooling ponds are neither categorically included nor categorically excluded from the definition of waters of the United States at 40 CFR, 122.2." Accordingly, EPA has concluded "facilities that withdraw cooling water from cooling ponds that are waters of the U.S. and meet other proposed criteria for coverage would be subject to today’s proposed rule."

In that a number of cooling ponds provide recreational and fishing opportunities for both in-state and out-of-state visitors, i.e., support interstate commerce, they often will meet the definition of waters of the United States. The issue, however, should not be whether or not they are de facto waters of the United States but, rather, are they a system that satisfies the performance standard or a system that must meet the performance standard. Or more simply put, are they part of the solution or part of the problem.

The uniqueness of a man-made, off-channel, closed-cycle, recirculating cooling pond is such that we believe they should not be lumped together with lakes and reservoirs — regardless of whether or not they are determined to be waters of the United States. More appropriately, these man-made resources, which often provide a valued habitat and fishery that otherwise would not exist and allow a cooling water intake capacity at a level commensurate with the use of a closed-cycle, recirculating cooling system, should be explicitly defined as meeting the performance standards of this rule. The presence of NPPD facilities has enhanced the sport fishery in many circumstances that normally would not be there.

EPA Response

The final rule provides that a Phase II existing facility may demonstrate that it has reduced its flow commensurate with a close-cycle recirculating system and therefore is not required to further demonstrate compliance with applicable performance standards. (see, § 125.94(b)(1)). However, whether use of a specific pond or reservoir meets the definition of a closed-cycle, recirculating system will be determined on a case-by-case basis. Also see response to 316bEFR.006.001.

Comment ID 316bEFR.063.012

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 7.02

Performance standards

With respect to the performance standard for reduction in impingement mortality of 80 - 95%, NPPD offers the comment that this level of reduction maybe possible ONLY with the use of advanced technologies that are not applicable to all water bodies. The Director should be given discretion on determining best technology available for a facility. This provides even more justification to a site-by-site determination. Tumbleweeds, corn shucks, plant debris in the spring and fall, can be devastating and very maintenance intensive to any kind of trash removal, fish removal system found in the state.

EPA Response

EPA disagrees that the impingement mortality standard may be met only with the use of advanced technologies that are not applicable to all waterbodies. Several of the technologies used to reduce impingement mortality have been widely-deployed and studied for the better part of three decades (modified ristroph screens, barrier nets) and can no longer be considered "advanced".

EPA agrees, however, that site-specific factors may render one design and construction technology or operational measure more successful at one facility than another. Today's rule leaves the determination of BTA for individual facilities up to the Director.

Comment ID 316bEFR.063.013

Author Name Joseph L. Citta, Jr.
Organization Nebraska Public Power District

Subject Matter Code 10.09

RFC: Does today's proposal allow for 'backsliding'

EPA has expressed concern that the proposed performance standards could create an opportunity for "backsliding" from current impingement mortality and entrainment performance levels. NPPD does not believe this concern is justified and that facilities will not remove or disable currently installed technology from their cooling water intake structures.

EPA Response

See response to 316bEFR.021.013.

Comment ID 316bEFR.063.014

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

NPPD would like EPA to include a provision to cover facilities that will be decommissioned within 10 years (a period that also coincides with the timing for significant investment for air emission controls currently under consideration) after the Phase II rule becomes final. If the Director obtains necessary assurances that the facility (and its cooling water intake structure) will cease operation within a time certain, the final NPDES permit(s) should be renewed without the requirements imposed by the Phase II rule.

EPA Response

The final rule does not exclude facilities that will be decommissioned within 10 years for several reasons. First, the power generation market is dynamic and changes in the market often influence decisions to prolong the use of aging facilities. Second, the emergence of innovative technologies (e.g., combined cycle energy production) often can alter the useful life of existing facilities. Finally, there is flexibility built into this rule. Given these factors, EPA has concerns regarding what type of assurances of closure would be sufficient, whether and how a facility could "change its mind" if faced with changed circumstances, whether such agreements could be effectively enforced, and whether such an approach most effectively fulfills the objectives of section 316(b).

Comment ID 316bEFR.063.015

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

NPPD feels from a scientific and risk management point of view, USEPA's decision based the proposed §316(b) performance standard on entrainment, rather than entrainment survival. Detailed comments resulting from review of sections Vl.A.7 and Vl.A.8.b of the rule and the support document on entrainment survival, Chapter A7, are provided below. The major findings and recommendations resulting from the review include:

-The proposed rule's exclusion of entrainment survival from the BTA performance standard is scientifically flawed;

-The proposed rule's exclusion of entrainment survival from the BTA performance standard can be ecologically unprotective and would not provide comparability in quantifying resource impacts among facilities and waterbodies;

-To provide a solid scientific and resource management foundation for BTA determination, the performance standard should be based on realistic estimates of entrainment losses (i.e. entrainment mortality) and be linked to protection of higher biological levels of organization.

-USEPA's evaluation does not reflect consideration of the evolution of entrainment survival study methods— methods have matured and later methods do allow for valid estimates of entrainment survival with appropriate levels of precision.

-USEPA's assumption of 100% entrainment mortality is not supported by the overwhelming evidence of substantial entrainment survival of many species that has been found in studies conducted to date, and is not justified by the concerns US EPA presented in Chapter A7.

NPPD feels the Performance Standard for BTA should be based on reducing entrainment loss, as it currently is for impingement. USEPA correctly states that:

Assessment of ecological and economic consequences of entrainment is based on estimates of the number of fish and shellfish killed as a result of entrainment" (p. A 7-1) (Emphasis added.)

Despite the above statements, USEPA, instead, proposes a performance standard that requires reducing numbers entrained rather than reducing numbers killed (Vl.A.7 of the proposed rule). Their decision was based on the belief that appropriate entrainment mortality data for existing and potential intake technologies used as the basis for the rule was either absent or insufficient. However, USEPA, in reality, is not excluding entrainment mortality from consideration in choosing this approach, but rather assuming all entrained organisms die (100 percent mortality) as a result of passage through cooling water intake system (CWIS) for all of the baseline and benefits evaluations. USEPA notes in Chapter A7 (e.g. Section A7-5), that they believe this assumption of 100 percent entrainment mortality is consistent with a precautionary approach, is protective of biological resources, and implies consistency in quantifying resource impacts at different facilities and waterbodies.

It is of utmost importance that USEPA reevaluate this position, which fundamentally influences the soundness of the decision-making process for 316(b). A performance standard that is scientifically sound, consistent with risk assessment and management frameworks currently in use by USEPA, and environmentally protective should be based on numbers killed, as USEPA currently proposes for impingement, to provide better measures of potential risks at population and community levels. Our comments are elaborated in more detail below. The proposed rule should clarify terms dealing with entrainment mortality and distinguish between entrainment loss as a performance standard and estimates of entrainment mortality rate that may be used in benefits assessment. The protection requirements should be consistently based on actual risks to the ecological entities of concern for both entrainment and impingement. To assure BTA performance requirements are protective, they should be based on entrainment loss. Facility operators should be allowed to address the baseline assumption of 100% entrainment mortality by inclusion of entrainment survival estimates in the BTA assessment, as USEPA proposes for impingement. To assure BTA performance standards are protective, and to provide a basis for evaluating tradeoffs among species as part of BTA determination they should provide for consideration of risks to higher biological levels in the BTA determination. Comparability in quantifying resource impacts and determining BTA at different sites and waterbodies requires that the entrainment mortality rate be considered. The description of the entrainment vulnerability is overly broad and misleading.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.063.016

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Estimates of entrainment mortality RATE CAN and should be used in Benefits Assessment.

USEPA indicates that the proposed Phase II rule does not preclude the use of estimates of entrainment mortality and/or survival rates when estimating benefits to be achieved through installation of BTA (Section Vl.A.8.b). However, USEPA expresses some reservations about the quality of existing entrainment survival data and the potential of collecting reliable survival data in the future based on its review of 13 entrainment survival studies, which it provides in Chapter A7.

We believe that it is scientifically appropriate to allow consideration of entrainment mortality rates in benefits estimation for the same reasons discussed previously above. Further, as elaborated below, previous entrainment studies, including those reviewed by USEPA, were conducted during a period when equipment and procedures for estimating entrainment survival were being refined to minimize the potential confounding influences of handling stress. Consequently, not all previous entrainment survival studies can be viewed with the same degree of scientific certainty. However, much valuable information exists (far more than “a provocative set of anecdotes”) that could and should be used as part of the evaluation of alternatives. Finally, the success of some of the most recently conducted studies clearly demonstrates that entrainment mortality can be estimated with a level of confidence comparable to that of other biological testing (e.g., bioassay testing). Thus, assuming a 100 percent entrainment mortality rate for the many relatively hardy species would clearly result in biased estimates of entrainment loss and introduce much greater uncertainty in the decision-making process than would inclusion of best available estimates of entrainment mortality rate. In such cases, an assumption of 100 percent entrainment mortality rate cannot be scientifically justified. This concept would carry over and create a flaw in the cost benefit analysis as well.

Entrainment survival is a scientifically demonstrated reality for some species. Entrainment mortality rate is estimatable with sufficient precision. Existing data has utility in benefits assessment. Although not all commonly entrained species have been studied in sufficient detail, existing information related to entrainment survival does cover many of the commonly entrained species and can have important utility for evaluating the potential benefits of CWIS alternatives. Information on entrainment survival has long been recognized as an important evaluative tool for making better decisions on the selection of technologies for minimizing impacts (Jinks et. al. 1981). In addition to the results of previously conducted field studies of entrainment survival, other available information that assessors should consider includes:

-Thermal tolerance data relevant to short-term exposures of early life stages to elevated temperatures;
-Pressure bomb and condenser simulator studies that help to define the general range of mechanical stresses tolerated by fish eggs and larvae.
-Direct release studies of through-plant survival using live hatchery-reared eggs and larvae
-Monitoring data demonstrating species and life stages obtained and seasonal distribution.

While actual entrainment survival assessments have been conducted at only a relatively small number of existing power plants, the studies to date support the transferability of results to other power plants with similar pumping and thermal regimes. Hence, the results of studies conducted at one facility can be used to support the evaluation of potential benefits of intake alternatives at other, similar facilities.

The following example serves to illustrate how existing entrainment survival information can be used to aid in the selection of potential intake alternatives to reduce CWIS impacts:

An existing steam-electric generating facility operates in load following mode at less than full generating capacity throughout most of the year. Load is typically lowest during late evening and nighttime hours. Unfortunately, the existing cooling water pumps run at a fixed speed regardless of facility generating load and cooling requirements. Therefore, it appears that a significant reduction in entrainment exposure might be achieved through reductions in cooling water withdrawal by installation of variable speed pumps that could better match the changing cooling water need of the facility. However, both the permitting authority and the facility operators are concerned that installation of variable speed pumps could result in elevated condenser discharge temperatures and higher thermal stress. This increased stress might result in a higher entrainment mortality rate that could offset potential reductions in the numbers entrained for the species being entrained. Facility operators are further concerned that flow reductions being sought with the use of variable speed pumps will result in losses of condenser efficiency resulting in severe economic penalties to operation of the facility.

A review of available information for the facility indicates that no site-specific measurements of through-plant survival are available for any of six species that are most abundant in entrainment at the facility. However, estimates of entrainment survival are available for two of the species and on a congeneric of a third species at other facilities. These data indicate that these three species could be very tolerant of the mechanical stresses of entrainment at the facility being evaluated. In addition, laboratory-based thermal tolerance data for short-term exposures to temperature elevation is also available on the early life-stages of these species. Although no entrainment survival data is available anywhere for the other three species, data for related family members indicates low (0-15 percent) entrainment survival.

All parties decide to include an analysis of the limits on flow reduction imposed by thermal mortality and condenser performance in the benefit assessment. The permitting authority and facility operators felt that the most realistic estimates of potential benefits for the three focal species that have potentially high entrainment survival would be obtained by using mechanical mortality rate estimates and thermal tolerance threshold limits available from studies conducted at other facilities. The analysis assumed 100 percent mortality rates for the other three focal species. Losses were estimated for variable speed pumps and for projected typical operation of the existing intake. By comparing these results with losses for a baseline assuming 100 percent mortality rate for organisms entrained at full capacity operation, the assessors provided information on the incremental benefits of variable speed pump
installation compared to the protection already implemented by facility operation. Further, should the assessment show significant potential benefits of installing variable speed pumps, the facility plans to incorporate site-specific studies to verify entrainment mortality rates for the entrained species as part of the overall engineering and implementation plans.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.063.017

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

Clarify that storm water permits do not subject an otherwise non-applicable facility to coverage under the Phase II rule.

The Phase II rule applies to existing power generation facilities that use a cooling water intake structure (CWIS) to withdraw certain amounts of cooling water from waters of the United States lithe facility is a point source subject to an NPDES permit. The preamble to the Phase II rule, however, discusses a hypothetical facility that discharges wastewater, storm water, and cooling water, or some combination thereof, and suggests that the permitting agency would include CWIS requirements in the NPDES permit. The preamble then goes on to state:

In the event that a Phase II existing facility's only NPDES permit is a general permit for storm water discharges, the Agency anticipates that the Director would write an individual NPDES permit containing requirements for the facility's cooling water intake structure. The Agency invites comments on this approach for applying cooling water intake structure requirements to the facility. 67 Fed. Reg. 17129.

NPPD disagrees with EPA's assertion of jurisdiction over facilities that have NPDES permits only for storm water. There are both legal and practical arguments against such an approach. First, Section 316(b) of the Clean Water Act (CWA) does not grant EPA comprehensive authority to address all cooling water intake structures. Instead, EPA is directed to develop Best Technology Available (BTA) requirements in connection with "any standard established under section 301 or section 306 and applicable to a point source." The special provisions addressing storm water discharges in CWA section 402(p) were enacted subsequent to that directive in section 316(b), and in any case they do not constitute a "standard established under section 301 or section 306." There is thus no indication that Congress intended that a facility subject only to a storm water permit would have to comply with section 316(b) standards.

In addition to the absence of CWA statutory authority for applying the proposed rule to storm water permits, there are a number of practical reasons why it would be inappropriate for EPA to do so, especially considering the potential impacts that such an action would have if similarly applied in Phase III. If EPA were to subject to section 316(b) facilities whose only direct discharge is storm water, most of which are subject to an NPDES general permit, EPA would be imposing a significant administrative burden on both the regulated community and on state and EPA permit writers. Permitting authorities would have to somehow identify such facilities and then develop, following procedural requirements that apply to NPDES permitting, individual NPDES permits for such facilities for the first time. EPA should avoid imposing this burden, in light of its lack of statutory authority and the questionable environmental benefit to be obtained from such an action.

EPA Response

See response to 316bEFR.035.001.

Comment ID 316bEFR.063.018

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.06

RFC: Cooling water withdrawal thresholds of 25%

The definition of a cooling water intake structure, and the applicability threshold for the rule, should be based on a minimum of 50% of the intake water used for cooling purposes. Do not require monthly determinations of the applicability of the Phase II rule on the basis of water use.

The proposed rule states in effect that it applies to an existing facility if the facility is a point source with a water intake structure, and the facility uses for cooling purposes at least 25% of the water drawn through that intake structure. As stated in comments on the Phase I rule, there is no logical reason for asserting that an intake structure constitutes a cooling water intake structure" where the primary purpose of the intake structure is to withdraw water for non-cooling purposes. A cooling water intake structure should be one that withdraws water where more than

50% of the water is used as cooling water, i.e., where the primary purpose for the structure is to withdraw cooling water.

EPA Response

Please see response to comment 316bEFR.035.002.

Comment ID 316bEFR.063.019

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.06

RFC: Cooling water withdrawal thresholds of 25%

Regardless of whether the applicability threshold is 50% or 25%, though, EPA needs to provide clearer and more practicable guidance on how to determine if the threshold is met. Section 125.91(d) of the proposed rule discusses how one calculates whether 25% or more of water withdrawn is used for cooling water. Unfortunately, the language of the proposed rule would create serious implementation problems.

The proposed rule states that the 25% threshold "is met if any monthly average of cooling water over any 12 month period is 25 percent or more of the total water withdrawn." Besides the ambiguous language used, the primary problem with this approach is that it seems to suggest that a facility make a determination every month as to whether or not it is within the scope of the rule. Applicability of the Phase II rule is a very important determination with significant financial and other resource consequences. It is both unreasonable and impracticable for the regulated entity, as well as the permitting authority, to be expected to make this determination every month. Moreover, withdrawal rates may vary from month to month due to seasonal or process variables, and facilities should not be subject to the rule simply because cooling water use percentages may marginally exceed 25% (or other applicability threshold) in a given month.

We suggest instead that the rule require that the calculation be made once at the time the facility submits its application for renewal of its NPDES permit. At that time, the facility should review the previous 12 months of flow data or, alternatively, a representative 12 month period. If the total amount of cooling water used during that period is 25% or more of the total flow for that period, then the facility would be subject to the Phase II rule. If not, the facility is not subject to the rule. This determination would be revisited each time a permit is renewed and would be based on the previous five years' worth of data.

This approach provides a high degree of certainty for both the facility and the permitting agency as to the basic question of whether a facility is subject to the rule. It is also comparable to the approach EPA has taken for applying production-based effluent limitations guidelines, where application of the guidelines and calculation of mass effluent limitations based on production occurs at the time a permit is issued or renewed, not on an ongoing basis.

EPA Response

Please see response to comment 316bEFR.035.002.

Comment ID 316bEFR.063.020

Author Name Joseph L. Citta, Jr.
Organization Nebraska Public Power District

Subject Matter Code 3.06.01
Withdrawal threshold of 50 MGD

Permittees should have the option of meeting an actual flow threshold in lieu of the 50 MGD design flow threshold.

The proposed rule lists a design intake flow of 50 million gallons per day (MGD) as one of the criteria for applicability of the proposed Phase II regulations. In many cases, however, actual intake flow is below the design capacity. If a permittee is willing to accept permit limitations that restrict its actual water use to some level below 50 MGD, and thereby not be subject to the Phase II regulations, EPA should encourage such actions as a means of reducing the potential for entrainment and impingement, which the rule seeks to avoid.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.063.021

Author Name Joseph L. Citta, Jr.

Organization Nebraska Public Power District

Subject Matter Code 3.01

Definition: Existing Facility

Remove the proposed imposition of Best Professional Judgment requirements.

The proposed Phase II rule contains a provision that is certain to cause confusion and is potentially the source of regulatory uncertainty, controversy, and litigation. Proposed 40 C.F.R. § 125.90(c) states that: "Existing facilities that are not subject to this subpart [the Phase II rule] must meet requirements under section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPJ) basis." The apparent effect of this provision would be to subject any facility with an NPDES permit and withdrawal of any amount of surface water for cooling purposes to case-by-case section 316(b) BPJ determinations.

This provision unnecessarily blurs the distinction between Phase II and Phase III facilities. EPA appears to be directing permit writers to impose BPJ section 316(b) conditions on Phase III facilities (and even facilities with de minimis impacts or falling below the applicability thresholds in an eventual Phase Ill rule) before EPA promulgates the Phase Ill rule. The benefits and objectives of the phased rulemaking addressing different types of facilities in different rules would be contravened by including a provision in the Phase II rules that sweeps in all of the Phase III facilities as well.

The language in 40 C.F.R. § 125.90(c) is unnecessary. Although EPA claims that the authority for applying BPJ interpretations for purposes of section 316(b) requirements already exists, it has never included such a requirement in its regulations, including the 40 C.F.R. Part 125 Subpart A regulations on establishing BPJ permit limits. If EPA believes that its rules have always allowed imposition of case-by-case requirements for cooling water intake structures, then there is no need to modify the regulations now. By including express BPJ language in the section 125.90(c) of the Phase II rule, EPA seems to imply a greater need for BPJ requirements for Phase III intake structures now, when in fact the opposite is certainly the case: Phase III facilities will be addressed shortly in a new rulemaking, so it would be particularly inefficient and problematic to direct permit writers to begin issuing BPJ requirements for Phase III facilities that have been operating without any BPJ intake structure requirements for many years.

Moreover the proposed Phase II regulations give no guidance as to when BPJ permit conditions are required. In fact, proposed 40 C.F.R. § 125.90(c) could be interpreted to require that BPJ requirements under section 316(b) be included in every NPDES permit for any facility with a surface water intake structure where any portion of the water is used for cooling purposes. Likewise, EPA provides no guidance in the regulations or preamble as to how the permit writer should establish BPJ section 316(b) permit conditions. The absence of details or specific interpretive guidance on the applicability of BPJ requirements makes it impossible for industry to comment comprehensively or specifically on this proposal. Even more importantly, the lack of specificity would leave permit writers and permittees with the difficult and resource-intensive task of trying to develop and negotiate permit conditions in a regulatory vacuum.

Industry has both legal and practical concerns about the concept of BPJ limitations on intake structures in general. We have previously communicated some of those concerns to EPA and plan to do so in greater detail in the Phase III rulemaking. Apart from these specific concerns with BPJ, however, there is simply no justification for EPA directing consideration of BPJ limits for Phase III facilities in the Phase II rule.

If a state permitting authority believes that the intake structure at a Phase III facility needs to be regulated before EPA promulgates the Phase III rule, and if that state has a state law that authorizes imposition of requirements on cooling water intake structures, then under Clean Water Act section 510 the state would be able to impose those more stringent requirements. States do not, however, have any authority to come up with their own, case-by-case interpretation of the regulations EPA is developing under section 316(b). The BPJ language of the Phase II proposal suggests that they do.

Another aspect of BPJ authority provided by proposed 40 C.F.R. §125.94(e) is the provision to authorize the permit writer to: “establish more stringent requirements as best technology available (BTA) for minimizing adverse environmental impact” if the permit writer determines that compliance with the technology requirements of the Phase II rule “would not meet the requirements of other applicable Federal, State, or Tribal law.” Again, this provision is both confusing and unnecessary. It makes no sense to suggest that a given set of technologies for minimizing adverse environmental impact from a cooling water intake structure constitutes BTA unless use of that technology would not meet the requirements of some other applicable law. While there may be some other law that requires imposition of more stringent conditions on a particular cooling water intake structure, those more stringent conditions would not be determinative of BTA; rather, they would be imposed by the other law as a requirement in addition to the BTA requirement of CWA section 316.

At a minimum, EPA should delete language suggesting that BTA may be dictated by other statutes, rather than the requirements of section 316(b) and EPA’s implementing regulations. It would be preferable, however, to remove this provision altogether, which raises more questions than it answers and is not necessary for proper operation of the Phase II regulations.

EPA Response

The final rule provides that existing facilities that are not expressly subject to this (Subpart J – Requirements Applicable to Cooling Water Intake Structures for Phase II Existing Facilities Under Section 316(b)) or another subpart of Part 125, must meet the requirements of section 316(b) of the CWA as determined by the Director on case-by-case, best professional judgment (BPJ) basis. EPA included this provision to ensure that section 316(b) requirements are implemented as necessary and appropriate at those existing facilities that use a cooling water intake structure but do not meet the applicability criteria of the phase II existing facility rule. Such facilities could include, but are not limited to, existing facilities with flows below the Phase II threshold or that do not meet the requirement that 25 percent of water intake be used for cooling. In each case, consistent with 316(b), such facilities would have to have one or more cooling water intake structures that withdraw cooling water from waters of the U.S., be a point source subject to NPDES permit, and be subject to 301 or 306 standards. Under the CWA, EPA is not at liberty to categorically exclude facilities from regulation that otherwise meet the applicability criteria of the Act. Moreover, given that this final regulation is not an effluent limitation guideline, EPA believes that it is it is appropriate to specifically include the BPJ requirements in the rule language.

EPA expects that in determining BPJ permit conditions for cooling water intake structures the Director will consider those factors identified in 316(b) and applicable NPDES program regulations. Such factors include, but may not be limited to, the adverse environmental impact posed by a facility, the control technologies that reduce these impacts, relative technology efficacy in minimizing impacts, and the availability of different control technologies. EPA may develop further guidance regarding the development of 316(b) BPJ permit conditions if the Agency deems it necessary following the completion of the 316(b) rulemakings.

Authority for BPJ determinations is in part found in 402(a)(1), which generally provides that prior to full implementation of specified CWA requirements (including sections 301 and 306 of the Act), the permitting authority may issue permits that include conditions necessary to carry out the Act. Section 316(b) requires that standards established pursuant to sections 301 and 306 of the CWA and applicable to a point source meet specified levels of performance. Given that some existing facilities that meet the applicability criteria of section 316(b) are not subject to the phase II existing facility rule, EPA has authority to issue BPJ-based permit conditions to these facilities according to the terms of section 316(b) to fully implement that section. A similar BPJ provision is included as part of the Phase I 316(b) final rule. (See, §125.80(c)).

EPA recognizes that following the effective date of the Phase II rule and prior to the effective date of the Phase III rule, this BPJ provision could potentially be used to address existing facilities that may ultimately be subject to Phase III requirements. The Agency fully expects that any BPJ permit conditions will continue to be developed based on the case-by-case characteristics of the relevant facility and will, thus, fully consider and appropriately address the specific characteristics of such facilities (including, small power producers or manufacturers as necessary and appropriate). Given the timing of these rulemakings and the implementation workload associated with the Phase II rule becoming effective, EPA believes that the permitting focus will remain predominantly on in-scope Phase II facilities pending the final Phase III rule.

With regard to proposed § 125.94(e), which is applicable under this rule but not under BPJ-based permits, this provision has been redesignated as § 125.94(f) and reworded to provide that "The Director may establish more stringent requirements as best technology available for minimizing adverse environmental impact if the Director determines that your compliance with the applicable requirements of paragraphs (b) and (c) of this section would not meet the requirements of applicable State and Tribal law, or other Federal law." This provision is intended to allow consideration as appropriate for the fact that State and Tribes may have addition or more stringent requirements applicable to Phase II existing facilities, as well as for the fact that other Federal laws also may be applicable when determining the permit conditions that fulfill this rule. EPA does not intend this provision to alter the national requirements for BTA under section 316(b), only for Directors to retain the ability to supplement them where appropriate.

Comment ID 316bEFR.063.022

Author Name Joseph L. Citta, Jr.
Organization Nebraska Public Power District

Subject Matter Code 7.02
Performance standards

The rule must be revised so the “calculation baseline” is not the only surrogate measure for the threshold of adverse environmental impact; the rule must provide for use of alternative performance standards [e.g. expanding 125.94(c) beyond just cost considerations] that allow demonstrating that the existing intake structure is not adversely impacting populations of aquatic life in the area.

The “calculation baseline” is used in the proposed rule essentially as a threshold for determining when adverse environmental impact begins. It calls for an “estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-though cooling water system and with no impingement and/or entrainment reduction controls.” (Section 125.93). We are not aware of any scientifically supportable way to make this estimate, particularly at an existing facility site where the populations and ecosystem have equilibrated to the presence of the existing intake structure. Performance standards based on the calculation baseline are essentially making the performance standard a volume reduction requirement based on reducing intake capacity to that of a cooling tower system.

EPA Response

The calculation baseline provides a standard intake configuration by which facilities can determine relative reductions in impingement and entrainment. EPA acknowledges the numerous comments on the proposed definition and has refined the definition to provide more clarity in implementing this concept. For example, the definition in the proposed rule incorporated a shoreline intake structure. In the final rule, the definition has been clarified to specify a 3/8 inch mesh traveling screen at a shoreline intake structure. Based on available data that indicate this is a common intake structure configuration at Phase II existing facilities, EPA designated a 3/8 inch screen as the standard mesh size against which reductions will be calculated. Similarly, the assumption of no impingement or entrainment controls in the definition in the proposed rule has been clarified to describe an intake where the baseline operations do not take into consideration any procedures to reduce impingement or entrainment. EPA recognizes that some facilities may have control technologies in place that already reduce impingement or entrainment and that the final calculation baseline would allow credit for such reductions. Additionally, EPA further clarified the definition to include the potential data sources that may be used in defining the calculation baseline, such as historical data, data collected at nearby locations, or data collected at the facility. EPA is permitting the use of existing biological data in determining the calculation baseline to minimize the impacts to facilities, provided that the data are representative of current conditions and were collected using appropriate quality control procedures.

EPA chose not to incorporate operating capacity into the calculation baseline, as the definition is not dependent upon intake flow volumes. EPA has adopted an "as built" component to the calculation baseline definition in today's rule.

EPA recognizes that this definition cannot address the variety of intake configurations and other conditions at all facilities and therefore cannot define the calculation baseline in all settings. However, EPA believes that the calculation baseline in the final rule is clear and straightforward to implement, and allows for proactive facilities (i.e., those with control technologies, operational procedures, or restoration measures already in place) to take credit for existing measures.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Kevin Hylton

On Behalf Of:

Rochester Gas & Electric Corp

Author ID Number:

316bEFR.064

Notes

EEI (316bEFR.072)

Comment ID 316bEFR.064.001

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code SUP

General statement of support

In summary the company supports the overall proposal in that it provides a solid initial foundation, though it believes that the proposal can be improved to provide an adaptable, technology-neutral, site specific approach that yields optimal, cost effective, and scientifically sound protection of the environment.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.064.002

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 3.01

Definition: Existing Facility

RG&E questions the definition of "existing facility", as presented in Sect 125.93 and discussed in Section II.A. of the Supplementary Information of the proposed rule. Within the proposed definition of existing facility, increased intake design capacities and flows are not precluded for either facility modifications or the addition of a unit (for the same industrial application). Therefore, in the case of an electric generating station, increased intake capacities and flows resulting from plant modifications or even the addition of another generating unit would meet the definition of an existing facility. However, a facility constructed in place of an existing facility (a replacement facility) cannot be included as an existing facility if intake flows are increased. This presents an apparent incongruity in that, for example, the addition of another generating unit at a single unit site could increase intake flows by 100% and meet the existing facility definition, while a replacement facility may increase intake flows by a much lesser amount (e.g., 25%), and yet not meet the existing facility definition. RG&E believes that the determination regarding the regulatory program to which a facility is subject (i.e. new vs existing facility), should turn on the fact that a new facility would result in entirely new impacts upon a source Waterbury, whereas, the existing facility (which would include replacement facilities) would merely result in increased flows that would be a continuation of existing impacts. This is because the impacts of a replacement facility, even with a modest increase in intake flow, more closely resemble an existing facility than a new facility, and should be evaluated accordingly.

RG&E therefore recommends that the existing facility definition criteria include all types of facility modifications, up to and including the construction of a replacement facility, qualified with a limit upon any increase in intake capacity and flow. While a doubling of intake flows would seem excessive to be included as an existing facility, a maximum limitation of 25% increase in capacity and/or or flow seems reasonable.

EPA Response

See section II of the preamble to the final rule. In the final rule (§ 125.93), EPA has defined the term “existing facility” to mean any facility that commenced construction, as described in 40 CFR 122.29(b)(4), on or before January 17, 2002; and any modification of, or any addition of a unit at such a facility that does not meet the definition of a new facility at § 125.83.

Under this rule, the definition of “existing facility” is based on several factors, including EPA’s recognition that existing power generating facilities can and do make changes to their facilities and cooling water intakes in the course of operation, the nature and magnitude of such changes within the technology-forcing approach framework contained in the NPDES permitting portions of the CWA, the environmental impacts associated with changes to an existing facility, and existing regulations, including existing NPDES program new source and new discharger definitions (e.g., 40 CFR 122.2 and 122.29), as well as the Phase I regulatory definition of new facility. EPA has considered each of these factors in establishing a reasonable demarcation between new and existing facilities subject to section 316(b) requirements.

In the final rule, EPA is not determining which facilities are new versus those that are existing facilities based solely on whether a facility poses entirely new versus existing environmental impacts, as the comment suggests. Such an approach is not consistent with the technology-based framework for environmental protection specified in the CWA, under which new facilities are required to meet the most stringent CWA standards because such facilities have the greatest ability to adopt highly effective environmental protection technologies. EPA's existing NPDES regulations recognize this and clarify when changes to an existing facility may result in the facility being defined and regulated as a new source (e.g., 40 CFR 122.29). The new facility definition in 125.83, which is referenced in this rule, also is consistent with this approach.

Defining new facilities as only those with entirely new environmental impacts raises the difficult issue of defining what constitute new impacts (i.e., must impacts be different than existing impacts, increased levels of existing impacts, or totally new?) and, depending on the approach, could result in all changes to existing facilities being regulated under the Phase II existing facility rule regardless of the scope or nature of the change. EPA does not believe such an approach, or an approach under which EPA would establish a maximum limit on the increase in capacity or flow, is consistent with existing relevant NPDES regulations or the technology-forcing framework contained in the NPDES permitting portions of the CWA

EPA's definition of "existing facility" in this final rule reasonably balances the need of existing facilities to make changes with their ability, when changes are substantial, to upgrade to the level of best technology required at new facilities, while being consistent with existing regulations.

Comment ID 316bEFR.064.003

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 17.06

Option: Site-specific determination of BTA

RG&E supports the concept of site-specific evaluation and determination for implementing 316(b) regulations and reiterates comments of the Edison Electric Institute (EEI) in their 316(b) Phase II comment letter to docket:

"The single most important lesson learned from [these] 25 years of experience is that the site-specific variations in facility operations and affected ecosystems makes site-specific technology selection the most efficient and effective means of minimizing adverse environmental impact. A structured site-specific approach makes it possible to select and install the technology that maximizes the net benefits to society. EEI members maintain that a rule embodying such a structured site-specific approach represents the best approach to addressing any adverse environmental impacts that may result from the operation of cooling water intake structures at member facilities."

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.064.004

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

In Section VII.F. of the Supplementary Information of the proposed rule, EPA has invited comments on the role of "functionally equivalent" State programs in the implementation of these proposed regulations. RG&E strongly supports this concept of functionally equivalent programs and urges EPA to allow States maximum flexibility within their individual programs to achieve site-specific determinations of best technology available to minimize adverse environmental impacts. The State, as the primary stakeholder of its natural resources, is best suited to ensure the proper implementation of the proposed 316(b) concepts in a manner that conforms with the individual State's economic and environmental goals. For example, in New York State, the Department of Environmental Conservation is responsible for both fisheries management (within all waters of the State) and SPDES Permits, thus NYS fisheries management goals have always been considered in assessing power plant operations and associated impacts. This results in SPDES operating permit requirements which include minimizing intake impacts. RG&E believes that this approach has been successfully applied for nearly thirty years, and should be continued.

EPA Response

In today's final rule, EPA has provided for approval of State programs that meet specific requirements (125.90(d)). See response to 316bEFR.023.001 for details.

Comment ID 316bEFR.064.005

Author Name Kevin Hylton
Organization Rochester Gas & Electric Corp

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Further, RG&E endorses both restoration and habitat enhancement within the State program. This support is again based upon the fact that these concepts increase the State's flexibility to balance their own resources and thus address environmental concerns in a manner which best benefits the people of each State and most effectively preserves natural resources.

EPA Response

For a discussion of the extent to which restoration measures may incorporate state program priorities, see EPA's response to comment 316bEFR.099.029. All restoration measures must meet the requirements of the final rule.

Comment ID 316bEFR.064.006

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

RG&E is pleased that the proposed regulations do not mandate the retrofit of costly and potentially unnecessary closed-cycle recirculating cooling systems (i.e., cooling towers), and advocates that this approach be retained within the final rule.

EPA Response

The commenter's recommendations have been met in the final rule.

Comment ID 316bEFR.064.007

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA has made an exhaustive effort to examine a variety of alternative approaches to the regulation. Based on the analysis performed by the Agency, the EPA chose the approach that provided the greatest net benefit to society.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

With respect to selecting the approach with the greatest net benefits, please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.064.008

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that impact the technical practicability of meeting the proposed standards. Specifically, the costs of compliance may exceed those anticipated by the agency. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.064.009

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. The rule allows facilities to select an alternative level of compliance in cases where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits derived from achieving levels. This approach explicitly recognizes the site-specific variations in the ecology of source water bodies and can account for controls already in place at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.064.010

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 7.02

Performance standards

The EPA proposal provides a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or restoration of habitats and other non-traditional approaches. This does not freeze compliance in time by relying on today's technologies and allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment. This also leaves significant discretion in determining how best to comply with the standards to State permitting authorities and facilities managers who have developed extensive expertise on these issues.

EPA Response

EPA agrees with the commenter and has accorded considerable discretion to the Director in implementing the requirements of today's rule.

Comment ID 316bEFR.064.011

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

The EPA analysis greatly understates the cost of retrofitting cooling towers, making any alternative involving cooling towers appear more favorable than it is in fact.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.064.012

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

EPA's failure to define significantly greater for either of its cost tests creates unnecessary uncertainty in the rule.

EPA Response

See response to 316bEFR.006.003.

Comment ID 316bEFR.064.013

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

EPA should provide a much simpler implementation path for facilities that choose to install one of the EPA approved technologies. The EPA proposal does too little to reduce the costs of implementation for facilities and State permitting authorities. Much of the information necessary to implement a purely site-specific approach, (e.g., calculation of baseline losses, estimation of technology effectiveness, post compliance monitoring, etc.,) must be generated despite its not being used to improve the technology selection decision.

EPA Response

EPA agrees that streamlined implementation is a worthy goal and notes that facilities using approved design and construction technologies (such as a wedge-wire screen in certain freshwater river environments) may demonstrate compliance with the rule under § 125.94(a)(4) or may request that the Director approve additional technologies under § 125.99(b). Please refer to the response to comment 316bEFR.072.045 for more information.

Comment ID 316bEFR.064.014

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 10.1

General: cost tests

Rule must retain consideration of site-specific variations in cost. This is currently embodied in both the new facility standards and the proposed rule as a test of the cost of compliance against the costs considered by the Agency in establishing the standards. This is referred to as the cost-cost test. Rule should provide guidance on proper and reasonable interpretation of significance for the cost-cost test. The company suggests that to be deemed "significantly greater than," costs should not exceed the costs considered by the agency by some factor between zero and one. In no case by more than 100 percent of the cost considered by the Agency in establishing the standards as this would result in costs that were not only significantly greater but wholly disproportionate.

EPA Response

The cost-cost test is retained in the final rule. Therefore, this recommendation from the commenter has been met.

The Agency does not necessarily agree with the commenter’s assertion that costs exceeding 100 percent of the cost considered by the Agency should be termed “wholly disproportionate.” The Agency notes that the commenter provides no basis for this designation (neither anecdotal nor historical). Hence, the Agency prefers to differ to the Director applying the standard for their locality in order to determine what is “significantly greater.”

Comment ID 316bEFR.064.015

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Rule must retain consideration of site-specific variations in benefits. This is currently embodied in the proposed rule to as a test of the cost of compliance against the expected benefits of compliance. This is referred as the benefit-cost test. The decision criteria for the benefit-cost test should be the maximization of net benefits.

EPA Response

EPA does not agree that decisions must be made based on maximization of net benefits in cases such as this where benefits cannot be completely monetized. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.064.016

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

In order to reduce implementation costs, speed permitting and prevent unnecessary permit backlog for both facilities and the States, the EPA should allow State permitting agencies to waive the requirement for baseline monitoring, study and modeling for facilities that install or currently utilize any of the technologies referenced by the EPA in establishing the standards. Likewise, post-compliance monitoring should be limited to that which is necessary to demonstrate proper operation of the technologies.

EPA Response

Much flexibility has been added to today's final rule to assist in speeding implementation and reducing application burden. For example, under 125.94(b)(4), a facility may demonstrate that it has installed and properly operates and maintains an approved design and construction technology in accordance with 125.99(a) or (b); or the facility may install and properly operate wedgewire screens in accordance with 125.99(a). Under this compliance alternative, facilities only need to submit the Design and Construction Technology Plan (125.95(b)(4)(i)) and the Verification Monitoring Plan (125.96(b)(7)). Facilities may also opt to comply using the Technology Installation and Operation Plan (125.94(d)(1)) and/or Restoration Plan (125.94(c)) which allows a facility to comply with conditions of the respective plan in lieu of having compliance based on meeting performance standards (see section 9 of the preamble for more discussion). Under today's final rule, monitoring must be performed in accordance with the Verification Monitoring Plan, the Technology Installation and Operation Plan (125.95(b)(4)(ii)), as appropriate, and, if applicable, the Restoration Plan (125.95(b)(5)). Additional monitoring requirements may be specified the Director. EPA is also allowing the use of historical data where it is still reflective of existing conditions for use in baseline calculations. EPA believes that these measures, and other measures in the final rule, will provide flexibility for the facility and the Director.

Comment ID 316bEFR.064.017

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code 21.06.01

Implications for nuclear facilities

Finally, with respect to impacts upon the Nuclear Industry and our Ginna Nuclear Power Station, RG&E supports the 316(b) Phase II Comments submitted by the Nuclear Energy Institute, and summarized below.

It is imperative that nuclear power plants be provided flexibility in how they meet Cooling Water Intake Structure (CWIS) requirements because costs for the nuclear industry will be higher for installation of new equipment/technologies due to a constant need for cooling water and to ensure that any changes do not adversely impact plant safety and increase the risk to the health and safety of the public.

The inclusion of 125.94 (f), which concerns the resolution of potential safety issues by the NRC resulting from 316(b) compliance, must remain in the rule to ensure that considerations of human health and safety of the people at and around nuclear power plants remain the paramount determining factor.

EPA Response

EPA has provided several different compliance alternatives that facilities can use to meet today's requirements in the most cost-effective way possible. In addition, EPA agrees with Rochester Gas and Electric Corporation on the importance of human health and safety considerations. Therefore, today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)).

Comment ID 316bEFR.064.018

Author Name Kevin Hylton

Organization Rochester Gas & Electric Corp

Subject Matter Code SUP

General statement of support

Rochester Gas and Electric supports the U.S. EPA's overall proposal, though it believes that these regulations may be improved to provide an adaptable, technology-neutral, site specific approach that yields optimal, cost effective, and scientifically sound protection of the environment as indicated by the comments provided. With these improvements, EPA's proposed rule regarding Section 316(b) permitting can result in a consistent decision-making framework that continues to provide flexibility to the states.

EPA Response

Today's final rule maintains the desired flexibility for both the permittee and the Director to determine the most appropriate and cost-effective means for meeting the requirements of today's rule. EPA also notes that compliance alternative 5 allows a site-specific determination to be made based on cost-cost and cost-benefit considerations.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Skiles W. Boyd

On Behalf Of:

Detroit Edison Company

Author ID Number:

316bEFR.065

Notes

UWAG (316bEFR.041)

Comment ID 316bEFR.065.001

Author Name Skiles W. Boyd

Organization Detroit Edison Company

Subject Matter Code 10.03.07.02

Monroe

It is not apparent to DE why the EPA selected the Monroe facility, along with some Ohio River facilities, as having cooling water intake structures (CWIS) that are presumably representative of all CWIS located on freshwater lakes and rivers, exclusive of the Great Lakes. (It should be noted that the Monroe facility is located at the confluence of the River Raisin and Lake Erie and while a portion of the cooling water flow is withdrawn from the River Raisin, the majority of the flow is withdrawn from Lake Erie.) The EPA does not describe the methodology (e.g., random or stratified sampling using variables such as capacity, intake design and/or data availability) used for selecting the facilities for case studies. Consequently, one has to question the appropriateness of the selection of Monroe as a case study facility if the basis is not known for its selection.

EPA Response

EPA based its use of I&E data for the Monroe facility and other facilities on a number of factors, including data availability and facility location in relation to other in scope facilities. However, EPA notes that it was unable to conduct statistically-based selection procedures such as random or stratified sampling due to the lack of I&E data for most of the over 550 facilities in scope of the Phase II rule. See also responses to Comment 316bEFR.072.055 on sample size and representativeness and Comment 316bEFR.041.041 on EPA's extrapolation approach.

Comment ID 316bEFR.065.002

Author Name Skiles W. Boyd

Organization Detroit Edison Company

Subject Matter Code 10.03.07.02

Monroe

Comments on Part I: Monroe Facility Case Study
EPA's Proposed Section 316(b) Phase II Rule

Chapter I1: Background

1. Each unit has three, not four, circulating water pumps.

2. The cooling water discharge does not empty into Plum Creek; rather it is discharged into Lake Erie via a discharge canal.

3. EPA identifies alewife and burbot as being "most frequently" impinged and entrained at the Monroe facility. However, alewife comprised only 0.001% of the University of Michigan (UM) impingement estimate (Jude et al. 1983) and 0.03% of the Michigan Department of Natural Resources (MDNR) impingement estimate (A. Nuhfer, unpublished data) and none were identified in the UM entrainment estimate (Jude et al. 1983). No burbot were identified in either impingement estimate and the species comprised only 0.06% of the entrainment estimate.

4. EPA lists species of special concern found in the River Raisin. It should be noted that none of these species are listed in EPA's Table I3-1: Species Vulnerable to I&E by Monroe.

5. Introduction of nonnative species. In addition to the zebra mussel mentioned in the case study, the round goby (Neogobius melanostomus), a species native to Eastern Europe, was discovered in Lake Erie in 1994 and has increased in abundance. This species is a threat to indigenous species as it displaces them from their habitat through competition for food and predation on eggs and young. Neither the UM study or MDNR study collected this species because they were conducted prior to its introduction.

6. Commercial fisheries. As indicated in Tables I1-4 and I1-5, total catch and total revenue were unusually high in 1985 because of the large harvest of gizzard shad. They were harvested to determine suitability for use as crayfish bait, a market that did not develop (Darl Komomy, commercial fisherman, personal communication). These fish were harvested in mid-winter (January-March) because Detroit Edison gave permission to seine at the mouth of the Monroe discharge canal that is ice-free and where shad are concentrated during winter. This catch would have been impossible under other circumstances. Therefore, 1985 should be excluded from estimates of annual average commercial catch (expressed either as pounds or revenue) for gizzard shad and the whole fishery (all species combined).

Chapter I2: Technical Description of Monroe

1. The capacity utilization values in Table I2-1 were recalculated (as capacity factors) using a net rated capacity of 750 MW for each unit as reported in EIA-860. The recalculated values are 71.0%, 55.3%, 72.4% and 79.9% for Units 1, 2, 3, and 4, respectively.

2. The heated water does not return to the River Raisin; rather it is discharged into Lake Erie via a discharge canal.

3. Operation of the fish pump and return system was discontinued in 2001 because of chronic fouling of collectors by zebra mussels.

Chapter I3: Evaluation of I&E Data

1. The EPA includes alewife in its evaluation of impingement and entrainment (I&E) data even though it comprises less than EPA's criteria of 1% of the total I&E estimates. (Alewives comprised only 0.001% of the TIM impingement estimate and 0.03% of the MDNR impingement estimate and none were identified in the UM entrainment estimate.)

2. While there is limited commercial harvest of adult gizzard shad, young-of-the-year shad are a major prey item for predator fish species, particularly the walleye. It is unclear why EPA has classified longnose gar as a forage species. It would be more appropriate to classify this species as recreational and commercial because of, albeit limited, harvests in these categories.

3. It should be noted that nearly one third of the UM estimate of gizzard shad impingement was based on a collection made during one unusual episodic event on December 13, 1982 when an estimated 1.3 million shad were impinged. Multiplying this estimate by 7 brought the estimated weekly total to 9.3 million. During the prior week an estimated 285,000 gizzard shad were impinged for a weakly estimate of nearly 2 million fish. The week following December 13 an estimated 438,000 fish were impinged for a weekly estimate of 3.1 million fish. Thus, because of the inclusion of this unusual episodic event data, the UM impingement estimate is not representative of annual impingement losses.

4. Most of the impinged gizzard shad do not represent power plant-induced mortality. Gizzard shad, primarily young-of-the-year (y-o-y), are subject to winter mortality when water temperature falls below 4 C (Miller 1961, flames 2000). Trautman (1981) reported that gizzard shad "winter-killed readily, especially the young". Most of the impinged shad are less than 1 year old (99%) and most of the impingement of fish subject to winter mortality (80%) occurs in December and January (Jude et al. 1983). Historically, condition of fish (e.g., live-dead ratios or other assessments) was not routinely assessed as part of impingement studies. However, White et al. (1986) noted that many of the gizzard shad impinged at some Ohio power plants were dying or dead. LaJeone and Monzingo (2000) reported that large numbers of gizzard shad were either dead or moribund prior to entrapment on the screens of a power plant on the Mississippi River. Assessment of the condition of impinged fish must be an integral part of all future studies.

5. Section I3-4 identifies white bass as one of four species that "dominated" impingement and entrainment collections. In fact, the related species, white perch, comprised a higher percentage of the impingement collections for the two studies. In the UM study nearly twice as many white perch were estimated to have been impinged than white bass, while for the MDNR study the white perch estimate was over four times greater. The investigators did not differentiate between the two species in the UM entrainment study. Also, the EPA combined the impingement estimates for the two species in Table I3-2 and identified the estimate as white bass. This is a noteworthy inaccuracy because the white perch is a less desirable recreational and commercial species.

6. In Section I3-4 EPA states that impingement rates are about 4-5 times the entrainment rates. In examining Table I3-10 only the age 1 equivalents and fishery yield for impingement have higher values than the corresponding entrainment values and the differences are 3 times and 2 times, respectively.

7. In Table I3-2 [impingement] EPA combines trout-perch with unrelated logperch and identifies the combined estimate as logperch even though the estimate for logperch was a fraction of the estimate for trout-perch. The UM estimate for trout-perch was over 13 times greater than the estimate for logperch and in the MDNR study the entire estimate reported in Table I3-2 was for logperch. The same misrepresentation error occurs in Table I3-6 [entrainment] where nearly four times as many trout-perch larvae were estimated to have been entrained as logperch. However, both species were considered forage so it appears that this error does not affect the overall valuation estimate.

8. In Table I3-3, EPA indicates in a footnote that the impingement losses expressed as age 1 equivalents are larger than the “raw losses” because the ages of impinged individuals are assumed to be distributed across the interval between the start of year 1 and start of year 2, and then the losses are normalized back to the start of year 1 by accounting for mortality during this interval. However, as indicated in the text and the length frequency distributions in the appendices of the UM report, the majority of fish for several of the major species (gizzard shad (99%), white perch (91%), white bass (94%) and walleye (95%)) were less than one year old. Thus the number of age 1 equivalents should be less, not more, than the “raw” numbers.

Chapter I4: Economic Value of I&E Losses Based on Benefits Transfer Techniques

Questions/comments 1, 2 and 3 were submitted to the EPA on June 4, 2002 by DTE Energy and on June 5, 2002 and June 11, 2002 (prioritized) by the Utility Water Act Group (UWAG). (UWAG’s submittals contained questions/comments from UWAG members, attorneys and consultants.) EPA sent responses to these questions to UWAG on July 2, 2002 (Appendix 1). These responses were considered unsatisfactory as they simply (1) restated what was already in the text of the Monroe facility case study and (2) in general, referred the reader to Chapter A5 with no further explanation.

1. Tables I4-2 and I4-3: The data in the column titled “Total Catch (#) appear to be harvestable catch data, but no explanation or reference is given to the source of the data.

2. Table I4-11: identify actual references in AFS (1993) from which came the “Hatchery costs ($/lb)”. Addendum: I also need to know where the EPA got the poundage for the three species that were multiplied times the hatchery costs to get the annual replacement costs.

3. Table I4-12: explain how this table was compiled, in particular, how the annual loss values were apportioned/calculated for each species. For example, how were the $673,405 and $1,133,734 low and high [production foregone] values, respectively, for whitefish derived?

4. Values of lost recreational and commercial yields because of impingement are overestimated. When estimates of the number of age 1 equivalent fish impinged at Monroe are corrected for predominance of fish less than 1 year old, estimated value of lost yield decreases dramatically. For example, the value of lost commercial yield of gizzard shad decreased from $203,222 to $71,146.

(Calculations used to revise the estimate of the value of lost yield of gizzard shad at the end of this section. The table summarizes the revision of the number of age 1 equivalent gizzard shad impinged.)

5. It is not appropriate to assign full value to lost yield for species like gizzard shad where lost yield (474,300 pounds, corrected for predominance of fish less than 1 year old) greatly exceeds annual harvest (9760 pounds, average excluding 1985 and years of no harvest). Commercial harvest of shad is not limited by yield (supply) but by demand which is low because of poor flesh quality.

6. Because whitefish larvae were collected on only one date and because juvenile and adult whitefish are not impinged at Monroe (Jude et al. 1983), presence of whitefish larvae in plankton is spurious. Additionally, it is unclear how an estimated annual entrainment of 190,000 whitefish (Table 13-6) results in an allocation that generates production foregone valued at $1.1 million (Table 14-12).

7. Additional comments on this chapter are provided in the report prepared by Resource Econometrics (Appendix 2).

Calculations used to revise the estimate of the value of lost yield of gizzard shad. Revision of the number of age 1 equivalent shad impinged is summarized in the table below.

[see hard copy for table]

EPA estimated that the number of age 1 equivalent shad impinged at Monroe was 34,323,242 (Table I3-3). Estimated lost yield to the commercial fishery was 1,354,816 lbs (Table I3-4). At $0.15/lb, lost yield was worth $203,222. Detroit Edison's corrected estimate of the number of age 1 equivalent shad impinged was 12,016,169. By proportion, this resulted in a lost yield of 474,305 lbs that at $0.15/lb, was worth $71,146. (If the $0.041 /lb reported in Appendix 2 is used this lost yield is worth $19,447.)

Chapter I5: Streamlined HRC Valuation of I&E Losses at the Monroe Facility.

1. The habitat-based replacement cost (HRC) analysis, particularly the "streamlined" version, is an unproven methodology for monetizing I&E losses. RRC was originally devised to monetize habitat damage/loss. Its application to I&E is a stretch that goes something like this. There is a need to address impacts beyond reductions in yield, particularly the very nebulous "ecological services" provided by fish (see also Comment 5, below). Ecosystem services are by-products of energy flow and material cycling that are habitat/ecosystem based. Therefore, to provide ecosystem services suitable habitat is required. EPA treats HRC analysis as though its validity is self-evident even though the appropriateness and/or efficacy of HRC has not been demonstrated for monetizing I&E losses.

2. Choosing shoreline wetland as the basis for the Monroe HRC analysis was arbitrary. No documentation (peer-reviewed scientific publications) was offered to support this decision. (This exemplifies the overall lack of credible information needed to conduct an HRC analysis despite EPA's repeated assertion that such information is readily available.) By choosing a single habitat type to estimate replacement cost, EPA assumes all species have the same habitat preferences/requirements. Absent documentation, this choice also assumes shoreline wetlands contribute substantially to recruitment of all species. Neither of the latter two assumptions can be verified with appropriate documentation (peer-reviewed literature). A "complete" HRC analysis may

have identified more appropriate alternatives.

3. Estimated annualized HRC at Monroe was $1.1 -14.4 million with a total cost of $22-288 million (20 year amortization). This is the estimated cost of constructing enough shoreline wetland to offset 50-90% of I&E. Replacement of 100% would require construction of 26,900 acres of wetland at a total cost of $828 million. This amount of wetland (41 square miles) would double the amount of wetland in U.S. waters of Lake Erie and is equivalent to a band (100 yards wide) extending 726 miles around the 860 mile long shoreline of Lake Erie. The large amount of wetland needed to replace 100% of I&E strongly suggests that the required mitigation was overestimated.

4. Large areas of wetlands are needed to replace species that arc abundant in I&E and uncommon or rare in wetlands. Low abundance in wetlands most often reflected preference for other habitats (e.g., logperch, trout-perch, smelt, gizzard shad, walleye and small mouth bass). EPA made no effort to take into account that shoreline wetlands were not suitable habitat for these species. By failing to do so, the high estimated cost of replacing I&E becomes an important driver of proposed reductions in I&E.

5. Part of the rationale for HRC was the perceived need to monetize, among other things, the "ecological services" provided by fish. Worldwide ecosystem services are valued at $33 trillion per year. Contributions of Lake Erie and adjacent wetlands to worldwide services were estimated based on the contribution of lakes/streams and swamps/marshes to annual worldwide net primary production and on area of Earth's surface these habitats/ecosystems represent (Table 1). This assumes ecosystem services are by-products of ecosystem processes like primary production. Estimated value of ecosystem services from lakes is $196/acre and from wetlands $1571/ acre (Table 1). If the contribution of fish to system energy flow is 10%, then services provided by the whole fish fauna are worth about $20/acre in lakes and $157/acre in wetlands. If I&E resulted in a 15% reduction in fish stocks, the value of lost ecosystem services is $3/acre in lakes and $24/acre in wetlands. This exercise demonstrates that HRC greatly exaggerates valuation of ecological services provided by fish.

[see hard copy for table]

Table 1. Area, annual net primary production and estimated value of ecosystem services (expressed three ways) for two habitats/ecosystems and the whole Earth (i.e., biosphere).

6. EPA does not provide any guidance on a verification program for habitat restoration plans.

Chapter I6: Benefits Analysis for the Monroe Facility

The errors noted in the other chapters will require revisions to the values reported in this chapter.

Chapter I7: Conclusions

The errors noted in the other chapters will require revisions to the values reported in this chapter.

Additional Comments

1. A societal benefit that has been established at the Monroe facility is the recreational fishing that occurs in the warm water discharge canal. Since the plant began commercial operation, the discharge canal has been accessible to boat anglers. In 1997 ten fishing piers were built to provide access from shore for fishing. The piers proved to be so popular that the Michigan Department of Natural Resources requested that the seasonal access to the piers be increased. The company agreed to the increase.

2. KJ. Hartman stated in his comments on the proposed rule (prepared for UWAG) that productivity in Lake Erie has declined due to nutrient abatement activities in the mid-1980's and invasion of the lake by zebra mussels in the late 1980's and 1990's. As a consequence, there has been a decline in fish production and thus a reduction in the availability of fish to I&E. This trend is contrary to EPA's assertion that improvements in water quality have resulted in increases in fish populations and thus increases in I&E since the period when many of the original I&E studies were conducted.

Conclusions

The Monroe case study is offered as a "science-based" assessment of the value of impingement and entrainment (I&E) losses at the plant. Ostensibly the large monetized values of I&E at Monroe (and the Ohio River facilities) projected to estimate the value of I&E losses for all cooling water intakes located in freshwater (exclusive of the Great Lakes), inappropriately provides strong support for proposed reductions of I&E.

I&E were monetized using two basic approaches. Valuation based on the benefits transfer technique quantified losses in terms of impacts on commercial and recreational fisheries and included assessment of non-use values of fish and impacts on forage species that support predator stocks. Using this, more or less, traditional method, estimated annualized value of I&E losses was $800,000-3.2 million. Revisions suggested in comments presented in the foregoing sections would reduce this estimate substantially.

Valuation of I&E was also based on estimation of habitat-based replacement cost (HRC). Application of HRC analysis to monetize I&E losses is new. There is no indication that this method was subject to peer-review prior to publication of the Phase II Rules (Chapter All of the case study document). Moreover, no peer-reviewed documentation based on field study is provided to validate this method. The failure to provide objective valuation-of HRC is important because the estimated annualized value of I&E losses at Monroe was $1.1 -14.4 million. Because valuation based on HRC was greater than valuation based on the benefits transfer technique, HRC also becomes the basis for estimating the benefits of reduced I&E at Monroe and possibly other cooling water intakes in freshwater locations, including the Great Lakes basin.

In this case study, I&E were used directly to monetize impacts. This deviates philosophically from traditional environmental impact assessments where the impacts of I&E are recognized primarily by quantifiable reductions in fish stocks. This latter approach recognizes that the rapid renewal capacity of resources like fish can mitigate losses like I&E. EPA made no attempt to assess impacts of I&E on fish stocks in Lake Erie.

Fish populations exhibit considerable capacity to offset natural and anthropogenic mortality. If they did not, even small increases in mortality from angling would cause population extinction. When mortality increases, population size is maintained by compensation. Compensation is an increase in recruitment (addition of sexually mature individuals to population) mediated though changes in life-history parameters such as survival rate, growth rate and age at maturation. Ability to adjust life-history parameters, called compensatory reserve, is not unlimited and varies among species. Increased mortality causes reduction in population size only after compensatory reserve is depleted. There is no evidence that I&E has depleted compensatory reserve or reduced fish stocks in Lake Erie.

EPA avoided consideration of compensation in this case study. (Compensation is only mentioned briefly in regard to life history parameters (Chapter A5-2.3)), This is unfortunate because compensation is not only an integral part of environmental impact assessment but also a mechanism for assessing whether reduction of I&E by intake modification or mitigation of I&E by habitat construction will achieve desired results. Considering the cost involved, some assessment and assurance of efficacy appears warranted.

EPA Response

The Background chapter and Technical Description of the facility are no longer included in EPA's final analysis or the Regional Analysis Document (DCN # 6-0003) presented in support of the final rule.

Regarding I&E estimates for Monroe, these data are used only as part of the total Great Lakes regional I&E estimate and are not used for a facility-specific estimate. A total of 3 facilities were used to estimate I&E in the Great Lakes. Please see response to Comment 316bEFR.041.041 for a discussion of EPA's regional extrapolation approach.

Regarding benefits transfer, please see EPA's response to Comment 316bEFR.075.504.

For information on replacement costs and the HRC method and its uses, please refer to EPA's responses to Comment 316bEFR005.035 and Comment 316bEFR.029.113 and the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

Regarding compensation, please see EPA's response to Comment 316bEFR.025.015.

Comment ID 316bEFR.065.003

Subject Matter Code 10.03.07.02

Monroe

Author Name Skiles W. Boyd

Organization Detroit Edison Company

DTE Energy Questions

1. Chapter I4 of Part I of the Case Study Document (DCN 4-0003) refers the reader to Section I3-4 of Chapter I3 for data sources. The chapter also explains that foregone recreational yield in pounds was converted to numbers of fish for valuation purposes. Details on how yield in pounds was derived from annual I&E loss rates are provided in Chapter A5 of Part A of the Case Study Document (DCN 4-0003).

2. All AFS (1993) values are derived from a 1989-1990 survey of public, private, and tribal hatcheries.

3. The methods for converting forage species to species which may be commercially or recreationally valued are described in Chapter A5 of Part A of the Case Study Document (DCN 4-0003).

4. This question is in the nature of a comment on the record or the proposed rule. EPA will address this question in its responses to public comments if it is included in public comments on the proposal.

DTE Energy Questions – Monroe Case Study

1. Tables I4-2 and I4-3: The data in the column titled "Total Catch (#) appear to be harvestable catch data, but no explanation or reference is given as to the source of the data.

2. Table I4-1l: identify actual references in APS (1993) from which came the "Hatchery costs ($/lb)". Addendum: 1 also need to know where the EPA got the poundages for the three species that were multiplied times the hatchery costs to get the annual replacement costs.

3. Table I4-12: explain how this table was compiled, in particular, how the annual loss values were apportioned/calculated for each species. For example, how were the $673,405 and $1,133,734 low and high values, respectively, for whitefish derived?

4. Is implementation and verification of the HRC methodology, particularly the "streamlined" version, practical? Combining steps 2 - 4 and limiting the data gathering raises some real concerns about the credibility of, essentially, an unproven methodology

EPA Response

1) See response to comment 316bEFR.041.824 on Tables I4-2 and I4-3.

2) See response to comment 316bEFR.041.825 on Table I4-11.

3) The valuation methods used to generate this range were not used in EPA's analysis for the final

Phase 2 rule.

4) The HRC method was not used in EPA's analysis for the final Phase 2 rule. For additional information, please see the document entitled "Habitat-based Replacement Cost Method" (DCN# 6-1003) and EPA's response to Comment 316bEFR.005.035.

Comment ID 316bEFR.065.004

Subject Matter Code 10.03.07.02

Monroe

Author Name Skiles W. Boyd

Organization Detroit Edison Company

Detroit Edison submitted with its comments (OW-2002-0049, 4-1.65 in the docket or 316bEFR.065 in this database): “Economics of Great Lakes fisheries: a 1985 assessment”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.065.005

Author Name Skiles W. Boyd
Organization Detroit Edison Company

Subject Matter Code 10.03.07.02
Monroe

Detroit Edison submitted with its comments (OW-2002-0049, 4-1.65 in the docket or 316bEFR.065 in this database): “Marine economics data”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.065.006

Author Name Skiles W. Boyd

Organization Detroit Edison Company

Subject Matter Code 10.03.07.02

Monroe

Detroit Edison submitted with its comments (OW-2002-0049, 4-1.65 in the docket or 316bEFR.065 in this database): “Optimum allocation of a renewable resource--a bioeconomic model of the GL whitefish fishery”

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Erik Silvola

On Behalf Of:

Great River Energy

Author ID Number:

316bEFR.066

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.066.001

Author Name Erik Silvola

Organization Great River Energy

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Cost - Benefit Test:

The cost-benefit test is the key to the successful implementation or failure of this rule. If EPA adopts their framework as proposed, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

EPA has included a site-specific compliance option based on cost-benefit considerations.

Comment ID 316bEFR.066.002

Author Name Erik Silvola
Organization Great River Energy

Subject Matter Code 10.07.02
RFC: Appropriateness of "significantly greater"

"Significantly Greater":

The proposal provides for a site-specific determination of the "best technology available" if the costs of compliance at a site would be "significantly greater" than either the benefits of meeting the performance standards or the cost of what the agency considered. EPA must provide a clear definition of what is meant by "significantly greater." To maximize net benefits to society, economic theory would dictate that this should be interpreted to mean any cost benefit ratio greater that 1:1. This reflects the most cost-effective, performance-based outcome.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.066.003

Author Name Erik Silvola

Organization Great River Energy

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Application to Existing Facilities:

The proposal should include a process for approving existing intake technologies as "best available" if it can be shown that the facility is not causing adverse environmental impact or the technologies have been deemed "best available" by the state. Such a process is reasonable since Section 316(b) has been in effect since 1972 and has been implemented case-by-case at many sites. There are many electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impact or that it has already installed the best technology available. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for either further studies or for additional intake technology.

EPA Response

See response to 316bEFR.006.004.

Comment ID 316bEFR.066.004

Author Name Erik Silvola

Organization Great River Energy

Subject Matter Code 7.02

Performance standards

Compliance Assessment:

Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the "best available", the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see response to comment 316bEFR.029.040 and 316bEFR.063.005.

Comment ID 316bEFR.066.005

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Erik Silvola

Organization Great River Energy

Compliance Timelines:

Some consideration should be given to facilities currently engaged in the re-permitting process. Again due to the variability of biologic systems in terms of weather cycles, seasonal changes, population dynamics, and a host of other factors large amounts of data over significant periods of time are required to establish baseline conditions. Those facilities currently engaged in re-permitting may not be able to supply adequate data to determine a baseline reflective of current conditions for use in determining the "best available" technology at the time of permit renewal.

EPA Response

In recognition of the situation described by the commenter, EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James F. Stine

On Behalf Of:

National Rural Electric Cooperative Association

Author ID Number:

316bEFR.067

Notes

UWAG (316bEFR.041)

Comment ID 316bEFR.067.001

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 17.08

Option: UWAG's recommended approach

Framework of EPA's proposed rule. As stated above, NRECA supports the approach UWAG advocates for the 316(b) regulations. UWAG's stresses that the regulations must be site-specific, and that they should apply only if a facility's cooling water intake structure (CWIS) is having an adverse environmental impact. UWAG has outlined a detailed regulatory proposal that we believe would be the optimum way to structured these regulations. It would provide real environmental protection, economically, without imposing undue administrative burdens on regulatory agencies or on permittees. An important benefit of the UWAG approach is that it uses a risk management approach to quickly identify facilities that are not having a significant adverse environmental impact allowing them to be removed from further consideration. NRECA strongly advocates the UWAG approach rather than the framework EPA has proposed.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.067.002

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

However, NRECA appreciates the efforts EPA has made to propose a regulation that has many favorable aspects to it. While it may not be the best approach, EPA's approach could be workable if certain modifications as suggested by UWAG and NRECA are adopted. The overall framework of EPA's proposal is good. In particular it allows a cost benefit test to insure that appropriate technology is identified as the "best available". However, in contrast to the UWAG approach, many facilities that are not having an adverse environmental impact will still have to incur significant costs to gather data and to develop certain studies (the costs of which EPA underestimates considerably). The UWAG proposal, using sound scientific principles and an environmentally protective approach, helps insure that facilities that are not having an adverse environmental impact are removed from the process, thereby reducing study costs and easing administrative burdens. If EPA decides to adopt the rule framework as proposed in the Phase II regulations, then NRECA urges EPA to make the modifications detailed in the UWAG comments as well as those suggested by NRECA below.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule. EPA appreciates the commenter's support of the regulatory approach in the proposal, and notes that the final rule uses a similar approach, including the use of a cost-benefit test.

EPA disagrees, for the reasons set forth in the preamble and elsewhere in the record to the final rule, that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b).

Comment ID 316bEFR.067.003

Subject Matter Code 7.02

Performance standards

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Performance criteria. NRECA believes that EPA's proposed performance criteria would not be suitable for direct insertion into NPDES permits as enforceable limitations. Biological populations are extremely variable, temporally and spatially, and technologies are simply not capable of providing the extremely high levels of control that would be necessary (on a daily basis, for example) to insure full time compliance and to avoid penalties including possible imprisonment for violating limits that were directly based on the performance criteria. That is not to say that the performance criteria can serve no useful purpose or that it is impossible to identify technologies that can meet the criteria on a long term basis.

NRECA believes that EPA has correctly determined that certain technologies (i.e., wedge-wire screens, aquatic fabric filter barriers, fine mesh traveling screens with fish returns, and barrier nets) are highly effective and produce significant reductions in impingement and entrainment in some cases. Those technologies cannot be applied in every case, however. Even where they can be applied, they may not achieve the ambitions reductions EPA anticipates in all cases.

Thus, the performance criteria should be bench-marks for the permittee and their states to use to identify the appropriate technology or combination of technologies, operational measures or mitigation that must be applied at a particular site. The installation of the technology or other agreed upon control strategy should be the permit requirement, not the performance criteria. Then, if necessary, this can be followed by an extended period of performance monitoring (to account for natural variability) with the recognition that more may need to be done if the approach selected is insufficient. Also, this can only -work if EPA retains the site specific cost/benefit test for technology selection as currently proposed in the rule.

In short, if EPA implements the regulatory framework they have proposed, they should structure the rule to insure that the most effective and economical (cost beneficial) technology is identified and implemented at each particular site -- and this could include in-place technology The "effectiveness" of the technology would be judged against the performance standards EPA has established.

EPA Response

EPA agrees with this comment and others like it. While EPA has retained the national performance standards in the final rule and continues to believe they reflect levels of reduction that can be achieved using available, practicable technologies, EPA also recognizes that it could be difficult ensure consistent attainment of those standards because of the type of variability the commenter describes. Because failing to achieve compliance with a numeric permit limitation customarily subjects a NPDES permittee to civil or even criminal penalties and performance standards are expressed in relation to the ambient environment, EPA has decided to authorize a Technology Installation and Operation Plan to be used, at the Director's discretion, as a compliance strategy for meeting the requirements of today's rule.

Comment ID 316bEFR.067.004

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.02

Performance standards

Baseline for assessing performance. If EPA decides not to use the performance criteria as enforceable permit limitations but rather as federal criteria that the permittee and their state use to select the best technology for a site, the rule will be much easier to implement. This approach will relieve problems associated with establishing a baseline or a point of reference for measuring attainment of the criteria. If the criteria are enforceable permit limitations, the issue of what levels of entrainment and impingement the criteria are measured against will be critically important. However, NRECA's members have strong concerns about how the theoretical performance of a non-existent intake structure could be assessed with the degree of accuracy necessary for anchoring enforceable performance criteria.

However, using the criteria as a basis for selecting technology would greatly relieve these problems. As long as permit limits are not an issue, in many cases, one could simply assume (as EPA has suggested in discussions) that the level of protection of the baseline facility is zero. By using zero for the baseline, the state and the permittee could focus directly on the more straight forward problem of identifying the technology needed to -bring current performance up to the levels required by EPA. If a permittee wanted to take credit for in-place technology, only then would he have to do a performance study. And in this instance he would be studying existing technology and would not even have to do the study unless the credit for in-place technology was likely to outweigh the study costs.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.067.005

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Lakes and Ponds. EPA should exclude ponds or lakes created specifically for cooling purposes from the definition of “Waters of the United States.” This is an important issue for many of NRECA’s members. We refer EPA to UWAG’s discussion of this issue in their comments on the Phase II rule. NRECA is not aware of any significant CWIS impacts on cooling lakes or ponds. Further, as UWAG points out, cooling lakes and ponds are treatment systems. They should not be considered “Waters of the United States”.

Even if cooling ponds and lakes are not excluded as treatment systems, EPA should consider them closed-cycle cooling systems that satisfy § 316(b). In the rule, EPA states that one can meet the entrainment and impingement standards if you “reduce your intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system.” EPA defines a closed-cycle recirculating system as a system with minimized makeup and blowdown flow that (usually) sends the water to a cooling canal or channel, lake, pond, or tower (67 Fed. Reg. 17130 col. 2). EPA uses wet cooling towers or ponds as examples of recirculating wet cooling systems (67 Fed. Reg. 17142 col.2, 17154 col. 3, italics added).

Many of NRECA’s members use cooling lakes or ponds; some specifically constructed to achieve compliance with NPDES permit requirements (for heat discharge) obviating the need to install cooling towers to reduce heat loads. There are many similarities between cooling lakes / ponds and cooling towers. Both are intended to reduce heat loads to the environment, both recirculate the cooling water and thereby withdraw less water from off-site water resources than comparable once-through designs. Plants that already have cooling towers satisfy the new regulations if they can demonstrate that they already meet the performance requirements in the regulations (although EPA needs to clarify how this demonstration would be made). NRECA believes that whether or not they are considered “Waters of the United States”, plants with closed, recirculating cooling lakes / ponds (allowing for a limited amount of make-up and blowdown) should also be considered to satisfy the 316(b) requirements.

EPA Response

See responses to 316bEFR.006.001 and 063.001.

Comment ID 316bEFR.067.006

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Flow Threshold. If a facility's flow is greater than 5% of the mean annual flow of a freshwater river or stream, it must meet the 60-90% entrainment reduction standard. NRECA believes that the threshold should apply to both impingement and entrainment. That is if the facility withdraws less that the threshold amount, the Section 316(b) requirements should not apply. Several of NRECA's facilities are located on very large rivers, including the Missouri. One facility withdraws less than even 1% of the river flow. Even when the intakes are near the 5% threshold, we do not see evidence of adverse effect on aquatic life in the river.

NRECA believes the threshold, whether it is 5% or larger, should be based on the mean annual flow of the river or stream, as proposed. Moreover, if at a particular site a facility withdraws more than 5% but is demonstrably not causing adverse environmental impact, the permit writer should be allowed to establish that whatever percent of the river or stream is withdrawn, the § 316(b) requirements do not apply.

EPA Response

EPA believes it has presented ample evidence demonstrating a significant decrease in the level of entrainment when intake flow is minimized in relation to the flow of the source waterbody. The documents DCN# 2-013L-R15 and 2-013J support the proposition that flow is related to entrainment. EPA believes the intake capacity standard established under today's final rule minimizes the entrainment impacts of cooling water intake structures. See also the preamble to today's final rule for a discussion of site-specific determinations and other compliance alternatives.

EPA disagrees that the 5% flow threshold should apply to impingement standards as well. Rates of impingement, although influenced by cooling water withdrawals, are not as directly attributable to percentage flows as are rates of entrainment.

Comment ID 316bEFR.067.007

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 21.01.01

Source water physical data

Spatial Extent of Biological Studies. Section 122.2 1(4) describes the Source Water Baseline Biological Characterization Data and says, “This information is required to characterize the biological community in the vicinity of the CWIS”. It also notes that this information can be used later to determine if the Design and Construction Technology Plan “should be revised”. EPA adds that, “The study area should include, at a minimum, the area of influence of the cooling water intake structure,” The phrase “in the vicinity of” is also used in the Comprehensive Demonstration Study, Section 125.95 (b)(3)(ii)…"a description of the abundance and temporal/spatial characteristics [of species] in the vicinity of" the CWIS.

NRECA is concerned about how the phrase "in the vicinity of" will be interpreted. We believe EPA should clarify that under the rule framework EPA has proposed, it is up to the permittee to decide on the appropriate spatial extent of the required studies.

Especially when biological populations are reasonably discrete (such as in a lake or isolated water body) a permittee should be allowed to put entrainment and impingement data collected around his intake in context with larger populations in the waterbody itself. However there may be times when a simple characterization within, say, the “hydrological zone of influence” would be sufficient and more cost effective than extensive population studies. EPA should make it clear that it is up to the permittee to decide on an appropriate extent for these studies.

EPA Response

EPA believes that the Director is best suited to define the scale of studies. The facility may propose a study scale in the Proposal for Information Collection and include a rationale for the scale. However, the Director will have the final determination on the scale of studies including defining the phrases "in the vicinity of" and "the hydrological zone of influence" as necessary.

Comment ID 316bEFR.067.008

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

What Species Must Be Studied. The proposed rule says that you must reduce impingement mortality and entrainment of "all life stages of fish and shellfish." "All life stages" are defined to mean "eggs, larvae, juveniles, and adults." But the proposed rule is largely silent as to whether this means all species present at the site, or a smaller set of 'representative' species, as industry has recommended. It is clear that we will have to address impingement mortality and entrainment of "species of concern," including any species that is designated as such by a fish and wildlife or environmental agency, and we will have to be concerned about disrupting the migration path of migratory species. Also, EPA's proposal says, with respect to monitoring, that companies will have to take enough samples to give an accurate representation of losses for "all commercial, recreational, and forage-based fish and shellfish species and their life stages" (preamble p. 117). Within these constraints, companies should be required to study only a limited set of representative and important species in the waterbody as agreed to by the state and the permittee. Otherwise the requirement would simply be too open-ended. Please refer to UWAG's more detailed comments on this issue.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John W. Dwyer

On Behalf Of:

Lignite Energy Council

Author ID Number:

316bEFR.068

Comment ID 316bEFR.068.001

Author Name John W. Dwyer
Organization Lignite Energy Council

Subject Matter Code 3.03
Definition: Waters of the U.S.

Cooling Lakes and Ponds

EPA should consider cooling lakes and ponds to constitute a treatment system, and not "waters of the United States". Even if EPA decides not to designate them as treatment systems, EPA should determine that such a cooling system constitutes a "closed-cycle recirculating cooling system" and is therefore exempt from the 316(b) rules.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.068.002

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Lakes and Ponds

In certain cases, a fishing, boating and recreational resource is present only because a dam and reservoir were constructed for cooling purposes. The fish population and diversity in such an established reservoir generally greatly exceed what was present before a reservoir was created. The impacts of impingement and entrainment in these settings is minimal compared to the overall benefit the facility has on the fishery.

To conduct costly studies to gather data on such reservoirs is unwarranted. Likewise, to assign costly retrofits in these settings because the structure itself may not meet "best available technology" is not warranted.

EPA Response

See responses to 316bEFR.006.001 and 316bEFR.063.011. See also the preamble to the final rule regarding site-specific and other compliance alternatives.

Comment ID 316bEFR.068.003

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Cost-Benefit Test

A cost-benefit test is the key to successful implementation of this rule. Specifically, a “site specific” cost benefit test would allow facilities and their permit writers the flexibility to choose the alternative that provides the greatest net benefit at each individual facility. Barring that, facilities should be allowed to choose an alternative approach to the “significantly greater than” test if they can demonstrate that the net benefit would be greater than meeting the levels presented in the rule. If EPA adopts their framework as proposed, rather than including a site-specific approach, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

EPA has included a specific-specific compliance option based on cost-benefit considerations. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.068.004

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

EPA's Attempt to Cover All Situations with a "One-Size Fits All" is Costly

In EPA's attempt to cover all situations regarding cooling water intake structures (CWIS) with a broad sweeping, one-size fits all rule, the result will be a more complicated and costly program to State agencies, utilities, and their customers. Just as there are many types of aquatic ecosystems in the U.S. waters, so are there different CWIS. One-size does not fit all.

A structured, site-specific approach is the only way to accurately choose the best technology for each CWIS. Many states have existing programs, which should be utilized by EPA to provide the greatest amount of protection, while implementing the best technology for each site. EPA should not try to rewrite what the States have already accomplished. Rather, they should codify that expertise into a flexible system that will meet all needs. Revamping the entire program would be very costly to State agencies.

Sound science is also necessary for complete evaluation of each site. Not all sites have the same potential for impact on aquatic life. This is yet another reason why a site-specific approach is the best approach.

The 1977 Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316 b) P.L. 92-500 (US. EPA, 1977) states that the best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis. This is stated in the proposed rule's Preamble.] This Draft Guidance should be the basis for the 316(b) Phase II requirements. Since each state may have very different water issues based on climate and other water uses, the States have more knowledge of what is needed to protect the aquatic environment in their particular region. One-size-fits-all may be the easiest approach, but the costs will most likely not justify the benefits to the environment.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.068.005

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 7.02

Performance standards

Compliance Assessment

Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the “best available”, the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see responses to comments 316bEFR.029.040, 316bEFR.063.005 and 316bEFR.063.003.

Comment ID 316bEFR.068.006

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

De minimis Criteria

The preamble (pp 17162) refers to comments by Utility Water Activities Group (UWAG) regarding "use of de minimus criteria to exempt small cooling water users that pose no appreciable risk of causing adverse environmental impact because only a small amount of cooling water is withdrawn from a water body at a location that does not require special protection".

The LEC concurs that certain small volume cooling water intakes at locations not requiring special protection should be exempted. It would be appropriate to apply de minimus criteria to other small volume cooling water intakes which are present at a facility that has at least one cooling water intake structure with a design intake capacity of 50 MGD. Some facilities have smaller cooling water intakes that would be regulated by the Phase II rulemaking only because they exist at a facility that has one with over 50 MGD capacity.

The Phase I rule established requirements applicable to the location, design, construction, and capacity of cooling water intake structures at new facilities that withdraw at least two million gallons per day. The LEC suggests that facilities regulated by Phase II that have intakes with less than two million gallons per day capacity be exempt from the Phase II regulations.

EPA Response

Today's rule is applicable to facilities that, among other criteria, have a total facility capacity of 50 MGD or more and are classified as a point source discharger and either have, or are required to obtain, an NPDES permit. A facility subject to the NPDES program is considered in its entirety, not as the commenter suggests in a piecemeal fashion. Therefore, today's rule does not exempt small volume intakes from 316(b) regulations, if those intakes are part of a facility that meets the criteria of a Phase II existing facility. Facilities will be able to propose to their Directors for review and approval, technologies and operational measures they have in place and/or have selected to meet the requirements in § 125.94 as part of the Design and Construction Technology Plan. Therefore, a facility may propose technologies or operational measures that are appropriate for each of its intakes, for review and approval by the Director. Please see the final rule preamble for an explanation of how the Phase II final rule is applied to facilities, and what constitutes a "Phase II existing facility."

Comment ID 316bEFR.068.007

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Adverse Environmental Impact

The LEC agrees with the concept that the focus of the term "adverse environmental impact" should be on the health of critical aquatic populations or ecosystems, rather than on absolute numbers of fish and other aquatic organisms impinged or entrained by a cooling water intake structure.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.068.008

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

EPA Lacks Authority to Apply 316(b) to Facilities Subject Only to a NPDES Storm Water Permit

EPA is proposing to apply section 316(b) to all facilities that are covered by NPDES permits, including those subject only to NPDES storm water permits. The Federal Water Pollution Control Act Amendments Section 316 Thermal Discharges paragraph (b) states the following:

"Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structure reflect the best technology available for minimizing adverse environmental impact."

Section 301 establishes the requirement for adoption of effluents limitations for all point sources. Section 306 establishes requirements for best demonstrated control technology and a list of source categories that must comply with standards of performance for new sources within the category. Those standards were subsequently adopted and implemented as the Steam Electric Point Source Effluent Guidelines in 40 CFR Part 423.

Thus, the 316(b) requirements apply to only to those facilities that are subject to sections 301 and 306 and not to facilities that are required to have storm water permits under section 402.

Furthermore, the LEC does not believe that EPA has the authority under section 402 to issue a general NPDES permit that would include Section 316(b) requirements. Nor does it have the authority to amend existing individual or general storm water permits to include section 316(b) requirements without amending the storm water rules and corresponding permit requirements.

EPA Response

See responses to 316bEFR.035.001 and 041.127.

Comment ID 316bEFR.068.009

Author Name John W. Dwyer

Organization Lignite Energy Council

Subject Matter Code 7.02

Performance standards

EPA's Operational Performance Standards Penalize Certain Geographical Regions

EPA is proposing to establish performance standards in section 125.94(b) that would offer facility owners several options for compliance including the option to reduce "intake capacity to a level commensurate with the use of closed-cycle, recirculating cooling system;.. ."

The LEC is concerned that the existing performance standard does not offer sufficient latitude to accommodate all closed-cycle, recirculating facilities in all geographical regions. Some facilities that are located in more arid regions have on-site cooling ponds and pumping facilities that are designed to appropriate large amounts of water from waters of the U. S. over a limited time period (for example, during spring run-off). Such facilities have a higher pumping capacity, but the pumps would operate for only a portion of any calendar year.

States have considered and mitigated possible impacts by limiting pumping based on site-specific permit conditions.

It is unreasonable for EPA to establish performance standards based strictly on an intake capacity comparison with closed-cycle, recirculating cooling systems while ignoring the annual amount of water pumped.

EPA Response

EPA believes the compliance alternative allowing a facility to demonstrate a flow reduction commensurate with a closed-cycle system is reasonable and expansive enough to address the situation discussed by the commenter.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas L. Englert

On Behalf Of:

Lawler, Matusky & Skelly Engineers, LLP

Author ID Number:

316bEFR.069

Comment ID 316bEFR.069.001

Author Name Thomas L. Englert

Organization Lawler, Matusky & Skelly Engineers, LLP

Subject Matter Code 10.03.05

Brayton Point

Production foregone or biomass lost due to impingement and entrainment (I&E) is a critical component of USEPA's analysis and plays an important role in USEPA's justification of the proposed 316(b) rule for existing facilities. One of the case studies used by USEPA is the Brayton Point Station. PG&E NEG and its consultants recently completed their own detailed analysis of production lost due to I&E at the Brayton Point Station in support of a permit application. USEPA states they got much of the biological information they used to compute production lost from the documents prepared and submitted by PG&E NEG.

PG&E NEG and its consultants who prepared the documents relied on by USEPA carefully reviewed the production lost calculations performed by USEPA for the Brayton Point Station Case Study. Based on correspondence with USEPA and attempts to reconstruct USEPA's results, PG&E NEG concludes that USEPA made two major errors in their calculations of production lost. The errors by USEPA resulted in production lost estimates being overestimated for 14 of the sixteen fish species analyzed. For several species, USEPA's estimates of production lost were hundreds of time higher than the correct values.

Production lost is commonly used to quantify the losses due to I&E. Production is addition of biomass to the population. Biomass at any given time is the sum of the weights of all individuals alive at that time. Because the weights of all individuals at a given time are often not known, biomass is often computed as the number alive times the mean weight of an individual. Production is the rate at which biomass is added to a population, and is the net result of individuals dieing over time while surviving individuals increase their body weight. Production forgone or lost is the amount of biomass that would have been added to the population if the individuals had not been entrained or impinged. These individuals would have grown in body weight, while eventually dieing from other causes. There is a well-known formula for taking the numbers of individuals entrained or impinged of a given age class or life stage, and computing the future production of these individuals over their life time Unfortunately, USEPA incorrectly implemented this formula.

The production lost formula uses information on the initial biomass of individuals and on growth and mortality rates. USEPA made two mistakes in their implementation of the production lost formula. The first mistake arose because US EPA used mean weights of individuals at the midpoint of life stages to compute the growth rate used in the formula, and used midpoint weights to compute initial biomass. The correct use of the formulas compute growth rate from the initial and final weights of the life stage, and use initial weight of the life stage to compute initial biomass. USEPA's implementation of the production lost formula is biologically wrong and mathematically incorrect. The second mistake made by USEPA was their estimates of mean weight at the midpoint of early life stages were too heavy, sometimes thousands of times too heavy, for many species.

The combined effect of these two errors by USEPA is frequent overestimation, sometimes by hundreds of times, of the production lost due to I&E for the Brayton Point Case Study. USEPA must reevaluate its production lost calculations and mean weights, replace their existing estimates of production lost with correct values, and determine how the revised estimates affect the 316(b) rule.

EPA Response

Please see EPA's response to Comment 316bEFR.305.003 on production foregone.

Comment ID 316bEFR.069.002

Author Name Thomas L. Englert

Organization Lawler, Matusky & Skelly Engineers, LLP

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Review of EPA's Application of Production Foregone Model2

Introduction

In support of its new Section 316(b) regulations, USEPA developed a series of case studies. As an example of a power plant located on an estuarine system, Part F of the "Case Study Analysis for the Proposed Section 3 16(b) Phase II Existing Facilities Rule" document addresses the Brayton Point Station (BPS), located on Mount Hope Bay, Massachusetts. The owner of BPS, PG&E NEG, and its consultants have recently completed their own Section 3 16(b) assessment of this facility and are thoroughly familiar with the methods and data used by USEPA. Based on this familiarity, we note several problems with the USEPA assessment, in particular with the findings of the Production Foregone Model application (pages A5-6 through A5-7 and F4-8).

The Production Foregone Model (PPM) is a procedure for quantifying the amount of production that would have resulted had individuals not been lost through entrainment and impingement. Production is defined as the total addition of biomass that would occur during a specified period of time, and is based on individuals increasing their body weight via growth rate and dieing through time. Mathematically, production (P) is calculated as:

[see hard copy for equation]
Equation 1

where:
P=expected production
G=the instantaneous growth rate
B=the average biomass during the time period

The instantaneous growth rate (G) is defined as,

[see hard copy for equation]
Equation 2

where W<1> and W<2> are the start and end weights, respectively, of an individual over the time period t<j> to t<2>. If delta-t = 1, then Equation 2 may be expressed as,

[see hard copy for equation]
Equation 3

An estimate of the mean biomass, B, may be obtained in several different ways; in principle it is the total weight of the population divided by the number of individuals alive at the time. As both weight and number of individuals change over time, both functions need to be integrated with respect to time.

Ricker (1973), among other authors, gives the following:

[see hard copy for equation]
Equation 4

where,
Z=instantaneous mortality rate
B<0>=average biomass at start of time period, t = t<1>
The instantaneous mortality rate (Z) is defined as,

[see hard copy for equation]
Equation 5

where N<1> and N<2> are the number of individuals at the start (t<j>) and end (t<2>), respectively, of the time period t. If delta-t = 1, then Equation 5 may be expressed as,

[see hard copy for equation]
Equation 6

Because G and Z change over the life of a fish, accurate estimation of P requires that the calculations be carried out separately for a particular age class or size class. This can be noted by adding a subscript to Equation 1 to denote a specific age or size class,

[see hard copy for equation]
Equation 7

Further, as Rago (1984) notes, we are interested in the production foregone by the entrainment and impingement of fish. In other words, given that an entrained or impinged fish is of age j (or life stage j), what would that fish have produced over its remaining life span? To address this, Equation 7 may be recast as the sum of production from the current age or life stage to the final age or life stage,

[see hard copy for equation]
Equation 8

where t<max> = maximum age (or stage) obtained by the species of fish.

Our examination of the USEPA analysis suggests two serious flaws in their approach to estimating production foregone. First, we believe that USEPA incorrectly computed the instantaneous growth rate (G) and mean biomass (B) used in Equation 1. Second, USEPA used biologically unrealistic values for early life stage weights. Each of these points is addressed in detail below.

Incorrect Application of Average Weight

USEPA, after Rago (1984), used the following formula for computing production losses:

[see hard copy for equation]

Equation 9

Note that N<i>W<i> (the average biomass) is substituted for B<0> (the initial biomass) of Equation 4. For entrainment and impingement calculations, W<i> and N<i> are computed recursively,

[see hard copy for equation]
Equation 10

and

[see hard copy for equation]
Equation 11

Our attempts to reconstruct USEPA's production foregone estimates using Equation 9 were unsuccessful. In response to our written comments, we were provided with communications (ca. 6/17/02) which indicated that USEPA had used the average weight between successive life stages to obtain the instantaneous growth rate, i.e.,

[see hard copy for equation]
Equation 12

and where [see hard copy for equation]. The average weights, [see hard copy for equation] are the start weights of life stages i, i+l and i+2. Inspections of their results also suggest that W<i> was also used for the initial biomass. Thus, USEPA used W<i> in two places in Equation 9: to compute G and in N<i>W<i> to estimate B. For example, if a larva was entrained, USEPA computed the average weight of the larva (W<i>) as the average of the predicted mean weight at the beginning of the larval stage and the predicted mean weight at the end of the larval life stage. To obtain the average weight for the subsequent life stage, i.e., W<i>, the average of the predicted mean weight at the beginning of the juvenile stage (= weight at end of larval stage) and the predicted mean weight at the end of the juvenile life stage were averaged. The resulting value of W<i> was inserted into Equation 9 and the values of [see hard copy for equation] were used to compute G via Equation 12. This is incorrect. The correct calculation would use the starting and ending weights of the larval stage to compute G, and the starting weight of the larval stage asW<i>. USEPA's erroneous use of mean weights, in some cases, greatly inflated the resulting values of production lost. Average biomäss based on the weight of an individual observed at the midpoint of a life stage will invariably be greater than the weight at the inception of the life stage, and instantaneous growth rate (G) based on the midpoint weights of a life stage and the next life stage is biologically incorrect.

If this is what was actually used, then there is potential for serious error in the production loss estimates. Depending on the relative magnitude of the instantaneous growth and mortality rates, both to each other and to the preceding life stage, the resulting estimates may be substantially over- or under-estimated. (It should be noted that, because we could not reproduce USEPA 's results even after their explanation, we cannot say with any certainty how they actually did the calculations. We have requested further clarification, but to date have not received any response to our request;)

Biologically Unrealistic Weights

USEPA made a series of unrealistic assumptions for the weights of individuals in the early life stages that are then used in the Production Foregone Model and USEPA failed to make use of available scientific literature. For almost all early life stages, USEPA overestimated, sometimes grossly, the average weight of the individuals at the midpoint of life stages. This, in turn, led to highly inflated estimates of lost production.

Production estimates are highly sensitive to the average weight of an individual selected for each life stage. Yet, for eggs and early larval stages these values are not readily available in a form directly usable in the PFM. Scientific studies rarely report the average wet-weight of any egg or larvae. Such weights would be difficult to measure accurately due to the overwhelming contribution of moisture. Weights for these small organisms are generally reported as dry-weight, i.e., the organisms have been dried to remove all moisture. These weights are no longer comparable to the wet-weights reported for larger organisms. It is not entirely clear how USEPA overcame this lack of comparable wet-weight data. Tables F1-l through F1-18 of the Case Study provides wet-weights and cites the PG&E NEG’s Brayton Point Station 316(b) Demonstration as the source, yet PG&E NEG did not provide wet-weights in their Demonstration.

There are several methods, however, that can yield reasonable estimates of early life stage wet-weights, particularly for eggs. These include (1) volume of the organism coupled with the assumption that the biological material has nearly the same weight as water, (2) that dry-weight is a constant proportion of the wet-weight, or (3) compute the average wet-weight by dividing the ovary wet-weight by the total number of eggs present. Additional computational details for the three methods follow.

Method #1
For eggs, volume (V) may be calculated as [see hard copy for equation]. For spherical eggs this reduces to [see hard copy for equation]. The volume of small fish larvae may similarly be computed by multiplication of length x depth x width. The volume may be expressed as weight assuming that 1 cm<3> = 1 gram.

Method #2
Wet weight can be calculated from dry weight based on the fact that dry weight is approximately 20% of the wet-weight (McGurk 1986). Our analysis (see below) is in close agreement with this figure, yielding 19.3%.

Method #3
By dividing the ovary wet weight by the total number of eggs, the average egg wet weight may be obtained. The information necessary for this method is often available from studies of fish fecundity. Some allowance should be made for the weight of the ovary tissues other than eggs. In the following example, we have assumed 10% for this weight.

An example of all three of these methods is presented in Table 1.

TABLE 1
Winter Flounder Egg Weight

	Buckley et al. (1991b)	Calculated

Ovary Wgt(g)	Egg DryWgt (g)	Fecundity	Wet Wgt*(g)	Dry/WetRatio (%)
82.5	0.000054	192,240	0.000386	14.0%
335.6	0.0000542	1,035,653	0.000292	18.6%
66.9	0.0000459	222,491	0.000271	17.0%
188.0	0.0000407	832,196	0.000203	20.0%
368.1	0.0000487	1,390,495	0.000238	20.4%
190.8	0.0000412	896,455	0.000192	21.5%
116.8	0.0000511	369,831	0.000284	18.0%
146.8	0.0000473	568,533	0.000232	20.4%
134.4	0.0000366	616,280	0.000196	18.6%
139.4	0.0000382	614,823	0.000204	18.7%
322.7	0.0000479	1,131,404	0.000257	18.7%
152.6	0.0000469	679,486	0.000202	23.2%
202.0	0.000045	753,385	0.000241	18.6%
230.6	0.000046	822,999	0.000252	18.2%
114.1	0.0000357	619,677	0.000166	21.5%
82.9	0.0000403	364,602	0.000205	19.7%
237.6	0.0000508	902,800	0.000237	21.4%

* Method #3, assuming total ovary weight is made up of 90% ova weight and 10% connective tissue.
Average Wet-Weight (Method #1) = 0.000268 grams
Average Wet-Weight (Method #2) = 0.000225 grams
Average Wet-Weight (Method #3) 0.000239 grams
Average Dry/Wet Weight Ratio = 19.3%

Using the average weight from all three methods, the expected weight of a single winter flounder egg is 0.000244 grams or 0.000000538 lbs.USEPA's reported value in Table Fl-18 was 0.0022 lbs, or over 4,000 times heavier than the actual weight!

As newly hatched larvae do not feed exogenously, but rely on yolk reserves, it is expected that the initial yolk-sac larvae weight will be similar to that of the egg stage. As the yolk-sac is absorbed, larval weight may actually decrease somewhat. For winter flounder, data from Buckley (1982) illustrate this point (Table 2).

TABLE 2
Winter Flounder Yolk-Sac Larvae Weight

Stage	Wet Weight(grams)	Comments
Egg	0.000244	From above calculations
Eggs on Day of Hatch	0.000157*	Buckley 1982, average, 3 tests
YSL on Day of Hatch	0.000131	Buckley 1982, average, 4 tests
YSL at yolk-sac absorption	0.000122	Buckley 1982, average, 4 tests
YSL at first feeding	0.000113	Buckley 1982, average, 3 tests

* Converted to wet weight from protein weight by 1 .626x protein to dry ratio (based on Buckley et al. 1991a) and 5x dry to wet ratio.

Buckley et al. (199lb) reported that the initial average weight of laboratory reared winter flounder yolk-sac larvae from upper Narragansett Bay was 29.7 ug, while those from lower Narragansett Bay averaged 25.6 ug. Assuming that dry weight is 20% of wet weight, corresponding wet weights would be 0.000160 g and 0.000128 g, (or 3.53x10<7> and 2.82x10<7> lbs) respectively. USEPA assumed an average weight of 0.00441 lbs for Stage 1 (= yolk-sac larvae). This is approximately 12,500 to 15,600 times heavier than the actual weight.

Weight at length relationships for post yolk-sac winter flounder larvae are available from several sources, including Laurence (1979), Beyer and Laurence (1980), and Rose et al. (1996). Using the relationship from Laurence (1979), the expected weights for post yolk-sac larvae (ca. 3.1 to 8.2 mm) may be calculated and compared to the values assumed by USEPA (Table 3).

[see hard copy for table]
TABLE 3
Winter Flounder Post Yolk-Sac Larvae Weight

The comparison in Table 3 demonstrates that USEPA grossly overestimated the weights for all post yolk-sac larvae stages of winter flounder. The largest discrepancy is for the Stage 2 larvae, surpassing the discrepancy for the yolk-sac larvae (Stage 1).

By re-arrangement of Rose et al.'s Equation 9, the expected weight for juvenile winter flounder (ca. 9 to 137 mm) may be obtained:

W<mg> wet = 0.000209 L<mm>3.57l

This equation yields an expected weight for an averaged size juvenile (ca. 73 mm) of 0.942g or 0.00208 lbs. The USEPA value of 0.033 lbs is 15.8 times greater than the actual value.

Discrepancies in early life stage weights are not restricted to winter' flounder, but appear in nearly all species. Below (Table 4) are several examples of this problem in other species (winter flounder is sometimes included for comparisons).

[see hard copy for table]
TABLE 4
Comparison of Expected Egg Weight with Values Assumed by USEPA

Of the eighteen species modeled by USEPA, egg weights for fifteen (83%) were overestimated. In some cases, such as the previously examined winter flounder and tautog, this overestimation was by several orders of magnitude. Only butterfish, silver hake, and striped killifish egg weights were underestimated.

Larval stages were also overestimated. For example, the expected weight for tautog larvae is shown in Table 5.

[see hard copy for table]
TABLE 5
Tautog Larvae Weight

Assuming an average size of approximately 15mm (size range is 2.2 mm at hatch to 30 mm TL at end of PYSL), the average weight is 0.000233 lbs (the average of 10 mm and 20 mm weights in Table 5).

The weight used by USEPA, 0.022 lbs, is almost 95 times heavier that the actual weight.

A similar analysis may be conducted for scup larvae (Table 6):

[see hard copy for equation]
TABLE 6

Scup hatch at about 2 mm in length and become juveniles at about 20 mm in length. Assuming an average size of approximately 11 mm for larvae, Laurence's equation predicts an average weight of 0.0 163 g or 0.000036 lbs. The assumed USEPA weight of 0.0011 lbs for scup larvae is 30 times heavier. (Even assuming the weight for the 20 mm individual, the USEPA weight is over 3 times heavier.)

USEPA needs to re-evaluate its Production Foregone estimates with biologically realistic measures of mean weights of individuals.

Combined Influence of Errors

The two errors by USEPA combine to yield an overestimate of the production losses resulting from BPS. To demonstrate the magnitude of this overestimation, we have computed production losses using the correct weights in the production formula and biologically realistic values for weights at midpoints of life stages. As can be seen in Table 7, USEPA overstated total production losses by at least 300 times!

For 14 of the sixteen species, the incorrect calculations used by USEPA resulted in overestimation of the production lost. For several species, USEPA's estimate of production lost was hundreds of times higher than the production lost based on realistic weights and the correct use of the production formula.

TABLE 7
Comparison of USEPA and LMS 1974-83 Average ProductionForegone Estimates for Brayton Point Station

Species	USEPAPFMlbs.wet	LMSPFMlbs.wet	USEPA ÷LMS
Alewife	584	42	13.8x
Atlantic Menhaden	546,168	22,850	23.9x
American Sand Lance	1,737	5,074	0.3x
Atlantic Silverside	8,748	2,154	4.1 x
Bay Anchovy	1,501,808	14,953	100.4x
Hogchoker	81,576	550	148.3x
Rainbow Smelt	4,276	1,656	2.6x
Scup	1,708	297	5.8x
Seaboard Goby	894	5,305	0.2x
Silver Hake	108	1	108.4x
Tautog	60,371,893	89,277	676.2x
Threespine Stickleback	28	8	3.5x
Weakfish	2,440,664	1,971	1,238.4x

White Perch	72	1	60.2x
Windowpane	181,291	1,547	117.2x
Winter Flounder 3	4,380,576	82,290	53.2x.
Total	69,522,131	227,976	305.0x

Note: Winter flounder numbers may change based on use of 1993-1999 data and possible revision of life history parameters.

Conclusion

USEPA must reevaluate its calculations of production lost and its estimates of mean weights, replace their existing estimates of production lost with correct values, and determine how the revised estimates affect the 316(b) rule.

EPA Response

Please see response to Comment 316bEFR.305.003 on production foregone.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Joseph DeAlteris

On Behalf Of:

DEALTERIS Associates

Author ID Number:

316bEFR.070

Comment ID 316bEFR.070.001

Author Name Joseph DeAlteris
Organization DEALTERIS Associates

Subject Matter Code 10.03.05
Brayton Point

Development of Long-term Indices of Post-larval Finfish Abundance in Narragansett Bay

We considered five data sources for development of long-term indices of post-larval finfish abundance within Narragansett Bay and/or Mount Hope Bay:

1. Manchester Street Station Impingement Survey

2. Marine Research Inc., Standard Trawl Index (MRI)

3. Brayton Point Station Impingement Survey (BPS)

4. Rhode Island Department of Fish and Wildlife Spring/Fall Trawl Survey (RIDFW)

5.University of Rhode Island Graduate School of Oceanography Trawl Survey (URIGSO)

The Manchester Street Station index is of limited value to the expanded analysis for two reasons: 1) the index covers the shortest time period (1982-2001) of all the available indices; and 2) four years of index data (1982, 1991, 1994, 1995) are either missing or represent incomplete collections due to significant periods of Station outage (3+ months). For these reasons, the Manchester Street Station is not considered further in this document.

The sections that follow describe each of the remaining four sampling programs and the methods used to generate the indices of abundance. Indices of abundance were calculated (and provided in Tables 1-6) for the following species: hogchoker, scup, tautog, windowpane flounder, and winter flounder.

Marine Research Inc., Standard Trawl Index (MRI)

MRI Survey Background

A standard otter trawl has been used in upper Mount Hope Bay since late 1971 to assess the relative spatial distribution and abundance of post-larval finfish. The standard otter trawl used to sample Mount Hope Bay is 11.4 m (37.5 ft) long. It has a 7.6-m (25-ft) head rope, 11-m (36-ft) foot rope, 120.6-mm (4.75-in) stretched mesh in the body, and 38.1-mm (1.5-in) stretched mesh in the cod end. Except for the purchase of replacement nets in 1986, 1987, 1994, and 2001 the gear and vessel have remained unchanged.

Beginning in late 1971, standard otter trawl tows were performed along transects located at five fixed stations within Mount Hope Bay: Spar, Cole River, Lee River, Intake and Crossleg. In 1979, three additional stations were added: Taunton River, Discharge, and Mid-Bay. In January 1986, the Crossleg and Mid-Bay stations were eliminated, bringing to six the number of fixed stations included in the standard otter trawl sampling program. Spar, Cole River, Lee River, and Intake have been sampled continuously since late 1971; the Taunton River and Discharge stations have been sampled continuously since 1979. The Discharge tow was perpendicular to the plume from 1979 — December 1985 and was reoriented inline with the plume beginning in January 1986. Figure 1 shows the eight fixed stations sampled at various times in MRI's finfish trawl program (only the post-1985 Discharge station is shown).

Duplicate tows were made twice each month until 1979, when tows were changed from duplicate to single. Tow frequency was reduced to once per month at the eight fixed stations in October 1980. Trawls are towed for 15 minutes along the established transects, except for the pre-1985 Discharge tows, which were 3 minutes in duration. (Transects are located with reference to land-based bearings and differential Global Positioning System longitude and latitude coordinates). Occasionally, tow duration exceeds 15 minutes because tidal-driven currents increase the time required to cover the established transect. This occurs most often on Taunton River transects, where currents are strongest.

For more detail on the standard otter trawl program, see Section F of USGEN (2000) and page E-12— E-13 of the (USGEN 2001).

MRI Index Calculation

The MRI CPUE index was calculated by Marine Research, Inc. using all fixed station data collected within a given year. The annual CPUE values are the delta mean catch per tow. The delta mean was used because it has substantially lower variance compared with the arithmetic mean when the data set consists of many zero tows. The MRI fixed station CPUE indexes fish abundance in approximately the upper 1/3 of Mount Hope Bay (from Spar Island north) (Figure 1).

Brayton Point Station Impingement Survey (BPIS)

BPIS Survey Background

The objective of the Brayton Point Impingement Survey, conducted by Marine Research Inc., is to determine the number of fish impinged per unit flow at the Units 1, 2, and 3 intake traveling screens (Figure 2). To assess impingement, field personnel divert screenwash to special collection tanks, where the impinged finfish are evaluated.

Units 1, 2, and 3 traveling screens are equipped with 9.5-mm (0.375-in) square mesh panels. To reduce impingement of horseshoe crabs (Limulus polyphemus), fixed screens with larger mesh —38 mm2 (1.5 in2) at Units 1 and 2 and 25 mm2 (1 in2) at Unit 3—are used in front of the traveling screens from May through October, when horseshoe crabs are most abundant. The fixed screens are mesh panels that drop down in the stop-log slots in front of the trash racks.

The traveling screens at Units 1, 2, and 3 have been run continuously since 1997 to minimize the amount of time fish are impinged and therefore their likelihood of injury or mortality due to impingement.

The Units 1, 2, and 3 traveling screens are connected to in-line collection tanks. During impingement sampling, water is diverted for a fixed period of time to collection tanks, where fishes are collected and processed. Diverted screenwash can be sampled over any time period, but algae and debris must be cleaned from the sides of the collection tank periodically so that overflow and subsequent loss of diverted material does not occur. Prior to arrival at the station, the biologist performing the assessment requests that the collection tanks be opened to accept screenwash at a specified time. The duration of collection periods typically is in the range of 4 to 8 hours. All fish captured are identified, counted, and measured for total length to the nearest millimeter.

If an impingement rate of more than 25 fish per hour is recorded, standard procedure requires that certain Brayton Point Station personnel and selected state agencies be notified, and that impingement measurement continue until a rate of less than seven fish per hour is recorded.

Assessment of impingement at the Units 1, 2, and 3 traveling screens has been performed since 1972. Before 1997, screenwash cycles typically were 8 or 12 hours, and sampling was done three times a week. Since 1997, when continuous screen travel began, sampling has been done daily to reduce the probability that occasions of high fish impingement will be missed.

For more detail on the BPS impingement program, see Section F of USGen (2000) and page E29 - E-30 of the (USGen 2001).

BPIS Index Calculation

The BPIS index, calculated by Lawler, Matusky, and Skelly Engineers Inc. (LMS), is the annual average number of organisms impinged per million m3 of intake water. The index was calculated by dividing the total number of fish of a given species captured during each year in the impingement sampling program by the total intake volume sampled during that year. The annual value was then converted to the number that would be impinged in 1 million m3 of intake water. The BPIS CPUE indexes fish abundance in the vicinity of the Station's Units 1, 2, and 3 intake in upper MHB (Figure 2).

Rhode Island Department of Fish and Wildlife Spring/Fall Trawl Survey (RIDFW)

MDFW Survey Background

The RIDFW spring and fall trawl program has monitored fish populations in Narragansett Bay, Rhode Island Sound, and Block Island Sound since 1979. The core program consists of stratified (by depth) random sampling conducted throughout the three areas. The sample areas and strata are shown in Figures 3, 4, and 5. Note that the area covered in Narragansett Bay does not include Massachusetts waters (i.e. upper portions of Mount Hope Bay). The Narragansett Bay survey was augmented in 1990 with the addition of 13 stratified fixed stations (Figure 6). Two of the fixed stations are located in, Mount Hope Bay: Roger Williams College and Spar Island. The 16-m (54-ft) (foot-rope) trawl has a 2.4-3 m (8—10 ft) rise and has 38-mm (1.5-in) mesh in the cod-end, with a 10-mm (GA-in) liner. Tow durations are 20 minutes.

An average of 93 trawl tows has been made annually in the random program since inception (range: 59 to 138). Sampling was generally conducted during April — May (spring) and September — October (fall), though some tows have been made during June, July, and November. Most tows are made in Narragansett Bay (which includes Mount Hope Bay) (60%) followed by Block Island Sound (25%) and Rhode Island Sound (15%). Fixed stations have been sampled each month since 1990.

RIDFW Index Calculation

LMS used data from the RIDFW spring and fall random and fixed surveys to generate annual indices of abundance of finfish in two areas: Lower Mount Hope Bay (LMHB), and Narragansett Bay exclusive of Mount Hope Bay (NB exclusive of MHB). In the calculation of the LMHB CPUE, lower Mount Hope Bay was defined to the north by the Rhode Island/Massachusetts state border and to the south by the Mt. Hope and Sakonnett Bridges (Figure 6). The NB exclusive of MHB CPUE was calculated with data from all Narragansett Bay tows, except those defined as being in Lower Mount Hope Bay. To generate the annual index for each area, all fish captured in the random and fixed station tows made in that area were summed together and divided by the total number of random and fixed tows made in that area in that year. In generating the indices, April - May and September - October fixed station tows were used because these time periods were sampled consistently throughout the duration of the random program. The Rhode Island Sound fixed station was not included in the calculation of the NB exclusive of MHB index because the objective was to index abundance in Narragansett Bay independent of the coastal population.

The LMHB CPUE indexes fish abundance in Rhode Island waters of MHB (lower 2/3 of MHB). The NB exclusive of MHB CPUE indexes fish, abundance in all of Narragansett Bay except waters in MHB (i.e., approximately 90% of NB) (Figure 7).

University of Rhode Island Graduate School of Oceanography (URIGSO)

UIRIGSO Survey Background

The University of Rhode Island Graduate School of Oceanography (URIGSO) trawl sampling program is the oldest in the state. The program, which has been ongoing since 1959, conducted monthly bottom trawl sampling until 1965 and weekly sampling thereafter at two fixed stations in Rhode Island waters (M. Scherer, personal communication, Marine Research Inc., Falmouth, MA). One station is located in the West Passage of Narragansett Bay (Fox Island) and the other is in Rhode Island Sound waters at the mouth of Narragansett Bay (Whale Rock) (Figure 8). The program's 10-m (33-fl) (foot-rope) net has a 1.2-m (4-fl) rise and 51-mm (2-in) mesh. There is no cod-end liner and tow duration is 30 minutes.

RIDFW Index Calculation

The URIGSO index is from USGEN (2000). The index is the annual geometric mean catch per tow at the Fox Island station, calculated from all tows made within a given year. Scup and tautog were the exception, with the annual geometric mean catch per tow being based on May through October and May through November tows only, respectively. The hogchoker index was not published for reasons unknown. The URIGSO Fox Island CPUE indexes fish abundance in the West Passage of Narragansett Bay (Figure 8).

[see hard copy for figures and tables]

EPA Response

EPA did not evaluate trends in fish populations in Mt. Hope Bay for its benefits analysis for the final 316b Phase 2 rule. However, EPA notes the commenter's listing of the available indices of post-larval finfish abundances in Narragansett Bay.

Author Name Joseph DeAlteris
Organization DEALTERIS Associates

REPORT

TRENDS IN THE ABUNDANCE OF FIVE FISH SPECIES IN MOUNT HOPE BAY:
A RESPONSE TO M. GIBSON'S ASSESSMENT OF THE EFFECT OF BRAYTON POINT STATION
ON FISH STOCKS IN MOUNT HOPE BAY

1 July 2002

Joseph DeAlteris, Ph.D.
DEALTERIS ASSOCIATES INC.
Jamestown, RI 02835

EXECUTIVE SUMMARY

In recent years, there has been a great deal of debate and controversy about trends in the abundance of certain fish populations in Mount Hope Bay. A series of reports (1996, 2000, 2002a, 2002b) prepared by Mark Gibson of the Rhode Island Division of Fish and Wildlife (RIDFW) have been at the heart of this debate. In these reports, Gibson concluded that Brayton Point Station has negatively impacted fish stocks in Mount Hope Bay (MHB). As will be shown in detail in this report, the weight of the evidence flatly 'contradicts Gibson's conclusions for some fish species and casts doubt about his conclusion for other species. Indeed, there is limited evidence that several bottom-dwelling species have fared better in Upper Mount Hope Bay (UMHB) near Brayton Point Station than they have fared in Narragansett Bay (NB), just as there is also limited evidence that other species have fared worse in UIVIHB than they have fared in NB.

Gibson's conclusion derives from two major errors in his use of data. First, he erroneously characterized data that was collected exclusively from the upper 1/3 of MHB (the MRI and BPIS data) as representative of all of MHB. That is not the case. RIDFW has collected data from Lower Mount Hope Bay (LMHB) and NB for many years, and my analysis of this data demonstrates conclusively that trends in fish abundance in the lower 2/3 of MHB are not different from those in NB. Note that it is widely agreed that Brayton Point Station has no impact on NB. A second major flaw in Gibson's use of data is that he compares data collected from coastal waters. (Rhode Island and Block Island Sounds) with data collected in UMHB (the MRI and BPIS) to support his conclusions. That comparison is biased and not appropriate. When the coastal data is removed from the analysis, it is immediately apparent that there are minimal differences between fish abundance trends in MHB and NB. Finally, in his 2002a report, Gibson only considered a single species -- winter flounder -- but improperly extrapolated his conclusion to two other bottom-dwelling species, windowpane flounder and tautog.

I have utilized all of the available data collected over a three decade period to evaluate trends in the abundance of five fish species in MHB. The purpose of my analysis and report was to undertake a critical and comprehensive examination of the data and of the validity of Gibson's conclusions. I have done this by using Gibson's (2002a) methodology, but included additional species, areas, and time periods. I evaluated four demersal species (winter flounder, windowpane flounder, hogchoker and tautog) and one pelagic species (scup). Like winter flounder, these have also been identified as species of concern in Mount Hope Bay. In addition, these species are present in the MRI trawl survey, and are also sampled in the Brayton Point impingement studies. RIDFW collects data on fish abundance in LMHB, NB, and the surrounding estuarine and coastal waters using a trawl survey. The survey includes stations in LMHB, and data from these stations were grouped to form an index of abundance representative of LMHB. I analyzed these abundance indices by standardizing them against two different long-term series for NB, the RIDFW and URIGSO trawl surveys. I considered three time periods: 1972-1985, 1986-2000 and 1972-2000, so as to correspond with the various Gibson analyses. I analyzed a total of 81 individual cases (see Table 13, page 34 of this report for a summary of the results of the trend analyses). Based on the results of these analyses, I then evaluated the trends in abundance of the five fish species in MHB to evaluate the potential effect of the Brayton Point Station. (I have not taken into account other potential stressors on abundance.) Conclusions for individual species are based on the results of the majority of the cases investigated, so as to provide clear and convincing interpretation of the analyses.

The results of my analyses are detailed below and are summarized as follows. There is limited evidence of a differential decline of winter flounder in UMHB but it is not as far-reaching, striking or as definitive as Gibson's reports suggest. Notably, as for windowpane flounder, hogchoker, and tautog, the weight of the evidence indicates that abundance trends in both UMHB and LMHB are similar to NB, but there is also limited evidence that these species fared better in UMHB than NB. As for scup, in LMHB the abundance trend is similar to NB, and there is only limited evidence of a differential decline of scup in UMHB. The clear weight of the evidence eliminates Brayton Point Station as a factor in the declines of all five species in the lower 2/3 of MHB. It also casts serious doubt on claims that the Station has seriously impacted the five species in UMHB.

More specifically as to winter flounder, all the short-term series for UMHB have slopes that are not significantly different from zero (8 of 8 cases). The long-term series trends have significant negative slopes in 2 of 4 cases, a significant positive slope in 1 of 4 cases, and a slope not significantly different from zero in 1 of 4 cases. The results of the analysis of the LMHB series clearly indicate that the abundance of winter flounder in LMHB is following a similar trend to the reference series for NB (6 of 6 cases). These results clearly refute the Gibson's conclusion that winter flounder are declining at a greater rate in the entire MHB system. in fact, it appears that the trends in abundance in LMHB are similar to NB, and that in UMHB the rate of decline is greater than NB in only 2 of 12 cases analyzed. In summary, while there may be some evidence of a greater differential decline in winter flounder in UMHB than in Narragansett Bay in some of the data series, it is neither definitive nor compelling as suggested by Gibson (2002a).

The results of the analyses of the data for windowpane flounder, hogchoker and tautog in UMHB as described by the MRI and BPI standardized series clearly indicate abundance trends for these species are similar to NB (23 of 30 cases). In fact, the analyses indicate that in the, remaining 7 of 30 cases, abundance trends for these species are significantly positive relative to NB. In LMHB the analyses indicate that abundance trends for these species are also similar to NB (15 of 15 cases). Again, results of analyses for these species clearly refute the conclusion drawn by Gibson (2002b).

The results of the analyses of the data for scup are also equivocal with respect to UMHB. The shorter term series indicate that the abundance trend is similar to NB (8 of 8 cases), while the long-term series (1972-2000) indicates that scup have declined at a greater rate than NB in 3 of 4 cases. The analyses of the LMHB standardized series indicate that the abundance trend for scup is not significantly different from NB (6 of 6 cases).

BACKGROUND

Fishery resource abundance patterns in Rhode Island estuarine and coastal waters have experienced dramatic changes in the last three decades due to the effects of overfishing selected species, global climate warming and other factors (DeAlteris et al. 2000). Quantifying the relative importance of individual causal factors associated with changes in the abundance of individual fish stocks is very difficult when multiple stressors are simultaneously acting on the fish stock (Hilborn and Walters 1992). A recent report from RI Division of fish and Wildlife, entitled “Winter Flounder Abundance near Brayton Point Station, Mount Hope Bay Revisited: Separating Local from Regional Impacts Using Long Term Abundance Data” (Gibson 2002a) states that the abundance of winter flounder, in Mount Hope Bay (MHB) is anomalously low compared to other areas inside and outside Narragansett Bay (NB). The Gibson conclusion is based on comparative analyses of abundance trends for winter flounder from two data sources in Mount Hope Bay (MHB), that are individually compared to five other long-term series from NB and the surrounding offshore areas for the period 1972 to 1985.

The two MHB data sources are the MRI trawl survey conducted by the operators of Brayton Point Station, and the Brayton Point impingement screen (BPIS) data from the cooling water intakes for that power plant. The other long-term data series are the RIDFW trawl survey of NB, Rhode Island Sound, and Block Island Sound, the URIGSO trawl survey West Passage in NB, the NMFS trawl survey for Block Island Sound, NMFS landings data for statistical area 539 which includes NB and the coastal water south of Rhode Island, and the Manchester Street power station screen impingement data for Upper Narragansett Bay. In this report, Gibson (2002a) incorrectly ascribed the representative area for the MRI trawl survey and BPIS data to the entire area of MHB (about 15 square miles), rather than to the upper 1/3 of MHB (about 5 square miles) where the data was in fact collected.

In a related report, Gibson (2002b) suggested that similar population declines have occurred in MHB for windowpane flounder and tautog, and then presented the results of a foregone production model that estimates a monetary value for the loss of all these species. However, there is no data or analysis to demonstrate that the abundance trends of windowpane flounder and tautog are in fact declining faster in MHB than in NB, and therefore he offers no scientific evidence to support his conclusions, other than citing to individual stock assessments for these species that indicate overall declines in abundance in RI waters. Gibson interprets the results of his analyses and states “that the operation of units 1-3 [at Brayton Point Station] during the period 1972-1985 was sufficient to induce a decline in the winter flounder stock”. He further states that “the conversion of unit 4 to open cycle cooling accelerated the decline” post 1986, and “led to. the complete collapse of the stock”. This latter conclusion was based on a previous analysis (Gibson 1996) that suggested a post 1986 power plant effect based on a parsimony hypothesis. This analysis correlated the post 1986 decline in MHB fish stocks with an increase in the heat flow from the power plant, associated with the conversion of unit 4 to open cycle cooling. However, it did not utilize other long-term reference abundance trends for NB to standardize the MHB series, as Gibson later considered them in the 2002a report.

The purpose of my analysis and this report was to undertake a critical and comprehensive examination of the data and an assessment of the validity of Gibson's conclusions. I have done this by conducting analyses utilizing the identical methods to Gibson 2002a, but including additional areas, time periods, and species.

QUESTIONS RAISED BY THE GIBSON REPORTS

1. Using the Gibson 2002a data for winter flounder, I evaluated standardized abundance trends for the periods 1972-1985, 1986-2000, and 1972-2000. My analyses addressed the following questions:

a. Are the results of Gibson 2002a for the period 1972-1985 reproducible?
b. Is there evidence of a post 1986 "collapse" (1986-2000) of the winter flounder stock in MHB?
c. Do the Gibson results and conclusions for the period 1972-1985, hold for the entire period 1972-2000?

2. Using available data for five finfish species (winter flounder, windowpane flounder, tautog, hogchoker and scup) for UMHB (MN trawl survey and BP1S), and LMHB (RIDFW stations in LMHB), I evaluated the abundance trends for these species and areas by standardizing these series with the long term series from RIDFW for NB only and URIGSO for West Passage of NB for the periods 1972-1985, 1986-2000, 1972-2000. My analyses addressed the following questions:

a. For winter flounder, are the standardized abundance trends for UMHB and LMHB increasing, decreasing or following the same trend as the other long term series in NB for the various time periods?
b. For the other species, windowpane flounder, hogchoker, tautog, and scup, are the standardized abundance trends increasing, decreasing, or following the same trend as the long-term series in NB for the three time periods?

Based on the results of the aforementioned analyses (six standardized abundance series evaluated for five species in three time periods for a total of 81 cases studied), I then considered the trends in abundance of these finfish species in MHB to evaluate the effect of the Brayton Point Station.

METHODS AND DATA SOURCES

Following the control-impact methodology (Underwood 1994) outlined and data presented in Gibson (2002a), I first standardized the MRI and BPIS series for upper Mount Hope Bay (UMHB) with the other five long-term data series (NMFS Block Island Sound, URIGSO for West Passage of Narragansett Bay (NB), RIDFW for NB and adjacent coastal waters, statistical area 539 landings, and Manchester Street screen impingement) (Manley 2001). I then plotted the natural log (LN) of the standardized index for each of the time series. Using linear regression in EXCEL, I estimated the slope of the entire series, the 1972-1985 series and the 1986-2000 series. Finally, I statistically evaluated the null hypothesis, that the slope of the regression was not significantly different from zero (?= 0.05). If the null hypothesis ,is accepted, this implies that the standardized series follows a similar trend to the reference long-term series. If the null hypothesis is rejected, then the standard series is either significantly increasing (+) more than or significantly decreasing (-) more than the reference long-term series (Netter et al. 1983).

An identical procedure was followed using data from the above sources tabulated by LMS (2002) for winter flounder, windowpane flounder, tautog, hogchoker and scup for UMHB, lower Mount Hope Bay (LMHB) and NB. The UMHB data series are the MRI trawl survey and Brayton Point screen impingement data. The LMHB series is based on the RIDFW trawl survey locations situated in LMHB. The NB series are the RIDFW data for stations exclusively in NB, and the URIGSO series in West Passage of NB. The analysis periods are 1972-1985, 1986-2000 and 1972-2000 as data were available, so as to correspond with the Gibson analyses. The hypotheses evaluated are identical to those identified previously, but the standardized series evaluated are MRI, BPIS and LMHB.

RESULTS

The raw data used in all the analyses are listed in Tables 1-6, and this section is divided into three parts: the reanalysis of the Gibson data for winter flounder (Table 7 and Figure 1), the analysis of the LMS data for winter flounder (Table 8 and Figure 2), and the analysis of LMS data for windowpane flounder, hogchoker, tautog, and scup (Tables 9-12 and Figures 3-6).

The, first analysis replicates Gibson's use of data. The results for winter flounder are shown in Figure 1 and are summarized in Tables 7a and 7b. For winter flounder, the MRI standardized series has a significant negative slope in 3 of 5 cases for the period 1972-1985, 4 of 5 cases for the period 1986-2000, and 5 of 5 cases for the period 1972-2000. For winter flounder, the standardized BPI series has a significant negative slope in 4 of 5 cases for the period 1972-1985, 3 of 5 cases for the period 1986-2000, and 4 of 5 cases for the period 1972-2000.

The second set of analyses evaluates standardized series for UMHB (MN trawl survey and Brayton Point impingement screen data) and LMHB (RIDWF trawl). The results of the analyses for winter flounder are shown in Figure 2 and summarized in Tables 8a, 8b, and 8c. For the periods 1972-1985 and 1986-2000, the slopes of the standardized MRI and BPI series representing UMHB are not significantly different from zero in 8 of 8 cases. However, for the longer period 1972-2000, the Mill standardized series has a significant negative slope in 2 of 2 cases, while the BPI standardized series has a significant positive slope in I case, and a slope not significantly different from zero in the other case. In LMHB the slopes of the standardized series are not significantly different from zero for any time periods (6 of 6 cases).

The results of the analyses for windowpane flounder are shown in Figure 3 and summarized Tables 9a, 9b, and 9c. For both the MRI and BPI standardized series representing UMHB for all time periods, the slopes of the series are not significantly different from zero, with the exception of the period 1986-2000 where 2 of 4 cases indicate a significant positive slope. For the standardized LMHB series in all cases and all time periods, the slopes are not significantly different from zero (6 of 6 cases).

The results of the analyses for hogchoker are shown in Figure 4 and summarized in Tables l0a, l0b, and l0c. For both the MN and BPI standardized series representing UMHB, the slopes are significantly positive for the period 1972-1985 (2 of 2 cases), and are not significantly different from zero for the periods 1986-2000, and 1972-2000 (4 of 4 cases). The slopes of LMHB standardized series is not significantly different from zero for any time periods (3 of 3 cases).

The results of the analyses for tautog are shown in Figure 5 and summarized in Tables 11a, 11b &

11c. For both the MRI and BPI standardized series representing UMHB, the slopes are significantly positive in 2 of 4 cases, and not significantly different from zero in 2 of 4 cases for each of the periods 1972-1985. For the period 1986-2000, the slopes of both the MRI and BPI standardized series are not significantly different from zero (4 of 4 cases). Finally, for the long-term period 1972-2000,. the slopes of the MRI and BPI standardized series are not significantly different from zero in 3 of 4 cases, and the remaining case is significantly positive. The slopes of the standardized LMHB standardized series are not significantly different from zero in all cases for any time periods (6 of 6 cases).

The results of the analysis for scup are shown in Figure 6 and summarized in Tables 12a, 12b, and 12c. For both the MRI and BPI standardized series representing UMHB, the slopes are not significantly different from zero for both the periods 1972-1985 and 1986-2000(8 of 8 cases). However for both series over period 1972-2000, the slope is significantly negative in 3 of 4 cases. The slopes of the LMHB standardized series are not significantly different from zero for any of the three time periods (6 of 6 cases).

DISCUSSION, SUMMARY AND CONCLUSIONS

With regard to winter flounder, the standardized long-term series in UMHB have significant negative slopes in 2 of 4 cases, a significant positive slope in 1 of 4 cases, and a slope not significantly different from zero in 1 of 4 cases. Additionally all the short-term series have slopes not significantly different from zero (8 of 8 cases). The results of my analyses of the LMHB series clearly indicate that the abundance of winter flounder in LMHB is following a similar trend to the reference series for NB in 6 of 6 cases. These results clearly refute the conclusion of Gibson (2002a) that winter flounder are declining at a greater rate in the entire MHB system. In fact, it appears that the trends in abundance in LMHB are similar to NB, and that in UMHB the rate of decline is greater than NB in only 2 of 12 cases analyzed. Thus, while there may be some evidence of a greater differential decline in winter flounder in UMHB than in Narragansett Bay in some of the data series, it is neither definitive nor compelling as suggested by Gibson (2002a).

The results of my analyses of our data for windowpane flounder, hogchoker and tautog in UMHB as described by the MRI and BPI standardized series clearly indicate abundance trends for these species are similar to NB (23 of 30 cases). In fact, the analyses suggest that in the remaining 7 of 30 cases, abundance trends for these species are positive relative to NB. In LMHB the analyses indicate that abundance trends for these species are also similar to NB (15 of 15 cases). Again, results of analyses for these species clearly refute the conclusion drawn by Gibson (2002b).

The results of my analyses of our data for scup are also equivocal with respect to UMHB. The shorter terms series indicate that the abundance trend is similar to NB (8 of 8 cases), while the long-term series (1972-2000) indicates that scup have declined at a greater rate than NB in 3 of 4 cases. The analyses of the LMHB standardized series indicate that the abundance trend for scup is not significantly different from NB (6 of 6 cases).

In conclusion, there is conflicting evidence about whether winter flounder in UMHB have declined at a greater rate than in NB. There is no question but that the abundance of winter flounder in LMHB is the same as in NB. Winter flounder have definitely not declined more sharply in LMHB than in NB. As for windowpane flounder, hogchoker, and tautog, the abundance trends in both UMHB and LMHB are similar to NB thus eliminating the Brayton Point Station as a factor in their abundance.

For scup in LMHB, the abundance trend is also similar to NB, but there is limited evidence that scup in UMHB may have declined at .a greater rate than NB. Again, there is definitely no negative effect of the Brayton Point Station on LMHB for the five species investigated and on UMHB for windowpane flounder, hogchoker, and tautog.

[see hard copy for figures]

EPA Response

EPA did not evaluate trends in fish populations in Mt. Hope Bay for its benefits analysis for the final 316b Phase 2 rule. However, EPA has reviewed materials prepared by EPA Region 1 on this issue. The Agency concurs with Region 1's conclusion that the commenter's analysis is incorrect. EPA agrees with Region 1 that the available evidence indicates that the decline in fish populations in Mt. Hope Bay is statistically greater than the decline in Narragansett Bay as a result of the BPS. Additional discussion of this issue is provided in EPA Region 1's 2002 NPDES permit determinations for BPS and the related Responses to Comments document (available at http://www.epa.gov/region1/braytonpoint/index.html)

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Ross Povenmire

On Behalf Of:

Public Service of New Hampshire

Author ID Number:

316bEFR.071

Notes

EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.071.001

Author Name Ross Povenmire

Organization Public Service of New Hampshire

Subject Matter Code SUP

General statement of support

Numerous aspects of the proposed rule represent welcome changes from previous drafts of 316(b) rules. Instead of imposing specific technology requirements on existing facilities, the rule offers three options for meeting the "best technology available" standard referenced in the Clean Water Act. The first option requires a demonstration that the facility has either reduced intake capacity commensurate with a closed-cycle, recirculating cooling system, or has otherwise already met the applicable performance standards.

EPA Response

EPA notes the comment. Today's rule adopts five compliance alternatives from which facilities may choose how to comply with the Phase II existing facility 316(b) regulation.

Comment ID 316bEFR.071.002

Author Name Ross Povenmire

Organization Public Service of New Hampshire

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The second option consists of meeting performance standards measured against a facility-specific baseline with the implementation of selected design, operation, or restoration measures. Restoration measures include enhancing wetlands, operating fish hatcheries or stocking programs, and removing impediments to fish migration. Northeast Utilities has undertaken a number of such restoration efforts, and believes that they can be very effective in mitigating the impacts of intake structures. Northeast Utilities supports the inclusion of restoration as a means of complying with proposed standards, and also urges EPA to provide maximum flexibility in the use of restoration banking and trading. Restoration should not, however, be a mandatory element of 316(b) compliance measures.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or help to minimize the adverse environmental impacts that derive from the impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule, including those in sections 125.94 and 125.95.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

For a discussion of the extent to which restoration is voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.071.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Ross Povenmire

Organization Public Service of New Hampshire

The third option allows for the development of site-specific performance standards to reflect the "significantly greater" costs of implementing the normal performance standards at the facility compared with EPA estimated costs or anticipated benefits. The "significantly greater" test embedded in the third option is much more preferable to the "wholly disproportionate" test that appeared in earlier drafts, and provides essential flexibility for site specific considerations.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.071.004

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Ross Povenmire

Organization Public Service of New Hampshire

Timetable for Compliance:

The proposed rule states that a facility must comply with the rule when an NPDES permit containing the requirements of the rule “is issued.” Because of a backlog of NPDES applications pending review at EPA, many facilities are currently operating under NPDES “extension letters” that, in essence, extend the effective date of existing NPDES permits. It is impossible to know when the application for a specific facility will be considered, or when compliance will be required. This uncertainty is an impediment to the proper planning for baseline studies, engineering feasibility studies, comprehensive demonstration studies, and other efforts related to compliance with the proposed rule.

For facilities with permit applications pending review, a better approach would be to set the effective date of the performance standards under the proposed rule coincident with the expiration of the NPDES permit currently under application. Because an NPDES permit is typically valid for five years (unless extended), this would provide the necessary time for each facility to conduct the necessary studies required by the proposed rule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. In addition, EPA has decided not to promulgate the regulatory text identified by the commenter because the rule contains a variety of requirements subject to varying timeframes. EPA was concerned that the proposed language would create confusion. EPA therefore eliminated it.

Comment ID 316bEFR.071.005

Author Name Ross Povenmire

Organization Public Service of New Hampshire

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

Demonstration of Compliance:

Under Option 2, a facility must select design and construction technology, operational measures, or restoration measures to meet the proposed performance standards. The rule requires that data must be "submitted with the NPDES permit application to show that the facility is in compliance with the location, design, construction and capacity requirements" of the rule. It is unclear how this would apply to facilities for which applications have already been submitted but are still pending review, or if this requires the implementation of selected measures prior to receiving a NPDES permit. The implementation of certain measures may require extensive preparatory effort that cannot be accomplished within a permit application period. In addition, although annual monitoring reports are required, there is no indication of when actual compliance with the performance standards must be demonstrated, or what procedure must be followed if the measures prove to be inadequate.

A better approach would be to clarify that under Option 2, measures identified by the applicant as adequate to meet the proposed performance standards will be incorporated into the NPDES permit as requirements for implementation during the permit period. A time-table could be specified in the permit. Timely implementation of the required measures would constitute compliance with the permit and with the requirements of 316(b). The demonstration studies required for the next NPDES application would assess the effectiveness of the implemented measures, and select additional measures, if needed, for implementation during the next permit period.

EPA Response

EPA has clarified timing requirements for the submittal of studies in today's final rule. See § 125.95 and the response to comment 316bEFR.034.066. Please also see the preamble and EPA's responses to comments 316bEFR.063.005 and 316bEFR.017.003 for a discussion of compliance with today's requirements.

Comment ID 316bEFR.071.006

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Ross Povenmire

Organization Public Service of New Hampshire

Consideration of Existing 316(b) Studies:

Since the inception of the NPDES permitting program, NU as worked with EPA's Region 1 offices to ensure compliance with 316(b) requirements at its facilities located in NH and MA. The application materials and studies submitted by NU for these permits reflected the expectations of the EPA office and the prevailing standards for environmental impact assessment and review. Although the proposed rule would allow the use of existing studies, the applicant must demonstrate that the studies represent current conditions and were collected using "appropriate quality assurance and control procedures." Given the evolving and increasingly sophisticated nature of environmental impact assessment and review, strict application of the proposed standard could disqualify many studies upon which previous permits were granted, and upon which current permit applications may be based.

A better approach would be to adopt a rebuttable presumption that existing studies are relevant and scientifically valid for purposes of NPDES permit applications currently under review. This would allow new studies reflecting the requirements of the proposed rule to be developed and completed during the new permit period, typically five years, and submitted as part of the next permit application.

EPA Response

For permits that expire within 4 years, EPA has allowed a facility to submit the required information in accordance with a schedule established by the Director. This information need not be incorporated into the permit application. The facility should discuss the appropriateness of using existing data to meet performance standards with the Director.

See also response to comment 316bEFR.034.066 for a complete discussion of timing requirements.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas R. Kuhn

On Behalf Of:

Edison Electric Institute

Author ID Number:

316bEFR.072

Comment ID 316bEFR.072.001

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

While our members continue to support a wholly site-specific approach toward the selection of Best Technology Available ("BTA"), the proposed rule can provide a solid initial foundation for rulemaking if certain concerns are addressed. We are encouraged that the proposal recognizes the site-specific nature of the issue, provides several compliance options based on benefit-cost analysis, and, most importantly, rejects any mandate for the retrofit of costly and potentially inefficient closed-cycle cooling towers that affect 40 percent of the nation's total installed electric generating capacity.

Still, EPA must address several critical impediments in its proposal if any new Section 316(b) permitting process is not to undermine the benefits provided by the current program which provides an adaptable, technology-neutral, site-specific approach that yields optimal, cost-effective, and scientifically sound protection of the environment.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.072.002

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EEI members and State permitting authorities have 30 years of experience in implementing solutions aimed at reducing averse environmental impacts associated with the operation of cooling water intake structures under Section 316(b). The single most important lesson learned during these 30 years is that the site-specific variations in facility operations and affected ecosystems make& site specific technology selection the most efficient and effective means of minimizing adverse environmental impact from cooling water intake structures. A structured site-specific approach makes it possible to select and install the technology that maximizes the net benefits to society EEI maintains that a rule embodying such a structured site specific approach represents the best approach to addressing any adverse environmental impacts that may result from the operation of cooling water intake structures at their facilities.

Indeed in our view, EPA has not demonstrated in its record for this rulemaking a need to depart fundamentally from the site-specific, case-by-case approach that has worked well in addressing adverse environmental impacts at cooling water intake structures over the past 30 years. At the same time, we recognize that EPA is trying to take a fresh look at operation of the §316(b) program both to ensure that it remains environmentally sound and to seek ways to improve operation of the program through appropriate further guidance to States and permittees. We also recognize that some State permitting authorities have raised concerns over the complexity and transaction costs that could be associated with universal implementation of a site specific approach. especially if that approach required voluminous new analyses under a new EPA final rule.

However, we believe that EPA can address its goals and the State concerns by proper implementation of a more truly site specific approach than the one EPA has proposed in its April 9 Federal Register notice. At a minimum, we encourage EPA to modify the April 9 proposed rule to ensure that any final rule EPA may adopt (a) retains positive attributes of the proposed rule and (b) incorporates further improvements that will allow use of a site specific analysis in appropriate circumstances and streamline operation of the 316(b) program to the benefit of all parties involved, as we will describe in the remainder of these comments.

The rule proposed by EPA represents a legitimate attempt to balance the aced for site-specific flexibility and the desire to reduce implementation costs of the program and as we will discuss below, EPA's proposal contains a number of positive features that clearly should be retained in any final rule EPA may adopt. At the same time, however, the proposed rule raises a number of significant concerns, in particular the potential for unnecessarily requiring new 316(b) analyses and measures that will not increase net benefits to society. We encourage EPA to address these concerns.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Comment ID 316bEFR.072.003

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

We appreciate the effort that EPA put into examining a variety of alternative approaches to the regulation. Moreover, we are encouraged that, based on the analysis performed by the Agency, EPA has sought to choose an approach that will provide relatively greater benefit to society than some of the alternatives EPA could have selected. Again, however, we believe that EPA can improve the net benefit to society even further by modifying the proposed rule as we will discuss in the remainder of our comments.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

With respect to selecting the approach with the greatest net benefits, please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.072.004

Subject Matter Code 10.1

General: cost tests

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

We are encouraged that EPA's proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that impact the technical practicability of meeting the proposed standards. Specifically, the Agency recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the considered by EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

The Agency notes that the comment supports inclusion of the cost-cost test in the final rule.

Comment ID 316bEFR.072.005

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

We are further encouraged that EPA's proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. The rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the sire-specific variations in the ecology of source water bodies and can help account for controls already in place at many facilities.

EPA Response

The Agency has retained the cost-benefit test for the final rule.

The Agency notes that in developing the costs and benefits of the final rule that it fully considered controls already in place at in-scope facilities. However, should the Agency's assessment of the current performance of these controls prove to be incorrect for certain facilities, then the cost-benefit and cost-cost tests will allow for site-specific adjustments to account for this possibility.

Comment ID 316bEFR.072.006

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

We are also encouraged that EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or restoration of habitats and trading. This does not freeze compliance in time by relying on today's technologies and allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to State permitting authorities and facility managers who have developed a great deal of expertise on these issues.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.072.007

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA's analysis greatly overstates the benefits of all of the options evaluated. For example, EPA reliance on habitat replacement costs as a measure of valuing benefits has no basis in welfare economics and leads to a gross overstatement of benefits, and EPA double counted the value of lost angler days by failing to consider the geographic distribution of power plants.

EPA Response

The habitat-based replacement cost (HRC) method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment # 316bEFR.005.035. For additional information on the HRC, please see the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003). EPA now employs a different method for considering geographic effects on angler days; see Phase II Regional Study Document (DCN #6-0003) which addresses concerns about this issue.

Comment ID 316bEFR.072.008

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA's analysis greatly understates the cost of retrofitting cooling towers, making any alternative involving cooling towers appear more favorable than it is in fact.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.072.009

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

The failure to define "significance" for either of its cost tests creates unnecessary uncertainty in the rule.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.072.010

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

While we support the consideration of site-specific benefits, the proposed benefit cost test uses incorrect decision criteria. EPA only allows site-specific alternatives to be considered if the cost of achieving the standard is significantly greater than the expected benefits of compliance. This still allows socially suboptimal solutions to be implemented. The correct decision criteria would be to allow facilities to select the control alternative that maximizes net benefits.

EPA Response

See responses to 316bEFR.006.003, 045.012, and 018.009.

Comment ID 316bEFR.072.011

Subject Matter Code 9.06

Burden to facilities (general)

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

We are concerned that the EPA proposal does too little to reduce the costs of implementation for both facilities and State permitting authorities. Much of the information necessary to implement a purely site-specific approach, (e.g., calculation of baseline losses, estimation of technology effectiveness, post compliance monitoring, etc.) must be generated despite not being used to improve the technology selection decision. EPA should provide a much simpler implementation path for facilities that choose to install one of the EPA approved technologies.

EPA Response

The Agency has adopted a simplified implementation path for all facilities, including those that adopt technologies that have been "pre-approved" by EPA in a fast-track alternative. Therefore, the Agency has done much to reduce the costs of implementation for both facilities and permit authorities, as the commenter recommends.

Comment ID 316bEFR.072.012

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

In summary, taking these points into account, EEI continues to support a wholly site-specific approach as the preferred alternative. At the same time, if EPA's proposed rule is properly modified to retain its positive features and to address our concerns, the proposed rule can provide a solid initial foundation for a final rule that preserves sufficient site specificity while also providing guidance and streamlining the §316(b) process. Again, the final rule must recognize the site-specific nature of the issue, provide several compliance options based on benefit-cost analysis, and, most importantly, reject any mandate for the retrofit of costly and potentially inefficient closed-cycle cooling towers, which would negatively affect 40 percent of the nation's total installed electric generating capacity.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.072.013

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.1

General: cost tests

Any final rule EPA may adopt must retain consideration of site-specific variations in cost. This is currently embodied in both the new facility standards and the proposed rule as a test of the cost of compliance against the costs considered by EPA in establishing the standards. For convenience we refer to this as the cost-cost test.

EPA Response

The cost-cost test is retained in the final rule. Therefore, this recommendation from the commenter has been met.

Comment ID 316bEFR.072.014

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Any such rule must retain consideration of site-specific variations in benefits. This is currently embodied in the proposed rule as a test of the cost of compliance against the expected benefits of compliance. We refer to this as the benefit-cost test.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020. See also the preamble to the final rule.

Comment ID 316bEFR.072.015

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The decision criteria for the benefit-cost test should be the maximization of net benefits. To achieve this goal, at a minimum, EPA must delete the “significantly greater than” hurdle so States and permittees can select among all technology with a higher net benefit than EPA’s performance standards would otherwise dictate.

EPA Response

See Sections V and IX of the preamble for a site-specific determination of best technology available for minimizing adverse environmental impact.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.072.016

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

In order to reduce implementation costs, speed the permitting process, and prevent unnecessary permit backlogs for both facilities and the States, EPA should allow State permitting agencies to rely on existing data and prior analyses and decisions, to the extent those data, analyses, and decisions are sound and demonstrate minimization of adverse environmental impacts or are otherwise relevant to the §316(b) decision. EPA's current proposal could prevent consideration of such information unless directly related to impingement and entrainment. But as studies of sensitive water bodies such as the Chesapeake Bay have demonstrated, entrainment and impingement are not necessarily the correct criteria for ensuring a robust fishery, nor need they be applied when prior studies have already demonstrated a healthy ecosystem. Similarly, EPA should allow the State agencies to waive the requirement for new baseline monitoring, study, and modeling for facilities that (a) install or currently use any of the technologies either referenced by the EPA in establishing the proposed performance standards or that subsequently prove equally effective at producing net benefits or (b) can otherwise demonstrate equal or greater net benefit through the use of alternative technology or approaches. Post-compliance monitoring should be limited to that which is necessary to demonstrate proper operation of the technologies.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

See also response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.072.017

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

EPA should explicitly recognize that the goal of Section 316(b) is to avoid adverse environmental impact, a goal best measured in terms of effects on the overall biota or fishery in a given water body, not individual members of the fishery.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level.

Comment ID 316bEFR.072.018

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

EPA should correct known flaws in its estimate of benefits and costs in analyzing its proposed rule, at a minimum to avoid requiring technology that in fact is unlikely to produce a positive net benefit. Again, see Appendices 1-3.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.072.019

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 21.04

Determination of compliance

EPA should address implementation issues, including concerns about the usefulness of revisiting the §316(b) issue as often as every 5 years under the NPDES permitting program and the lack of sufficient response time and certainty that such frequent, repetitive reviews could present permittees having to comply with new §316(b) regulations. EEI encourages EPA to provide facilities with greater certainty by not requiring repeat Section 316(b) reviews absent new information indicating that such a review is warranted.

EPA Response

Please see EPA's response to comment 316bEFR041.126.

Comment ID 316bEFR.072.020

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01.03

Option 3--Site-specific determination

With these and other key improvements, EPA's proposed rule regarding Section 316(b) permitting can result in a consistent decision-making framework that continues to provide flexibility to the States, building on a quarter-century of successful environmental protection. Improving the current permitting scheme would ensure that environmental concerns are addressed using the most cost-effective technologies to preserve and enhance affected waters. At the same time, EPA should preserve positive attributes of the existing Section 316(b) process, including its focus on site-specific analysis, and should allow States to rely on sound past data, analyses, and decisions to the maximum extent possible.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.072.021

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

EEI's members pride themselves on careful and proactive management of their environmental responsibilities. They use state of the art environmental programs, management systems, and other practices that are directed at both compliance and fostering the implementation of innovative and practical pollution abatement and prevention measures. These efforts yield positive results for the environment, electricity consumers, and shareholders.

Water is critical to the functioning of many electric generation facilities and ancillary operations. EEI is concerned that the actions required in some of the regulatory alternatives considered by EPA in developing this rulemaking would impair the ability of power generation facilities to operate efficiently, from both an environmental and an economic perspective. Moreover, the imposition of costs associated with the installation of controls where they are not warranted can affect both the competitiveness of an individual facility as well as the efficient operation of the entire electricity generating sector.

Because electric utilities are the largest industrial users of cooling water, they have been heavily involved in the implementation of Section 316(b) of the Clean Water Act for the past 30 years. EEI members and the industry as a whole have spent hundreds of millions of dollars on research and development (R&D) related to §316(b) issues and, more importantly, have been applying the knowledge gained from that research to satisfactorily minimize adverse environmental impact at the State level. Many of the difficult issues being addressed in this rulemaking are the subject of ongoing entrainment and impingement research. In comments to EPA, the Utility Water Act Group (UWAG) and the Electric Power Research Institute (EPRI) summarize the latest scientific findings by many of the world's foremost research scientists. The relationships associated with understanding and reducing any potential adverse environmental impact related to cooling water intake structures at electric generation facilities are complex.

EPA Response

Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.072.022

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.1

General: cost tests

EEI offers in appendices to these comments recommendations on how to improve the Agency's economic impact analysis. While these recommendations by no means address all of the concerns with EPA's analysis, they try to highlight some of the issues that EEI believes will have the greatest impact on EPA's ability to draw reasonable conclusions. EPA has spent considerable time, effort and U.S. taxpayer dollars to develop sound cooling water intake structure regulations. We believe the information contained in industry's comments represents the state-of the-art knowledge about the science and policy surrounding the environmental issues associated with cooling water intake structures, and EPA should fully incorporate this information into its decisions on the proposed rule.

EPA Response

The Agency addresses the specific appendices in subsequent response to comments 316b.EFR.072.201 through 316b.EFR.072.210. This is a general statement and has no bearing on the Agency's final rule requirements or analysis outside of referencing more detailed comments included in the appendices.

Comment ID 316bEFR.072.023

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EEI will begin by discussing our perspectives on Section 316(b) and implementation of that section to date. We will then turn to EPA's proposed rule, including three of the alternative approaches considered by EPA in the preamble to its proposed rule:

1. Fully site specific alternatives, which EEI members strongly support and would prefer EPA to choose.

2. EPA's preferred option, which while not fully site-specific contains some basic elements of site-specificity that clearly should be preserved. In these comments, EEI offers EPA suggestions to make its proposal more meaningful and supportable by the regulated community and the States charged with its effective implementation.

3. The "Waterbody/ Capacity-based" alternative, which we focus on because it is the least stringent option that mandates the retrofit of closed-cycle cooling systems (cooling towers). Our comments will highlight why mandatory retrofit of cooling towers represents bad public policy. EEI members recommend that EPA reject this option and any other option with a broader cooling tower mandate.

The comments and attached supporting documentation also provide a critical analysis of the "Economic and Benefits Assessment for the Proposed Section 316(b) Phase II Existing Facilities Rule" performed by EPA in support of the proposed rule. While we do not present a comprehensive list of all concerns with EPA's analysis, our analysis finds that aspects of the EPA analysis suffer from technical and methodological shortcomings and should be redone to accurately reflect the impacts associated with the proposal.

These comments set forth the crucial concerns of EEI and its members with the provisions of the proposed rule, with particular attention to the preferred alternative, and provide constructive suggestions for addressing these concerns. EEI is also a member of the Utility Water Act Group ("UWAG"). With the assistance of EEI and the rest of the membership, UWAG has brought together some of the most skilled and respected technical, engineering, biological, legal and economic experts to comment on the substantive underpinnings of the rulemaking effort. EEI fully supports the comments submitted by UWAG and together we urge the Agency to consider modifying both its analyses of the rulemaking's proposed options and revising aspects of its preferred alternative to create a framework that is both streamlined and workable at the State level.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

EPA has rejected an entirely site-specific approach to implementing 316(b). Please refer to section VII of the preamble for further information.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.072.024

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

EEI members strongly believe that a structured site-specific approach is the most prudent method of regulating cooling water intake structures because it both streamlines and focuses the current regulatory programs existing in many States. Our view is reinforced by letters EPA has already received from State offices.

EPA received letters from the Environmental Departments of Illinois, Texas, and Pennsylvania, and a letter from the Governor of North Carolina. In these letters, the States stressed their continued commitment to a site-specific approach based on the reasonable comparison of costs to benefits. The letters also cited a desire not to reopen regulatory decisions that have already been made based on such a comparison, and a desire not to burden their regulated sources with technology requirements that have little environmental benefit. At least one of the States called for a more “holistic” definition of adverse environmental impact, that is, effect on the environment rather than just an accounting of impinged and entrained organisms. All but one of the States objected to a rule that would mandate retrofit of cooling towers in all cases.

In short, implementation of §316(b) by State permitting authorities is working. The need for regulatory guidance is driven by administrative and legal rather than environmental concerns. EPA has failed to develop a convincing demonstration otherwise.

EPA Response

EPA disagrees. Please refer to the preamble for a discussion of the framework of today's rule. Also refer to the preamble to the final rule for information as to why EPA is promulgating today's final rule.

EPA acknowledges receipt of the comments mentioned and has addressed these comments individually.

Comment ID 316bEFR.072.025

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 2.04

EPA's legal authority to:

EPA has not demonstrated that there is a clearly defined and widespread environmental problem resulting from impacts of cooling water intake structures. The case study examples in the rulemaking documentation are examples of those few unusual situations where, because of ongoing controversy, public attention has been focused on the actions taken. Therefore, these facilities have a considerable amount of data on the facility operation and/or waterbody on which it is located. It is for this anomalous reason these "data-rich" were chosen by EPA as case studies. However, these facilities are not representative of the universe of facilities for which thousands of Section 316(b) studies have been conducted and permits issued. EPA acknowledges that it has reviewed these numerous studies, so EPA should be aware of the positive track record States and utilities have in implementing Section 316(b) during the past several decades. In addition, EEI organized tours of facilities around the country for EPA staff and its consultants. During these tours we met with State water pollution authorities and environmental department personnel. Never did any of these officials point to ongoing issues with cooling water intake structures as being a leading cause of water quality impairment. The 1998 EPA report to congress on the status of our nations water resources also never listed cooling water intake structures as a source of impairment.

Even if the case studies were representative, the focus of the case studies is uniformly on the "dramatic" numbers of impinged and entrained organisms. As large as these numbers are, they have little meaning unless evaluated against population and community level impacts. Despite nearly 30 years of research, demonstration of population level impacts has not occurred. In fact, in the case of the Hudson, probably the most studied water body in the U.S. with multiple cooling water intake structures, several key fish populations have increased by an order of magnitude since the 1 980s. Similar increases have been observed in European studies. EPRI's on-going studies on the effects of water withdrawal on reservoirs is demonstrating no relationship between water withdrawal and fish population and aquatic community health.

EPA Response

Impingement and entrainment are primary harmful impacts associated with the use of cooling water intake structures. EPA has discussed the environmental impacts of cooling water intake structures in preambles to this rule and the phase I rule. As discussed in those sections, EPA does not agree that the only measure of adverse environmental impact is population level impacts. Finally, under the final rule, an existing facility that meets the applicable performance standards or restoration requirements (i.e., is applying BTA) does not have to install further technology to meet rule requirements.

Comment ID 316bEFR.072.026

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

The EPA proposal says a great deal about the importance of site-specific decision-making but the proposal stops short of truly accommodating such decision making. The issues associated with minimizing adverse environmental impact that can occur as a result of cooling water intake structures are inherently site-specific and need to be dealt with accordingly. The proposal ignores the biological basis for decision making that EEI's members believe is central in Section 316(b) decision making and it does not address the central question of defining adverse environmental impact.

The Clean Water Act Section 316(b) states:

"[a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available ["BTA"] for minimizing adverse environmental impact."

It is difficult to understand how one can minimize what is not defined, but this is exactly what EPA would suggest by proposing performance standards to reduce impingement mortality and entrainment by set percentages without regard to what, if any, adverse impact may be occurring.

In some areas of the country longstanding research has been done to define and measure what, if any, adverse environmental impact has occurred as a result of operation of cooling water intake structures. Studies conducted by both the Federal government and the private sector can provide substantive, scientifically rigorous information that EPA needs to consider prior to promulgation of the § 316 (b) Phase II rule.

To illustrate this point, consider the conclusions of the Maryland Power Plant Research Program (M-PPRP). The M-PPRP is the longest running, most comprehensive power plant research program in the U.S. and the Chesapeake Bay, the largest estuary in the U.S. After 25 years of study, it concludes: "....that while operations of individual power plants impact various ecosystem elements in various ways, those impacts, taken together, have had no identifiable substantive cumulative impact on Maryland's aquatic resources to date" (M-PPRP 1999 and Richkus and McLean 2000 in Dixon et al. 2000).

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. See also preamble to the final rule for a discussion regarding EPA's decision to express impingement and entrainment in terms of percent reduction.

Comment ID 316bEFR.072.027

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

By departing so radically from the long established practice of site-specific decision making advocated by the Agency in the mid-seventies, the proposed regulation may penalize both the regulated community and States that have acted responsibly to comply with Section 316(b).

Since the 1970s, EPA, State permitting authorities, and industry have worked side-by- side to protect the viability of aquatic communities affected by cooling water intake structures. The current methodology provides an adaptable, technology-neutral, site- specific approach that yields optimal, cost-effective, and scientifically sound results that protect the environment. The outcome of EPA's rulemaking should respect and reflect these hallmarks of the permitting program, while establishing a more streamlined and consistent decision-making process.

We are not advocating that EPA take no action if action is warranted, but rather that EPA take measured and appropriate action based on the scope of the demonstrable concern, the vast amount of science and knowledge that has been generated on §316(b) issues since the seventies, and the needs and limitations of existing State programs. We are also advocating that the EPA give full credit to States for the determinations that they have already made under existing authority.

EPA Response

EPA disagrees. Please refer to the preamble for a discussion of the framework of today's rule. Also refer to the preamble to the final rule for information as to why EPA is promulgating today's final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

With respect to the use of previous studies, a goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.072.028

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Certain tenets about the interaction of cooling water intake structures and the environment have emerged in the more than 30 years it has been intensively studied.

First, the only way to accurately and appropriately select best technology available is on a site-specific basis. Site-specificity maximizes the ability to achieve the most environmentally effective and cost-effective reductions in adverse environmental impact. Moreover, site-specific technology selection is the only regulatory framework that is capable of maximizing net benefits to society. Technology selection should be based on a full examination of site-specific factors.

Second, a sound scientific basis for decision making is critical for making efficient decisions. There is an entire body of science surrounding fisheries management that should be used in any effort to improve the environmental and cost effectiveness of controlling cooling water intake structures. This science suggests that entrainment and impingement are not the sole, or even appropriate, biological endpoints in many cases.

Of course, there are also policy concerns that EEI believes are equally relevant and should be included when EPA takes final action on the proposed rulemaking. These include:

-The use of an appropriate benefit-cost test for selecting BTA. This is consistent with the Administration's goal of cost-effective regulation.

-Recognizing that a variety of protective intake technologies are available, the final rule should take advantage of the entire suite of alternatives and encourage innovation.

-Any final action should encourage the use of readily available data. Tools are available for quickly identifying low-risk sites and facilities, so the rule need not require extensive biological studies in every case. Streamlining decisions wherever possible is desirable.

-Streamlining decision-making is inextricably linked with preserving State authority. Where a State has already made a careful determination of the best technology available for a particular intake, a change in the State's decision is warranted only if there has been a change in circumstance since the decision was made.

-Finally, whatever regime is ultimately selected, the §316(b) rule for existing sources must protect our fisheries without adversely affecting national energy supply.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

A goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. (see § 125.90(c)).

Please refer to section XI of the preamble to the final rule and the Economic and Benefit Analysis (DCN 6-0002) for information about the effect of the rule on the national energy supply.

The proposed rule purports to establish national technology-based performance requirements applicable to the location, design, construction, and capacity of cooling water intake structures at existing power producing facilities. The proposal applies to existing electric generating facilities that use one or more cooling water intake structures withdrawing water from waters of the United States have or require a National Pollutant Discharge Elimination System (NPDES) permit, withdraw 50 million gallons per day (MGD) or more and use at least 25 percent of that water for cooling purposes.

EPA outlines a preferred alternative and invites comment on a broad array of other alternatives. These alternatives range from a stringent technology-based requirement for dry cooling at all existing facilities to several decision frameworks that would evaluate adverse environmental impact and determine the best technology available for minimizing such impact on a wholly site-specific basis.

In its preferred alternative, EPA sets forth performance requirements calling for the reduction of impingement mortality by 80-95% and in many cases reduction of entrainment by 60-90% in comparison to a theoretical “baseline.” The reductions required vary based on waterbody type, percentage of the source waterbody withdrawn and facility utilization rate.

Surface waters are grouped into five categories — freshwater rivers and streams, lakes and reservoirs, Great Lakes, estuaries and tidal rivers, and oceans — with different requirements for cooling water intake structures for each distinct waterbody type. According to EPA, the more sensitive or biologically productive the waterbody, the more stringent the proposed requirements.

In discussing its preferred alternative, EPA describes that a facility may choose one of three options for meeting best technology available requirements. These options include:

-Demonstrating the facility currently meets specified performance standards;

-Selecting and implementing design and construction technologies, operational measures, and/or restoration measures that meet specified performance standards; or

-Demonstrating that the facility qualifies for a site-specific determination of best technology available because its costs of compliance are either significantly greater than those considered appropriate by the Agency, or the facility’s costs of compliance would be significantly greater than the environmental benefits of compliance with the proposed performance standards.

This latter “site-specific alternative” is both appropriate and desired public policy. However, this option needs to be modified to ensure the selection of alternatives that maximize net benefits to society. EPA also proposes to allow alternative requirements where the Nuclear Regulatory Commission (NRC) determines that compliance with the rule would conflict with NRC-established safety requirements, an appropriate provision that EEI supports. EPA should provide similar flexibility for other special requirement situations, such as where an endangered species, non-native species, or arid conditions are present.

EPA Response

For a description of the framework of the final rule, please refer to the preamble.

EPA adopted this regulatory scheme because it provides a high degree of flexibility for existing facilities to select the most effective and efficient approach and technologies for minimizing adverse environmental impact associated with their cooling water intake structures. This approach also reflects EPA's judgment that, given the various factors that affect the environmental impact posed by the range of Phase II existing facilities, different technologies or different combinations of technologies can be used and optimized to achieve the best results.

EPA also notes that 125.94(f) allows for a site-specific determination of best technology available if conflict with Nuclear Regulatory Commission safety requirements.

Comment ID 316bEFR.072.030

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The preceding summary of EPA's proposal is consistent with the description of how the rule would work as set out in the preamble. However, the regulatory language itself is insufficiently clear to guarantee that the rule would be applied in this manner. In particular, the language in § 125.94 of the proposed rule is confusing and could lead to an interpretation that is clearly at odds with the Agency's stated intent.

The confusion is created by the inclusion of § 125 .94(b)(1), which says that to demonstrate compliance with the performance standard, one option is for a facility to "reduce [its] intake capacity to a level commensurate with the use of a closed-cycle re-circulating cooling system." This could erroneously be interpreted as the basis for the performance standard.

By way of background, proposed § 125.94(a) specifies that to comply with the proposed rule, facilities must comply with performance standards set in § 125.94(b) or demonstrate that a site-specific determination of BTA is warranted under § 125.94(c). In turn, § 125.94(b) sets out the impingement and entrainment percentage reduction requirements discussed above as well as the cooling water provision just mentioned. Section 125.94(c) allows a facility owner to demonstrate that a less costly alternative than would be mandated by those performance standards is warranted because the costs of meeting the numerical limits are either (a) significantly greater than the costs considered by the Agency in establishing the standards, or (b) significantly greater than the benefits of complying with the numerical standards. Finally, § 125.94(d) allows use of restoration measures that maintain the fish and shellfish within the waterbody at a level comparable to those that would result if the numerical standards were met.

Taken in this context, §125.94(b)(1) could be read to require the installation of closed-cycle cooling if a facility could not demonstrate to the satisfaction of the director that the costs of meeting the numerical limits were too high — relative to costs or benefits — and could not achieve the numerical limits through the installation of some other technology, such as fine mesh traveling screens. This outcome may not be likely given that costs of installing cooling towers are almost certain to be significantly greater than the costs considered by the Agency in establishing the standard — no facility in any of the analysis of EPA's preferred alternative is required to install closed-cycle cooling. Nevertheless, the current language is confusing.

We surmise that EPA included § 125.94(b)(1) to indicate that installation of cooling towers is a prima facia demonstration of compliance with the numerical limits established in § 125.94(b)(2)(3) and (4). But by placing that provision in § 125.94(b), EPA risks driving the §316(b) decision process by reference to cooling towers. Moving this language elsewhere in the regulation would eliminate this source of confusion.

One alternative would be to renumber current §l25.94(b)(2-4) as §125.94(b)(1-3) and replace current § 125.94(b)(1) with a new sentence at the end of 125.94(b) that reads: "If your facility has an intake capacity commensurate with a closed-cycle recirculating cooling system, you meet the performance standards without the need for further analysis." Another alternative would be to include similar language in § 125.94(a)(1) to remove the concept of closed-cycle cooling from the definition of performance standards altogether.

Perhaps the best alternative would be to move the discussion of closed-cycle cooling to §125.91 as follows:

§ 125.9 l(a)(5): Does not have an intake capacity level commensurate with the use of a closed-cycle, recirculating cooling system.

This alternative has the added benefit of relieving facilities and permitting authorities from the burden of preparing and reviewing the additional information required in § 122.21 including: the source Water Baseline Biological Characterization Data at facilities with closed-cycle cooling systems. This information will have no practical utility for these facilities since they already meet the standards.

EPA Response

EPA believes that the perceived confusion noted by the commenter has been resolved. The final rule contains five compliance alternatives from which a permittee may choose, one of which specifically addresses facilities with cooling towers. EPA agrees that facilities with intake flows commensurate with a closed-cycle cooling system meet the requirements for 125.94(a)(1)(i) and will be subject to fewer reporting requirements. Please refer to the preamble for a discussion of the framework of the final rule.

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Examination of a wide variety of alternatives

We appreciate the effort that EPA put into examining a wide variety of alternative approaches to the regulation. Moreover, we are encouraged that, based on the analysis performed by the Agency, EPA sought to choose the approach among those considered that provided the greatest net benefit to society, a correct goal.

EPA outlines a preferred alternative and invites comment on a broad array of other alternatives. These alternatives range from a stringent technology-based requirement for dry cooling at all existing facilities to several decision frameworks that would evaluate adverse environmental impact and determine the best technology available for minimizing such impact on a wholly site-specific basis.

The "Economic and Benefits Analysis" produced by the Agency in support of the rule provides benefit and cost estimates for five alternative approaches to the regulation. The net benefit estimates for these alternatives range from a negative $2.3 billion for the alternative requiring universal retrofit of wet cooling towers to a positive $452 million for the proposed rule. EPA correctly chose its preferred option as the basis of the proposal from among these options even though that option has the lowest absolute benefit estimate, because the incremental costs associated with the achieving each additional level of benefits were greater than the additional benefits achieved.

For example, moving from the preferred alternative to the next most stringent alternative —universal application of I&E controls — would increase the estimated benefits of the rule by $14 million. Unfortunately, it would cost $17 million to achieve that additional $14 million in benefits, and society would be made worse off by three million dollars. As a result, moving from the preferred option to the next most stringent alternative would not represent sound environmental policy. The negative incremental benefits become even greater as the stringency of the alternative chosen increases EPA recognizes that the correct decision criterion is not whether the total net benefits of the rule are greater than zero, but whether the estimated incremental benefits between alternatives can be justified.

As will be discussed later, the total net benefit associated with any of the cooling tower options is negative if a more realistic estimate of cooling tower costs is used.

We will also discuss the fact that EPA's proposed benefit-cost test for site-specific determinations is not consistent with the good principles EPA used in selecting between regulatory options.

It should be noted that although EPA selected the correct regulatory alternative from among those it examined, a wholly site-specific alternative would have even higher net benefits. There are undoubtedly situations where the performance standards established by the Agency will be inappropriate at a given facility. A site-specific approach would allow the permittee to work with the permit writer to select the alternative that provides the greatest net benefit at each individual facility. EPA makes some attempt to address the most egregious deviations from site-specific benefits maximization by including two cost tests that can be used by a facility to justify a site-specific alternative. As currently proposed, however, these tests do not sufficiently support the maximization of net benefits, and the tests need to be improved in ways we will recommend.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comments regarding the net benefits of a cooling tower option or the benefit-cost test for site-specific determinations will be addressed individually in other comments.

EPA did not select an entirely site-specific option for a variety of reasons. Please refer to the preamble for more information. However, a facility may still opt to seek a site-specific determination of best technology available under the fifth compliance alternative. In addition, use of a TIOP, with the approval of the Director, can help address site-specific conditions.

Comment ID 316bEFR.072.032

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.1

General: cost tests

Inclusion of a cost-cost test

We are encouraged that EPA's proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that impact the technical practicability of meeting the proposed standards. Specifically, the Agency recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the Agency in establishing these standards. In those instances, the proposal provides the facility with the opportunity to justify an alternative technology selection.

Facilities can demonstrate that a site-specific alternative is warranted if the costs of achieving the standards at a given facility are significantly greater than the costs considered by the Agency in establishing the standards. While this falls short of site-specific technology selection in all instances, it does provide an important safety valve. It should be noted, however, that this provision, by itse1f, does not avoid all situations where achieving the standards reduces net benefits to society, because it does not consider the benefits associated with achieving the standards at a given facility. So EPA needs to retain both the cost-cost and benefit-cost tests.

EEI recommends that this provision of the proposal be retained in the final rule.

EPA Response

The Agency includes the cost-cost and cost-benefit tests in the final rule. Therefore, the commenter's concerns and recommendations have been met.

Comment ID 316bEFR.072.033

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Inclusion of a benefit-cost test

We are further encouraged that EPA’s proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. The rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA’s performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site specific variations in the ecology of source water bodies and can help account for controls already in place at many facilities.

A site-specific evaluation of benefits and costs is the only means of guaranteeing that the benefits of §316(b) are maximized at every facility. The benefit-cost provision in EPA’s proposed rule will help avoid extreme cases where the application of technology will make society worse off in absolute terms, but it will not allow States and facilities to maximize the net benefits of the standards.

Therefore, while we strongly support the inclusion of a benefit-cost provision in the rule, we believe that the “significantly greater than" test should be replaced with a provision that allows facilities to select a site-specific alternative if they can demonstrate that it will lead to a greater net benefit than would meeting the performance standards set forward in the rule. This alternative is discussed in greater detail later in these comments.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.072.034

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 7.01
RFC: Three-option framework for determining BTA

Allowance for flexibility in compliance

We are also encouraged that the Agency has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or restoration of habitats and other non-traditional approaches. This does not freeze compliance in time by relying on today’s technologies and allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to State permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 30 years.

The proposal goes a long way in recognizing that many technologies, including those specifically identified in the proposal (wedge wire screens, fine mesh screens, fish returns, and aquatic fabric filter barriers) can be effective in reducing impingement mortality and entrainment but that no single technology will be the “best available."

The proposal goes even further to allow the use of methods other than the installation of end-of-pipe controls to meet the requirements of the rule.

EEI recommends that the EPA retain the flexibility of the proposal in the final rule. Later in these comments, we will discuss an alternative approach that would streamline the permitting process for facilities that choose to install those technologies that the EPA has determined will met the standards. This alternative is not intended to reduce the flexibility of the approach taken by EPA in the rule, but as a means of reducing transaction costs for the States and permittees at those facilities that do not need the flexibility provided by the proposal.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA does not specify any single technology as best available, but also recognizes that many technologies can be highly effective in reducing impingement mortality and entrainment.

Comment ID 316bEFR.072.035

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

AREAS OF CONCERN

Still, there are a number of areas of the proposed rule and the supporting analysis that cause us concern. These fall into two categories: concerns with the design of the regulation and concerns with the methodology used to support it. The balance of this document discusses our regulatory design and methodological concerns with an expanded discussion provided in Appendix 1-4. The concerns discussed below are not meant to be an exhaustive list of all of the concerns with EPA's analytical methodology, instead we try to highlight some of the concerns that we believe have the largest potential impact on EPA's ability to draw a reasoned regulatory conclusion.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule. No further response is required, as the concerns referred to in this comment will be addressed individually in other comments.

Comment ID 316bEFR.072.036

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

EPA fails to demonstrate a compelling need to overturn the existing system.

EPA suggests that there is a demonstrable environmental problem that needs to be solved by citing 8 case studies or examples of facilities where ongoing work is being pursued to minimize adverse environmental impact resulting from cooling water intake structures. In fact, the case studies used by EPA in its technical and economic support documents are appropriate as case studies not because they represent the norm but because of the very fact that they represent the small number of facilities where there remains some ongoing concern or continuing research to measure the extent of the impact caused by cooling water intake structures. EPA itself points out that it has a large number of Section 316(b) demonstration studies and permits showing little if any evidence of adverse environmental impacts occurring at these facilities.

In addition, ample studies exist that cast doubt upon the need for such a sweeping change in the existing system. The M-PPRP examines the largest estuary in the U.S., one that has historically yielded large harvests of a wide variety of fish and shellfish. Thirteen power plants, withdrawing and discharging 8 billion gallons per day of the Bay's waters for cooling purposes, are located on the main stem of the Bay.

Even though EPA has identified estuaries as being particularly sensitive to the effects of cooling water intake structure operations; it failed to note the conclusions of the M-PPRP: "...that while operations of individual power plants impact various ecosystem elements in various ways, those impacts taken together, have had no identifiable substantive cumulative impact on Maryland's aquatic resources to date" (M-PPRP 1999 and Richkus and McLean 2000 in Dixon et al. 2000).

Moreover, in 1996, in preparation for the impending relicensing of nuclear power plants in the U.S., the U.S. Nuclear Regulatory Commission (NRC) published the results of a multi-year study of the generic environmental impacts resulting from the operation of nuclear generating stations. (NRC 1996). The NRC study explicitly examined the impacts of impingement and entrainment at nuclear plants with once-through cooling water operations. NRC did not reference any specific population level impact with regard to plants where impingement and entrainment remains an issue or a concern. In fact, where issues or concerns remain, they were based solely on the subjective opinions of State regulators and resource agencies. The NRC concluded due to unresolved impingement and entrainment issues at some plants that this issue should be dealt with on a site-specific basis during plant relicensing.

EPA, in its own biannual report to Congress on the quality of our nation's water, never identified cooling water intake structures as a source of water quality impairment. In searches of the 1998 Report to Congress, specifically the Executive Summary, Chapter 3 (Streams and Rivers), Chapter 4 (Lakes and Reservoirs), Chapter 5 (Coastal Resources including Estuaries and Coastal Oceans), and Chapter 8 (Aquatic Life Concerns), the key words cooling water intake structure, impingement, entrainment and water withdrawals are not found. This is fully consistent with the fact that, when EEI hosted EPA on various power plant tours throughout the nation, no State employee or natural resource manger noted that cooling water intake structures were a priority concern in the management of the State's water resources.

On the Connecticut River, from 1965-1972, a comprehensive study on the effects of Connecticut Yankee was performed. The study concluded that impacts were not expected to be significant. (AFS monograph #1 (Merriman, D., and L. M. Thorpe. 1976. The Connecticut River Ecological Study: Impact of a Nuclear Power Plant. American Fisheries Society Number 1, Bethesda, MD.).

In the Fall of 2001, EPRI brought the original scientists and State personnel back together to re-visit the original studies conclusions. ALL persons involved — including State regulatory personnel — concluded that the plant had "benign" impacts on the River. (EPRI. 2002. Proceedings of Workshop — Connecticut River Ecological Study: Revisiting the Impacts of a Nuclear Power Plant. EPRI Workshop held at University of Connecticut Marine Laboratory, Avery Point, CT, November 15-16, 2001. EPRI CD 1006900, April 2002. Palo Alto, CA.)

EPA seems to be applying the precautionary principle, and has structured a proposal that mandates that every facility must "do something" to reduce environmental impact even if there is no evidence that adverse impact is occurring.

EPA Response

EPA disagrees. Please refer to the response preamble for a discussion of the framework of today's rule. Also refer to the preamble to the final rule for information as to why EPA is promulgating today's final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.072.037

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.06

Option: Site-specific determination of BTA

EPA's proposed rule is insufficiently site-specific

The EPA proposal says a great deal about the importance of site-specific decision-making but stops short of truly accommodating it. The issues associated with minimizing adverse environmental impact that can occur as a result of cooling water intake structures are inherently site-specific and need to be dealt with accordingly. Site-specific determination of the "best technology" is the only way of ensuring that net benefits to society are maximized.

Since the 1970s, FPA, State permitting authorities, and industry have worked side-by-side to protect the viability of aquatic communities affected by cooling water intake structures. The current regulatory system provides an adaptable, technology-neutral, site-specific approach that yields optimal, cost-effective, and scientifically sound results that protect the environment. The outcome of s rulemaking should respect and reflect these hallmarks of the permitting program, while establishing a more streamlined and consistent decision- making process.

EPA is proposing to abandon the current site-specific decision making framework in favor of a uniform national performance standard that only allows consideration of site-specific factors as a basis for exception from the standards. This proposed change would allow suboptimal technology determinations to stand except in extreme circumstances, significantly reducing the ability to maximize net benefits.

EPA Response

EPA disagrees. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.072.038

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.06

Burden to facilities (general)

EPA has expressed concern that a site-specific approach may be too burdensome for State permit writers to easily administer. There are several reasons why this is not the case. First, this approach has been implemented for 30 years and the science and understanding of cooling water intake structure effects are better understood and approaches to study the issue better refined than in the seventies. Second, for the past 30 years, site-specific implementation has been done (successfully) without the aid of a formal rule and companion guidance. Presumably, once an approach is clearly communicated to the States, implementation will be easier to implement and reasonably consistent. Moreover, under a risk assessment/site-specific approach, permittees bear the burden of collecting and analyzing information with which the Director will make a determination. This would ease the workload of State permit writers.

By departing so radically from the long established practice of site-specific decision making advocated by the Agency in the mid-seventies, the proposed regulation would penalize both the regulated community and States that have acted responsibly to comply with Section 316(b). Furthermore, this approach to Section 316(b) ensures that more societal resources will be spent complying with the section than warranted.

EPA Response

The final rule includes site-specific regulatory provisions. See § 125.94(a)(5). Therefore, the commenter’s concern in that matter has been met.

The commenter’s premise that because site-specific implementation has been the status quo method of implementation for 30 years means that it is the least burdensome approach is faulty logic, in the Agency's opinion. The Agency believes that historical implementation of 316(b) has in cases been sufficiently burdensome to permit writers over the past 30 years to warrant a new approach. As such, the Agency has included a combination of national standards, a flexible implementation pathway, alternative regulatory options for site-specific cases, pre-approved technology fast-track pathways, and substantial guidance in implementing the final regulation. The ultimate approach will serve to reduce the extreme cases of burden that have plagued the industry and permit writing community over the past 30 years and provide a steady but manageable workload to permit writers.

Comment ID 316bEFR.072.039

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Under the proposed rule, site-specific factors would be considered only in exceptional circumstances, not as the basis for technology determinations. Both of the proposal's cost tests include a "significantly greater than" requirement that is incompatible with the goal of maximizing net benefits to society. While these tests may prevent some truly egregious technology applications, it is not clear that they are designed to lead to significantly better technology determinations.

RECOMMENDATION: EPA should promulgate a rule that is based on a site-specific determination of the best technology. The site-specific alternative regulatory plan submitted by PSEG and included in the preamble is a good model for such a program. If EPA persists with promulgation of a rule based on the "preferred alternative" as proposed, the Agency must broaden consideration of site-specific factors through modification of both the cost-cost test and the benefit-cost test.

EPA Response

EPA disagrees. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule, including the approach proposed by PSEG. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.072.040

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA's proposal is not based on the correct biological endpoint.

The proposal ignores the biological basis for decision making that EEI's members believe is central in Section 316(b) decision making and it does not address the central question of defining adverse environmental impact.

The Clean Water Act Section 316(b) states:

[a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available ["BTA"] for minimizing adverse environmental impact.

It is difficult to understand how one can minimize what is not defined, but this is exactly what EPA would suggest by proposing performance standards to reduce impingement mortality and entrainment by set percentages without regard to what, if any, adverse impact may be occurring. EEI makes the following two recommendations aimed at rectifying this issue.

Define Adverse Environmental Impact

The proposal lacks a definition of the statutory term "adverse environmental impact" (AEI). EEI believes that defining AEI will lead to better, more streamlined decision making, focusing resources where they will have the greatest impact. In fact, we believe it is a necessary precondition to the application of any best technology available determination.

The lack of a definition for AEI in the proposed rule leads one to conclude that any impingement mortality and any entrainment is adverse. This is not consistent with fisheries management science — which focuses on management of populations and communities of species rather than individuals — or with current practice and past precedent as expressed by EPA.

In EPA's draft 1977 guidance for §316(b) the Agency states "[t]he exact point at which adverse aquatic impact occurs at any given plant site or waterbody segment is highly speculative and can only be estimated on a case-by-case basis by considering the species involved, magnitude of the losses, years of intake operation remaining, ability to reduce losses, etc." U.S. EPA, Office of Water Enforcement, Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500 at 11 (Draft May 1, 1977). If magnitude of losses and reductions of losses were to be considered it stands to reason that adverse environmental impact must be more than the loss of one individual.

RECOMMENDATION: EPA Should Define "Adverse Environmental Impact." In doing so the Agency should remain consistent with accepted biological management models that stress the maintenance and protection of populations not simply the protection of individuals. Essentially, the definition should embody the notion that the structure and function of the aquatic community be preserved. The utility industry has recommended an appropriate definition <FN 1> of AEI in prior comments filed with the Agency on different phases of this rulemaking.

Footnotes

1 UWAG and EEI recommend the following definition:
Adverse environmental impact is a reduction in one or more representative indicator species that (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to the operation of the cooling water intake structure.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.072.041

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Allow Ecological Risk Assessment to Provide Basis for AEI Determinations

As described in the decision principles presented by UWAG (see UWAG Comments, Appendix 2), the use of ecological risk assessments provide an Agency-endorsed approach that can be used to demonstrate whether there is any risk of AEI occurring, how much risk may be occurring, and what technology is "best" for a site under §316(b). The Agency has been reluctant to embrace a definition of AEI, asserting that it is a difficult and often variable target to assess. However, assessing risk using a structured AEI decision making process consistent with EPA's 1998 Ecological Risk Assessment Guidelines would provide both the process and the consistent decision making framework that EPA suggests would be lacking if a site-specific approach were to be implemented. Furthermore, EPRI's recent report Evaluating the Effects of Power Plant Operations on Aquatic Communities (EPRI Report 100758 July 2002) offers an "ecological risk assessment framework" for §316(b) demonstrations.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking. For these same reasons, EPA has rejected an ecological risk assessment framework for section 316(b) demonstrations in the NPDES permitting program.

Comment ID 316bEFR.072.042

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The estimated cost of a cooling tower retrofit was grossly understated.

EPA's estimate of the cost of a cooling tower retrofit was based largely on the extrapolation of a single datapoint representing a "rule of thumb" guess by a vendor for a non-representative size of cooling tower. The resultant cost "equation" was significantly at odds with any estimate from any other study that has been done on this subject. The costs of a cooling tower retrofit are likely to be at least twice what EPA states they will be.

As a result, any regulatory alternative that would require the retrofit of cooling towers is even more undesirable than would appear to be the case based on EPA's analysis. Based on our recalculation of the Waterbody/Capacity-based alternative, this — and all other cooling tower alternatives — would have negative net benefits. These net costs become even greater when our concerns over EPA's benefits estimates are considered.

Applying EPA's retrofit equation for redwood cooling tower installation yields a rough average cost estimate of $80 per gpm for redwood towers. Other analyses performed by DOE, the industry, and elsewhere in the literature all find that the costs of tower retrofits are between $140 and $225 per gpm:

[see hard copy for table]

EPA's estimate is half or less than the costs estimated by other sources.

As a result, the costs associated with any option involving cooling towers will increase significantly if more realistic numbers are used. For example, the costs of the 'Waterbody/capacity based option" — the option with the fewest additional cooling towers —increase from $970 million to $1.7 billion.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.072.043

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA's failure to define "significance" for either of its cost tests creates unnecessary uncertainty in the rule.

The EPA proposal contains both a cost-cost test and a benefit-cost test to account for site specific variations in costs and benefits that may affect whether meeting the EPA's proposed performance standards is appropriate at any given facility. As discussed above, EEI members support these tests as providing a necessary option to avoid the application of technologies to plants where such application clearly does not make sense.

However, both of these cost tests rely on facilities demonstrating that the costs faced at that facility are "significantly greater" than either the costs considered by EPA in establishing the standards or the expected benefits of applying the standards at that specific facility. Unfortunately, the term "significantly greater" is never defined. This limits our ability to judge how useful these necessary provisions will be. In addition, the "significantly greater" decision criterion is inappropriate for making determinations based on a weighing of benefits and costs — this will be discussed in greater detail below.

By choosing the term "significantly greater," EPA is abandoning an earlier standard of "wholly disproportionate." We assume EPA intended that facilities could demonstrate that costs were significantly greater before they reached the level of wholly disproportionate. Common sense would suggest that two cost estimates are proportionate if they are roughly the same. If one estimate were twice as high as the other, they would clearly be out of proportion. Therefore, significantly greater would need to be some difference less than two times the cost considered by the EPA in establishing the standard or two times the estimated benefits of compliance with the performance standards.

Another interpretation of significance would be that used in statistics. The difference between two numbers is determined to be statistically significant if the two numbers can be demonstrated, to a given level of certainty, to be different. To make this demonstration with respect to cost estimates, one requires information on the variance in cost estimates that the Agency considered. Unfortunately, the EPA did not provide this information.

RECCOMMENDATION: EPA should either delete the "significantly greater than" requirement for purposes of the cost tests that it includes in the rule or define the term. If the term is retained, EEI suggests that it should be defined as a multiplier between zero and one.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.072.044

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 10.07.02
RFC: Appropriateness of "significantly greater"

"Significantly greater than" is an inappropriate decision criterion for weighing costs against benefits.

While we support the consideration of site-specific benefits, the benefit-cost test proposed in the rule uses the incorrect decision criteria. EPA only allows site-specific alternatives to be considered if the cost of achieving the standard is significantly greater than the expected benefits of compliance. Moreover, EPA only allows deviation from the standard to the extent justified by the significantly greater costs. This could be read to imply that a facility must install a technology that has no net costs or net benefits. As explained below, this allows socially suboptimal solutions to be implemented. The correct decision criterion would be to allow facilities to select the control alternative that maximizes net benefits.

EPA considers four possible alternative criteria for identifying the "best technology" in the proposed rule:

(1) the wholly disproportionate cost test, whereby the alternative which exhibits the greatest environmental gain without bringing about costs which are "wholly disproportionate" to the benefits (of the environmental gains) is preferred (p. 17165);

(2) a modified wholly disproportionate cost test proposed by Public Service Electricity and Gas Company (PSEG), whereby the alternative which exhibits the greatest net benefits (difference between benefits an costs) without bringing about costs which are "wholly disproportionate" to the benefits is preferred (p. 17166);

(3) a significantly greater cost to benefit test, whereby the alternative which exhibits the greatest environmental gain without bringing about costs which are significantly greater than the benefits is preferred (p. 17166); and

(4) a benefits should justify the costs test, proposed by the Utility Water Act Group (UWAG), whereby the alternative which exhibits the greatest net benefits without bringing about negative net benefits is preferred (p. 17165). The Proposed Rule's description of the UWAG recommendation incorrectly refers to the ranking as one characterized by "cost-effectiveness," whereas the ranking is actually according to efficiency (page 17165).

The latter is the preferred alternative. Economic thinking looks toward the test that will lead consistently to decisions that are in the general social interest. When comparing different options, economics dictates that the option with the greatest difference between benefits and costs is the best option. This is the universally accepted "Kaldor-Hicks test," which is the basis of benefit-cost analysis and which is the prescribed method in EPA's own "Guidelines for Preparing Economic Analyses."

In the §316(b) context, the technology adopted by a company is in society's interest if the present discounted value of net benefits is greater the net benefits of the alternative options - including the status quo. EPA incorrectly interprets this approach as meaning the best choice is that alternative which exhibits the greatest environmental gain so long as it does not create costs which are significantly greater than the benefits of other options.

The basis for including a benefit-cost test is to avoid the implementation of controls where those controls are not be warranted by sound public policy principles. One such instance may be where a facility is drawing water from a waterbody that does not support life. In this instance installing screens to protect organisms that do not exist would not be a wise use of society's resources. Another instance could be where a facility already has controls in place that achieve a level of control that is less than the EPA's proposed standards. In this case, the marginal improvement associated with replacing the existing controls may not warrant the level of expenditure required to make those improvements.

To put this in more concrete terms, we would provide the following hypothetical example. For the purposes of this discussion we will assume that there is a facility that faces the following four alternative technology scenarios:

Alternative Approach	Cost	Expected Benefits
Alternative 1: Controls already in place	"$0"	$300
Alternative 2: First order control (e.g. move intake)	$283	$735
Alternative 3: EPA proposed standards	$610	$890
Alternative 4: Greater control (e.g. cooling towers)	$3,507	$1,223

In this example, Alternative 2 would be the economically preferred alternative because it would provide the maximum benefit in excess of cost — net benefit — ($735 - $283) of any of the alternatives. Yet under EPA's current proposed rule, a facility could not make a case for Alternative 2 because the costs of Alternative 3 do not exceed its benefits. As a result, the facility would have no basis for arguing for a site-specific approach that would allow selection of Alternative 2. However, this would lead to a socially suboptimal outcome, since the net benefit of Alternative 3 is only $280 whereas the net benefit of Alternative 2 is $452. Put another way, the incremental cost of moving from Alternative 2 to Alternative 3 is $327 while the incremental benefit is only $155. Society is made worse off by $172, and the benefit-cost provision in EPA's rule does nothing to avoid this outcome. This situation would arise any time existing controls generate benefits in excess of the net benefits of achieving EPA's proposed new standards at a given facility.

As part of the maximum net benefits analysis, EPA also must allow consideration of past actions taken by States and permittees in determining the benefits of new technologies if it is to reach the correct decision. In addition, this consideration of past expenditures is consistent with the concept of fairness as well as efficiency. EPA should avoid doing anything in this rulemaking that would punish those facilities, relative to their competitors, for past actions taken in good faith that were consistent with the environmental goal of reducing adverse environmental impacts from the operation of cooling water intake structures.

Thus, EPA needs to ensure that the cost-benefit test also compares incremental costs and benefits between existing technology at a facility and any additional technology being considered at the facility. Again in this example, if the benefits already being generated by the existing controls are considered, a much different conclusion is reached. In this instance, we would be incurring $610 in costs to generate $590 in benefits, for a negative net benefit of $20. Even so, the “significantly greater than” standard means that the permittee might be required to adopt changes that would produce a negative benefit to society. Instead, the maximum net benefits test should be used.

The numbers used in the example above are not used by coincidence. They are one millionth of the costs used by EPA to justify the rule nationally. Alternative 2 represents the benefit and cost estimates of the proposed rule. As discussed previously, EPA correctly chose the alternative that maximized net benefits from among the alternatives examined. However, the proposal forbids facilities from doing the same at individual sites. This reduces the net benefits of the rule unnecessarily.

RECOMMENDATION: EPA should allow facilities to demonstrate that a site-specific alternative approach is warranted based on a demonstration that the net benefits of the alternative are greater than the expected net benefit associated with meeting the performance standards proposed in the rule.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.072.045

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA Should Streamline BTA Decision making to Reduce Implementation Costs

EPA and some States have expressed concern that the flexibility afforded in the preferred alternative could either:

1) create a situation where permittees may immediately take advantage of the site specific determination compliance option and attempt to demonstrate that no action is required at a particular facility; or

2) produce an undue administrative burden to State permitting authorities as a result of site- specific demonstration information requirements. EEI believes that scientific facts and understanding of the adverse environmental impact at a particular situation are indeed what should predominate in a BTA decision making. If the demonstration from the permittee leads the State to making a no action decision, then so be it. As explained elsewhere in these comments, if EPA added certain streamlining provisions to the preferred alternative, combined with experience from past years, maturing science, and the fact that the burden of demonstration falls to the permittee, EEI does not believe tint the burden on State permitting authorities will be excessive or unmanageable.

Having said that, EPA could modify the proposal to add a “technology-specific” option based on the same technologies as EPA’s proposal while still allowing permittees to demonstrate that the technology does not meet the cost-cost or cost-benefit tests at their particular facility. This would afford a much simpler implementation path for facilities that choose to install one of the specific technologies that EPA has reviewed for this rulemaking. This addition would save time and money, deploy technologies in suitable circumstances quicker than otherwise would be done, and considerably reduce the administrative burden to State permit authorities and reduce transaction time associated with permit negotiations.

The EPA performance standards are based on the performance of technologies that the Agency is confident can meet the standards. However, the proposal requires significant resources be devoted to demonstrating that installation of these technologies will meet these performance levels at each individual facility. A significant portion of the burden on State permitting authorities associated with this rule is a direct result of these studies and demonstrations. These studies and demonstrations, while adding to burden (and delaying implementation) do not provide any additional information concerning the performance or implementation of the technologies discussed in the proposal.

The NPDES permit would not need to specify a numerical limit on the number or mass of fish entrained or impinged or on the percent reduction, but the commitment to install, operate, and maintain an approved technology would be enforceable. Once the permittee had installed the approved technology, his or her continuing obligation would be to verify periodically that he or she was properly maintaining and operating the technology.

There are two reasons why such an addition should not be viewed as inhibiting technology advancement. First, the approved technologies cannot be deployed cost effectively in all cases — EPA implicitly acknowledges this fact by including a site-specific alternative to account for those instances where unique situations occur that affect the practical deployment or cost associated with installation of these technologies. Second, with the site-specific alternative still in place, regulated entities would have built in incentives to find cost-effective and environmentally protective technologies that meet the performance standards.

In fact, this alternative may present a unique means for EPA to promote innovation and combine that with a means for institutionalizing those technologies that, through innovation, show themselves to be effective in many situations. Take for example the following illustration. Through the application of the site-specific alternative, an innovative application of a conventional technology or the application of an "new" technology could be found to be effective in several different waterbody types and different plant configurations, it conceivably could be added to the "approved" list of technologies needing only proper installation, operation and maintenance for purposes of demonstrating compliance. Innovation can flourish, reduced administrative burden to State permit agencies can result and the environment can be adequately protected.

The greater level of demonstration would still be required for facilities choosing to make a site-specific demonstration based on one of the cost tests included in the rule and for facilities that wish to demonstrate that an alternative compliance regime is capable of meeting the standards proposed by the EPA.

RECOMMENDATION: Facilities that choose to install one of the technologies that EPA expects to meet the standards need only demonstrate proper installation and operation of the technology to be deemed in compliance.

EPA Response

EPA recognizes the advantages of providing a simpler, expedited permitting process and has added an approved technology alternative to the final rule. Under this provision, a Phase II existing facility may demonstrate to the Director that it has installed and is properly operating and maintaining a rule-specified design and construction technology in accordance with § 125.99(a). Submerged cylindrical wedge-wire screen technology is a rule-specified design and construction technology that may be used in instances in which a facility's cooling water intake structure is located in a freshwater river or stream and meets other criteria specified at § 125.99(a). In addition, under this compliance alternative, a facility or other interested person may submit a request to the Director for approval of a different technology.

Facilities demonstrating compliance under the approved technology alternative have fewer information collection requirements, as noted in § 125.95.

In addition, EPA has authorized the use of a Technology Installation and Operation Plan, with the approval of the Director, as a means of demonstrating compliance with today's rule.

Comment ID 316bEFR.072.046

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

In addition, EPA's proposal does not sufficiently recognize the work already done by the States in implementing this section of the Clean Water Act. The preferred alternative would be fortified if adapted to encourage States to maintain and promote comparable programs proven to work effectively in environmental protection and to take advantage of knowledge already collected about certain facilities.

EPA correctly has discussed the ability to allow a State to show that its program is "functionally equivalent" to the details of the proposal. Consideration of such an approach is appropriate and should be encouraged since, in the case of §316(b), it is not a new regulatory program but one in effect since 1972. There are many States that have elements in place providing adequate oversight and reasonable BTA decision making. It is unnecessary, bureaucratic and costly to all involved, especially the States, to require these decisions to be re-evaluated and permits re-issued.

Unfortunately, it appears that the proposal would require a showing that a State's program meets or exceeds the numerical performance standards if it were ever to be deemed an equivalent program. This is an inflexible and too conservative approach. Since the endpoint of concern is a healthy environment, such a rigid approach disallows the use of different and possibly more effective or innovative approaches for determining the adequacy of environmental protection.

Where a facility already has performed a successful §316(b) demonstration and no significant aspect of facility operations or the biota has changed, or where local regulatory authorities have at their disposal sufficient credible data about a waterbody to be confident that entrainment and impingement will not be a concern, EPA should allow and even encourage States to rely on this knowledge.

EPA Response

See response to 316bEFR.025.017 for details on State program approval. Please also see response to 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

Comment ID 316bEFR.072.047

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 5.0

Char. of Industries Potentially Subject to Prop. Rule

The selection criteria used by the Agency to identify the universe of in-scope facilities may have excluded, either randomly or systematically, facilities that must comply with the rule.

If facilities have been excluded, the benefit-cost analysis cannot assess the full impact of the rule. This may not present a substantial problem since the facilities would theoretically be excluded from both the cost and the benefit analyses. In the case of the alternative options, however, some of them have negative net benefits. In these instances, the exclusion of a facility would result in an underestimation of the net costs of the options.

RECOMMENDATION: EPA should check the STQ responses from the facilities excluded based on a lack of EIA data against the assumption that these facilities will not be covered by the rule. The exclusion of facilities can significantly alter both the costs and the benefits of the rule, particularly in those cases where the missing facilities are from a subpopulation that is particularly sensitive to the costs of compliance. The Agency should also check the extrapolated maximum design flow values against the information reported to the EIA.

EPA Response

EPA believes that it has correctly characterized the universe of in-scope facilities. As discussed in section III of the preamble in the proposed rule [67 FR 17131 - 17135], EPA conducted an extensive data collection effort, including the use of existing data sources and administering an industry questionnaire.

For a discussion of EPA's use of design intake flows, please refer to the response to comment 316bEFR.072.202.

Comment ID 316bEFR.072.048

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

None of the three methodologies used to assess economic impact — the Cost-to-Revenue Test, the Average Household Impact, and an analysis of the IPM-based Electricity Market Indicators — can predict economic impacts with any accuracy.

a. The Cost-To-Revenue Test (CRT). The CRT is a method that has no basis in economic or financial analysis. It compares both average and maximum annual costs per facility against the facility's and firm's gross revenue. This method completely ignores the fact that gross revenue is a meaningless measure of economic viability or lack thereof — a facility might have gross revenues of $15 million but still have negative net revenue after costs/debt are subtracted.

Recommendation: The Agency should instead evaluate the effect of the regulation by calculating the ratio of the net present value (NPV) of the marginal cost of compliance to the NPV of expected net revenues. This is the method used by financial markets, the ultimate arbiters of the viability of a given investment.

b. Average Household Impact. Average cost per household also is not a meaningful statistic — the denominator is so large that it masks the true effects of the rule. This approach is only warranted in those instances where the entire population is homogenous with respect to the percentage of cost shouldered —that is, in those cases where each household can reasonably be expected to see identical increases in costs as a result of rule. This is clearly not the case.

Recommendation EPA should eliminate this analysis altogether. It cannot provide a meaningful measure of the impacts of the regulation, and in fact leads to erroneous impressions.

c. The IPM. There are three categories of issues associated with IPM modeling analysis: 1) General assumptions used in the model, 2) scope issues regarding the set up and operation of the model, and 3) technical and economic assumptions specific to the §316(b) rule options. Overall, there is a systematic bias in the assumptions and operation of the model that lead to an underestimation of market impacts.

EPA Response

Please refer to the following comment responses:

--The Cost-To-Revenue Test (CRT): 316bEFR.072.206 (subject matter code 9.01).
--Average Household Impact: 316bEFR.072.207 (subject matter code 9.02).
--The IPM: 316bEFR.072.209 (subject matter code 9.03).

Comment ID 316bEFR.072.049

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.01.02

Methods to Evaluate I&E

The EPA analysis greatly overstates the benefits of all of the options evaluated.

EPA vastly overestimates the extent of the entrainment and impingement losses caused by cooling water intakes nationwide, the implications of such losses for consumers and society at large, and the economic benefits of reducing losses. Appendices 13, 14, and 17 to the UWAG comments, prepared by nationally recognized fisheries biologists and resource economists, provide a detailed critique of the data and methods EPA used to assess the losses associated with once-through cooling, as well as the likely benefits of requiring cooling towers and various intake structure technologies. The following represent a subset of the methodological issues associated with EPA's estimation and extrapolation of benefits. These issues are addressed in the appendices to the UWAG comments as well as in Appendix 2 of these comments.

Besides these appendices, recent EPRI studies support the conclusion that EPA's benefits estimates are too high. As a report by Dr. Charles Coutant commissioned by EPRI shows, a linear relationship does not exist between flow on the one hand and entrainment and impingement (on which EPA' s benefits estimate for cooling towers principally rests) on the other. Nor is there a meaningful correlation between flow and impingement/entrainment effects at higher levels of biological organization. (EPRI, Impacts of Intake Flow Rate on Fish Populations and Communities (Principal Investigators M.S. Bevelhimer & C.C. Coutant) (EPRJ 1005178) (Final Report June 2002)).

EPA Response

EPA reviewed the study document cited by the commenter. The study focused on effects of reservoir withdrawal rates on fish populations, not I&E rates. EPA notes that because a statistically significant relationship was not found doesn't mean that one does not exist. As the authors note, many factors affect fish populations in the reservoirs examined, including stocking and natural environmental perturbations, which may have impaired the authors' ability to detect a relationship between withdrawal and fish abundance. See also response to Comment 316bEFR.041.037 concerning EPA's assumption that I&E are proportional to flow.

Comment ID 316bEFR.072.050

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.01.02.02

Fish Population Modeling

EPA ignores sound science in favor of a baseless “precautionary approach.” The appropriate method of valuing losses associated with the operation of cooling water intake structures is based on the changes in fisheries stocks and related catch levels. This has long been recognized as the correct approach by both biologists and economists. A large body of peer-reviewed research supports this approach through the use of bioeconomic models such as “stock recruitment” models.

EPA chooses to replace this large body of peer reviewed science with a normative approach thinly disguised as scientific. EPA labels this “a precautionary approach.” This approach appears to serve no purpose other than to inflate the benefits estimates through the application of a number of questionable to clearly invalid methodologies.

EPA Response

EPA's analysis is based on sound science throughout. Please see responses to Comment 316bEFR.005.009 on fish population modeling, Comment 316bEFR.025.015 on compensation and Comment 316bEFR.074.201 on the term "precautionary approach."

Comment ID 316bEFR.072.051

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Habitat Replacement Cost (HRC) has no basis in economic theory or practice, and is incorrectly applied in the 316(b) Phase II rule. HRC is a measurement of the costs of an alternative means of compliance. It tells us nothing about the value of the lost resource. It measures what we can spend on a resource, not what we should. Since there is no information on the demand for the resource, this methodology is incapable of providing any information on value. The fact that avoided-cost methodologies of assessing benefits are invalid is well-accepted among economists. Moreover, EPA asserts that replacement of habitat is superior to more direct (and generally cheaper) forms of replacement because habitat creation generates additional benefits such as groundwater filtration and flood control. While it is likely that these benefits exist, they haw nothing to do with the resource that is lost through impingement and entrainment.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.072.052

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Societal Revealed Preference is an inappropriate measure of value. In its two San Francisco Bay studies EPA uses an "innovative" approach they term societal revealed preference. In this instance the innovation appears to be ignoring principles of sound economics and invalidating the basis of benefit-cost analysis. Like habitat replacement cost, this method does nothing more than look at costs and deem them to be benefits. Under this approach all governmentally imposed costs are assumed to be at least as great as the benefits. There is no basis for this assumption in economic theory or empirical observation. If this assumption were true, there would be no need to do benefit-cost analysis of government regulation. Any conclusions drawn from application of this methodology are completely invalid.

EPA Response

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

Comment ID 316bEFR.072.053

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

EPA's use of a "rule of thumb" to estimate non-use values is completely arbitrary. EPA uses a unique rule of thumb that assumes that non-use values associated with a good, in this case recreational fishing, is equal to 50 percent of the use value. There is absolutely no basis for this assumption and its use in these studies inflates the benefits artificially.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.072.054

Subject Matter Code 10.02.06.02

Revealed preference

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Angler days are double counted. EPA estimates benefits for recreational fisheries using the number of angler days within 120 miles of each facility. This will lead to an overestimation of benefits when facilities are located within 120 miles of one another. EEI mapped the facilities covered by the proposed rule to see how prevalent this overlap of these areas of influence might be. This mapping exercise demonstrated that 100% of the areas in the eastern half of the United States fall within the area of influence of at least two facilities. EPA needs to adjust its benefit estimates to account for this overlap. (See Appendix 4 for map of in-scope facilities, explanation of analysis, and summary statistics regarding percent of overlap.)

EPA Response

In the cost-benefit analysis of the benefits for the final Section 316(b) Phase II rule, EPA no longer uses the angling index to extrapolate benefits. Rather, all benefits are now extrapolated based on average annual operational flow. Because the angling-related approach is no longer used, the issue of potential double counting is now moot.

Comment ID 316bEFR.072.055

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

The choice of case study facilities does not constitute a representative sample that can be used as the basis for extrapolation to national estimates of benefits. The benefit estimates are based upon an extrapolation from five of case studies, supplemented with information from six other studies. This process has two serious problems: (a) the case studies are not representative, and (b) the small sample of case study facilities magnifies any biases.

1. The choice of case study facilities does not constitute a representative sample that can be used as the basis for extrapolation to national estimates of benefits: EPA chose case studies based on those facilities that had the greatest amount of available data. As a result, the sample facilities are not a random (or representative) sample of the affected population. Moreover, the facilities that have the most data are likely to be the facilities that have come under the most scrutiny under the existing program. These facilities are more likely to be representative of facilities where concern with I&E impacts may have existed, not of the general population of facilities. Any extrapolation from these facilities, therefore, will overstate the impacts of I&E losses, and consequently, overstate the benefits of I&E controls.

2. A small sample size magnifies the bias associated with individual studies: The concern over the bias on the sample facilities exacerbates the bias that is created by extrapolating from a very small sample, in many cases a single facility, to the entire population. This magnifies the upward bias in the estimate at individual facilities. For example, the Salem case study is the basis for 55 of the total baseline loss estimates.

EPA Response

(1) Representativeness: EPA did not select case study facilities only on the basis of the quantity of I&E data available, nor did EPA examine only facilities with high I&E losses. To the extent possible, EPA sought facilities with several years of I&E data that were also relatively complete in terms of details such as life-stage specific I&E numbers and growth and mortality rates, within-year monitoring, and the number of impacted species that were evaluated. Nonetheless, EPA's selection of facilities to evaluate was constrained by the lack of I&E studies for most of the over 500 facilities in scope of the Phase II rule, making it impossible to develop a statistically-based sampling design.

(2) Sample size: EPA understands the desire for more case studies than were presented at proposal. Therefore, for its final analysis for the Phase II rule, EPA examined many more facilities (a total of 46), substantially increasing sample size.
Extrapolation in the final analysis was conducted within seven regions, rather than nationwide.

Comment ID 316bEFR.072.056

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 6.01

Overview of I & E effects on organisms

Estimates of I&E impacts and benefits are not proportional to cooling water flows. EPA assumes that I&E impacts are directly correlated with flow at a facility. However, EPA's own data in the one instance where it composed multiple facilities in the same pool indicates that this proportionality assumption is incorrect (see Appendix 13 of the UWAG comments on this proposal for a more detailed discussion of this issue). The direction of the bias introduced by this is unclear. However, when combined with the fact that the sample facility is likely to have an uncharacteristically high impact per unit of flow, the effect of the assumption will be to overstate the benefits.

EPA Response

EPA agrees that there is no clear directional bias. For a discussion of EPA's assumptions regarding the relationship between intake flow and I&E rates, please see response to Comment 316bEFR.041.037.

EPA disagrees that the facilities used in the case study or regional analysis are likely to have an uncharacteristically high impact per unit of flow. While one facility may be above average in its level of I&E per unit of flow, other facilities may be below average. For its final regional analysis, EPA based regional estimates on multiple facilities.

Comment ID 316bEFR.072.057

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02.02

Commercial Fishing Benefits

EPA inflates the benefits estimate by valuing losses further up the value chain than is appropriate. EPA develops a series of multipliers to translate dockside market value into larger numbers to reflect secondary economic benefits. These multipliers are not based on any significant empirical data. Moreover, they ignore the additional value added at each step of the market chain, leading to an upward bias in the perceived contribution of losses to social cost. Lastly, they lead to an unfair comparison of costs and benefits, since the costs associated with reducing impingement and entrainment are measured at the equivalent of the dockside and are not adjusted by similar multipliers to account for their movement through the value chain. (Comments submitted to EPA by Robert N. Stavins, Ph.D).

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.072.058

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA application of otherwise valid approaches was flawed. Some of the approaches used by the EPA, such as random utility models, do have a sound foundation in economic theory. However, application of these models to individual case study facilities was uneven.

EPA Response

For EPA's response to comments on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

The Agency disagrees that its RUM approach suffers from methodological problems. For EPA's response to comments on the RUM method, please see responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

EPA further notes that it has revised its RUM analyses for the final Phase II 316b analysis to be consistent across all regions. Each coastal region's RUM model uses data from the National Marine Fisheries Service (NMFS) Marine Recreational Fishing Statistics Survey, which have been collected for a number of years using a thoroughly tested survey methodology. EPA's coastal RUM models are built upon models estimated for NMFS by highly respected Resource Economists (e.g., Ted McConnell). EPA has improved on NMFS' models by modeling individual fishing sites rather than aggregating sites by county, and by estimating distances traveled using a state of the art GIS-based program developed specifically for this analysis. Although for the Great Lakes region EPA used a different data set (i.e., the Michigan Recreational Anglers Survey conducted by Michigan Department of Natural Resources), the modeling technique used in the Great Lakes recreational fishing benefits analysis was consistent with the techniques used for the coastal regions. Therefore, EPA's application of RUM models cannot be considered to be "uneven," as consistent modeling techniques were used across all regions.

Comment ID 316bEFR.072.059

Subject Matter Code 10.02.01.01

General/Benefit Transfer

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

EPA relied on questionable “benefits transfer” and other approaches to draw conclusions that may not be applicable to the actual facility being studied.

EPA Response

The comment refers to EPA’s benefit transfer approach from the proposed rule analysis. For EPA’s response to comments on the benefits transfer approach used to value recreational fishing benefits at proposal, see comment #316bEFR.075.504.

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where the benefits transfer approach was applied (including proposed rule analysis), EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) and has carefully applied benefit transfer methods. The following steps were followed as recommended in the Guidelines when using BT:

1. describe the policy case;
2. identify existing, relevant studies;
3. review available studies for quality and applicability;
4. transfer the benefit estimates; and
5. address uncertainty.

All of these steps were followed in the Phase II benefits analysis for the final rule.

For EPA’s responses to specific comments on commercial fishing methods please see comment # 316bEFR.323.016.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment # 316bEFR.005.035."

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.072.060

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA overestimates the benefit of cooling towers. EPA appears to have calculated the benefits of cooling towers based upon a reduction from the maximum design flow at existing facilities. The reduction in flow relative to actual operating flows is likely to be much less. Therefore, the benefits estimates associated with closed-cycle cooling will be biased upwards.

EPA Response

The Agency has based its calculation of benefits for the final rule on the reported actual operating flows of the facilities within the scope of the rule.

The Agency disagrees that the benefits estimates with closed-cycle cooling presented at proposal were biased upwards. For EPA's responses to specific concerns regarding the benefits assessment methods used at proposal and NODA, see Section 10.02 of the 316 (b) Comment Response document. For the final Section 316(b) rule the Agency did not re-estimate benefits associated with closed-cycle cooling.

Comment ID 316bEFR.072.061

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The EPA analysis greatly understates the cost of retrofitting cooling towers.

EPA based its recirculating cooling estimates on the cooling tower costs developed for the final new facility §316(b) standards. The basic capital cost was derived from a "rule of thumb" cost per gallon per minute ("gpm") obtained from vendors. This rule of thumb figure was modified to attempt to account for installation costs, construction material, and splash fill. The Agency then translated this determination information into a scientific looking equation from which one can calculate cooling tower cost based on flow in gpm.

However, EPA's cost estimates for cooling towers retrofits are substantially underestimated. Applying EPA's retrofit equation for redwood cooling tower installation yields a rough average cost estimate of $80 per gpm for the redwood towers. Other analyses performed by DOE, the industry, and elsewhere in the literature all find that the costs of tower retrofits are between $140 and $225 per gpm. EPA's estimate is at least 50 percent lower than any other cost estimated by other sources.

Retrofitting cooling towers at existing facilities presents highly complex technical challenges. These engineering issues are at once time consuming and costly, as EPA acknowledges throughout the preamble and the Technical Development Document. EPA has only limited data that it has collected concerning the outage period associated with retrofitting cooling towers and these data show that outage periods are likely to be highly variable and, in some cases, quite long (i.e., ranging from 83 hours for the Jeffries Plant (a relatively small two-unit fossil- fueled plant) to 10 months for the Palisades Nuclear Generating Plant (EPA TDD Chapter 4, pp. 4-6). EPA subsequently dismisses this 10-month time frame.

From personal communications EEI has had with utility engineering experts familiar with cooling towers and cooling water intake structure design and operation, we believe such a long time frame may be more representative of the likely time required to retrofit a cooling tower on an existing facility. In fact, when queried about what would be the "typical" start-to-finish time to convert a once-through cooling system for a 400-MW fossil unit to a recirculated system, experts suggested a one year time would be optimistic scenario. (This estimate includes design, bidding, procurement, delivery, construction and testing). Assuming the very best circumstances, it was estimated that the "typical" unit downtime for the cooling system retrofit would ranges from a possible eight weeks (2 months) to a more realistic estimate of 13 weeks (3 months). (Personal communication with Wayne Micheletti, January 2002).

Moreover, redwood cooling towers may not be used as widely as EPA assumes. At some facilities, site-specific conditions may prevent the use of redwood towers, causing those facilities to turn to more costly options. EPA's total cost estimate, therefore, may substantially underestimate the true cost of regulatory compliance for non-nuclear generating facilities. In addition, EPA has not considered the environmental effects of widespread use of redwood lumber.

EPA Response

See response to comment 316b.EFR.208.002.

The Agency notes that it revised downtime estimates from proposal to NODA for its cooling tower analysis. The Agency also points out that the cost basis of redwood cooling towers is the median cost material, which just happens to be made of redwood. The Agency stresses, in the off-chance that the commenter's unusual line of reasoning is carried out elsewhere (i.e., that because the Agency utilized a median cost material for estimating costs that it has somehow mandated that this material be used) that the material of construction for any technology is chosen to best represent what the Agency deems the likely cost incurred and in no way instructs, recommends, or mandates a material selection when many others are available. This is a decision, regardless of the technology involved, that the Agency strongly believes is made by the complying facility based on its site conditions.

Comment ID 316bEFR.072.062

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

EPA should expand the definition of capacity utilization to incorporate legal or practical restrictions

The performance standards pertaining to entrainment are different for facilities with capacity utilization rates of 15% or less. This distinction recognizes the differences between “peaking” units and other facilities. This is an appropriate distinction and one that should be maintained. Moreover, there are other circumstances where a facility’s capacity utilization rate is limited as a practical matter. In these situations the facility should be deemed to have a capacity utilization rate no greater than the practical limit dictates. Also, if the permittee agrees to limit its capacity utilization to below the threshold (15% in EPA’s proposal) -- either by agreement with the permitting authority or by permit condition --then the facility should be deemed to be below the threshold.

EPA Response

The final rule includes the capacity utilization threshold. The final rule definition allows for any case in which the capacity utilization of a facility is historically below 15 percent (based on a single permit cycle). As such, if a facility’s capacity utilization rate is limited by a “practical matter,” this will be accounted for in the final definition.

The Agency has included in the final rule a flexible definition of capacity utilization that allows the permittee to agree to limit its capacity utilization, in the future, to below the threshold by permit condition. Therefore, the comment has been met.

Comment ID 316bEFR.072.063

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

EPA may not apply §316(b) to facilities subject only to permits for storm water discharges

EPA proposes to apply §316(b) to existing facilities covered by NPDES permits (whether general or individual) applicable solely to storm water. EEI and UWAG believe that EPA lacks authority to do this, because such facilities are not subject to effluent limitations under §301 and 306, which is a threshold requirement for applying §316(b). Also, EPA's proposal to cover these facilities vastly increases the number of permits covered and raises numerous administrative issues that will serve only to increase burdens on State and federal permit writers — the opposite of EPA's avowed mission.

EPA's proposal also raises complex and troubling legal issues — for instance, does EPA have authority, as it claims, to issue to a general permittee a separate permit containing only intake limits? Section 402 of the CWA suggests it does not. If EPA were to take the position that it could force storm water permittees to obtain individual storm water/cooling water intake structure permits, would it not have to amend the storm water rules and the storm water general permits, estimate and justify the additional reporting and recordkeeping burden, and obtain OMB approval? If EPA were to attempt to include cooling water intake structure conditions in general permits, would it not need to prepare burden estimates, obtain OMB approval, and develop special mechanisms to ensure that such conditions apply only to relevant facilities?

All of these factors weigh against EPA's proposal to apply the §316(b) rule to storm-water-only permittees with cooling water intake structures.

EPA Response

See responses to 316bEFR.035.001 and 041.127.

Comment ID 316bEFR.072.064

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA's operational performance standards penalize certain geographical regions

EPA is proposing to establish performance standards in Section 125.94(b) that would offer facility owners several options for compliance including the option to reduce "intake capacity to a level commensurate with the use of closed-cycle, recirculating cooling system;..."

EEI is concerned that the existing performance standard does not offer sufficient latitude to accommodate all closed-cycle, recirculating facilities in all geographical regions. Some facilities that are located in more arid regions have on-site cooling ponds and pumping facilities that are designed to appropriate large amounts of water from waters of the U.S. over a limited time period during, for example, spring run-off. Such facilities have a higher pumping capacity, but the pumps would operate for only a portion of any calendar year. States have considered and mitigated possible impacts by limiting pumping based on site-specific permit conditions.

It is unreasonable for EPA to establish performance standards based strictly on an intake capacity comparison with closed-cycle, recirculating cooling systems while ignoring the annual amount of water pumped.

EPA Response

EPA disagrees. To begin, please refer to the response to comment 316bEFR.006.001 for more information about the case-by-case nature of determinations of the status of cooling ponds as closed-cycle cooling systems. If a facility is considered to employ closed-cycle recirculating cooling, then the facility is considered to be in compliance with the rule. While the timing and volume of the intake flows might be considered in assessing the appropriateness of being designated as using closed-cycle cooling, these flow characteristics would not be important for a facility that has been determined to be in compliance with the rule.

On the other hand, a facility with a cooling pond may not be determined to employ closed cycle cooling. In such a situation, EPA does not wish to speculate on the compliance alternative that the facility may pursue. However, EPA believes that the final rule offers sufficient flexibility for such a facility to meet the requirements of today's rule.

Comment ID 316bEFR.072.065

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 21.09

Permit applications/implementation schedule

EPA should implement the BTA requirements using a permitting condition that sets out a process for choosing BTA

There is insufficient time built into the regulation as proposed to allow the permitting agency (the Director) to review and approve the key steps. For example, the Director will need to approve the data collection program and also, later, the permittee's choice of technology. This holds particularly true for facilities that are very near their date of permit reapplication when the final rule is promulgated. The §316(b) rule should make clear that time for agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition. At the very least, permittees who have applied already for a permit renewal when the §316(b) rule becomes final should not have to redo their application. In such a case, the succeeding five-year permit term should be the time in which the permittee complies with the new rule. Similarly, if the new rule becomes final when a permittee is very near the time when his or her renewal application is due (for example, 365 days before his permit expires), it would be almost as unreasonable to require him or her to adjust his or her application process to the new rule.

EPA Response

EPA has added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements and speeding permitting. See response to comment 316bEFR.034.005 for details.

Additionally, EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.072.066

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 3.03

Definition: Waters of the U.S.

EPA should clarify that ponds and lakes created specifically for cooling are not "Waters of the U.S." for the purposes of this rule.

Waste treatment systems, including ponds and lagoons designed to meet CWA requirements, which cooling ponds clearly are, are specifically exempted from the NPDES permit requirement. EPA's proposed definition of "once-through cooling water system" mistakenly says that such systems sometimes use "ponds." This could result in the incorrect interpretation that cooling ponds are "Waters of the U.S." rather than waste water treatment systems.

EPA has long asserted broad authority to define waters of the U.S., and to include and exclude waters from the definition where necessary to achieve the purposes of the CWA. EPA should treat "cooling lakes," or those built in whole or in part to supply cooling water by damming rivers that are waters of the U.S., as closed-cycle cooling systems that already achieve the §316(b) requirements. Cooling lakes do not require additional intake technology, both because AEI was considered when the impoundment was constructed and because experience shows that AEI typically does not occur in cooling lakes.

EPA Response

See responses to 316bEFR.006.001 and 316bEFR.035.015.

Comment ID 316bEFR.072.067

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA should clarify what is "Entrainable"

EPA appropriately acknowledges, through the concept of the calculation baseline, that many existing plants have already reduced their potential impact and, therefore, should get credit for their actions to reduce impact.

However, EPA should provide clarity in its proposal on how to measure the baseline level of impingement mortality and entrainment. The Agency needs to clarify the difference between impingement and entrainment organisms, which depends on screen mesh size. A larger mesh means, other things being equal, that there are more "entrainable" organisms and fewer impingeable ones. Reducing the mesh size means that some organisms that would have been entrained now may be impinged. Thus, a fine mesh screen might be installed to reduce entrainment, with the result that formerly entrainable fish or larvae are now impinged against the screen.

Recommendation: In its description of a baseline intake, the Agency can resolve this uncertainty by explicitly defining an "entrainable" organism as one that will fit through a standard 3/8-inch intake screen. This will lend certainty and consistency to the rule.

EPA Response

EPA has clarified its definition of calculation baseline in today's final rule (see 125.93).

Comment ID 316bEFR.072.068

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.08

Option: UWAG's recommended approach

ATERNATIVE PROPOSAL

The only way accurately and appropriately to select best technology available is on a site-specific basis. The mandate of Section 316(b) is distinct from the classic environmental protection paradigm where there is a source discharging some level of an identified pollutant. In the more traditional discharge cases, the concerns at issue are often technical capability (is there a technology of controlling the emission), economic practicability (is it practical or cost-effective to control the pollutant), and scientific (is there evidence that the. pollutant presents an unacceptable risk to society or some portion of society). In the case of Section 316(b), those same concerns are present. However, the situation is complicated by the fact that there is a not a "source" discharging anything. Rather there is the inherently variable and complex juxtaposition between individuals of aquatic populations of many species and human engineering. The interaction between the two is highly variable and site-specific for a myriad of factors such as the shape of the shoreline, the flow of the river, site design, the time of year, and especially the species present. Regardless of the engineering designs in place, the nature and variability of aquatic populations are such that some impact may occur despite well-intentioned planning. The question becomes one of degree, efficiency, and flexibility to deal with peculiar issues when they arise. No one solution will be best or even practical in every situation.

It is for these reasons that regulations implementing Section 316(b) of the CWA need to be sensitive to the inherent variability associated with measuring and minimizing adverse environmental impacts associated with cooling water intake strictures and flexible enough to account for unusual situations. In other words, Section 316(b) implementing regulations should allow for site-specific decision making and should calibrate its success by a measure of whether the environment and society are being served. Put another way, the statute calls for the minimization of adverse environmental impact. It is appropriate to interpret this to mean that it should be viewed as broad (greater than simply aquatic), relative ("adverse "and "minimize" are measures of relative risk), and flexible to adjust to unknowns.

Some have argued that the administrative costs associated with the site-specific approach have been too high. There are always some higher costs to pay when a new issue is confronted and a great deal has to be learned about the issue. But now, 30 years after Congress enacted the Clean Water Act, a great deal has already been learned about the key issues to examine and how best to study them. In addition, past administrative costs were, in part, a result of implementation with a rule and with only minimal draft guidance.

RECOMMENDATION: SITE SPECIFIC OPTION: EEI advocates that EPA select a purely site-specific regulatory scheme such as those advocated by UWAG and PSEG. Such approaches not only would build on a record of successful past precedent but also allow new methods to be developed to advance our understanding and measurement of biological integrity and ecosystem level impacts concepts that the Agency acknowledges in the preamble, and proposed regulatory language as important and central to this rulemaking.

EPA does not need to re-invent the wheel and develop new unproven and complex approaches when arguably all that may be needed is a federal regulatory structure codifying what is already in place with simple, easy to understand guidance to assure consistent decisionmaking. We strongly urge the Agency to consider the wisdom in promoting and refining existing decisionmaking approaches by promoting site-specific decisionmaking rather than fundamentally reordering a program that for many States has a 30-year history of successful implementation.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.072.069

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 17.06

Option: Site-specific determination of BTA

EEI members support a fully site-specific approach to determining the best technology available for minimizing adverse environmental impacts associated with the operation of cooling water intake structures. EPA should develop a reasonable definition of adverse environmental impact and allow facilities to demonstrate that their chosen technological solution minimizes these impacts in a way that maximizes net benefits. This can be done with no significant increase in transaction costs over EPA's proposed rule.

EPA's proposed rule falls short of this ideal, but it does include some provisions that allow for consideration of site-specific factors under certain conditions.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA has chosen to not define the term "adverse environmental impact" for the final rule. Please refer to the preamble to the final rule for more information.

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

Comment ID 316bEFR.072.070

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

If the EPA insists on pursuing a version of its preferred option, the following changes are necessary for that approach to be minimally supportable by the industry.

1. Modify the regulatory language of its proposal to remove any reference to closed-cycle recirculating cooling systems from the "performance standards" section of the regulation.

2. Maintain a cost-cost and a cost-benefit test in the final rule. These tests should be modified to allow facilities to choose any alternative that results in greater net benefits than would result from achieving EPA's numerical impingement and entrainment reduction targets, deleting the "significantly greater than" constraint.

3. Retain the flexibility to select from among all available technology and non-technology solutions in choosing a compliance strategy for an individual facility.

4. Include a streamlined permitting approach for facilities that choose to install the technologies considered by the Agency in establishing the standards and others that prove protective of fisheries at reasonable cost. This will reduce transaction costs for both facilities and permitting authorities.

5. Correct all of the major methodological issues with its economic and benefits analysis. This new analysis should be provided to the public prior to promulgation of the final rule.

6. Allow States to select alternative criteria for minimizing AEI than impingement and entrainment, including reference to the overall health of the fishery; encourage use of readily available data; preserve State authority including sound prior State analyses and decisions; and reexamine /use of the NPDES permitting process as the means of implementing Section 316(b) given that process's repeated reviews every 5 years, which we are concerned do not fit well with the § 316(b) issue

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule. EPA notes that the final rule uses a similar approach.

With respect to item #1 in the above comment, EPA has revised the rule language. Please refer to § 125.94(b) for a description of the performance standards.

With respect to item #2 in the above comment, the cost-benefit and cost-cost tests have been retained as part of the site-specific compliance alternative. Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative CWIS technologies.

With respect to item #3 in the above comment, EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose, which include restoration technologies.

With respect to item #4 in the above comment, EPA recognizes the advantages of providing a simpler, expedited permitting process and has added an approved technology alternative to the final rule. Please refer to the response to comment 316bEFR.072.045 for a discussion of this compliance alternative.

With respect to item #5 in the above comment, EPA revised its economic and benefits analysis in the NODA [68 FR 13522-13587].

With respect to item #6 in the above comment, please refer to the response to comment 023.001 for a discussion of alternative regulatory requirements.

Comment ID 316bEFR.072.101

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

ON LOCATION, INC. ELECTRICITY MARKET MODELING ANALYSIS

Analysis of EPA's Proposed 316(b) Rule

Prepared for the Edison Electric Institute

by

OnLocation, Inc.	EOP Group, Inc
Energy Systems Consulting	819th Street, NW
501 Church Street	Washington, DC 20001
Vienna, VA 22180	

August 2002

Executive Summary

This report summarizes the results of an electricity modeling analysis conducted by OnLocation, Inc, Energy Systems Consulting, for the Edison Electric Institute on the Environmental Protection Agency Proposed § 316(b) Rule for Phase II Existing Facilities (67 Fed Reg 17,121-225). The analysis used the POEMS electricity market model to compare and contrast key assumptions with the modeling analysis conducted by EPA using the IPM model.

The modeling analysis was performed for two of the EPA regulatory options: the preferred option (consisting of national performance standards for reduction of impingement and entrainment), and the waterbody/capacity-based option (consisting of installation of cooling towers at about 50 selected facilities). Due to constraints on the availability of data, the modeling analysis was not a comprehensive re-analysis of the EPA IPM modeling work, but instead focused on several key assumptions in order to highlight issues for further review and discussion with EPA.

The principal analytical objective of the POEMS analysis was to test several key assumptions used in the EPA IPM modeling in order to better understand the sensitivity of EPA's estimates of electricity market impacts. This was done by varying the input of several key assumptions, such as cooling tower retrofit costs and energy penalties, as well as using updated reference economic conditions. Not all of the issues regarding EPA assumptions raised in Appendix 2 were addressed in the POEMS modeling. The result illustrates the sensitivity that modifying a few of the variables with more appropriate data can have on the model output (impacts on electricity markets). If all the potential shortcomings of the original EPA study were rectified, an even more accurate (and presumable larger) impact on electricity markets would result. This is a critical finding that at least one of the proposed regulatory options (Option 1- waterbody/ capacity-based option), if analyzed more accurately, would likely lead to more significant impacts on electric markets than those identified in the EPA study

For the EPA preferred option, the POEMS modeling analysis showed that electricity market prices in general were not significantly affected by changes in assumptions regarding the costs of I&E controls. Price effects tended to be within the "noise level" of the model, resulting in little or no increased costs to consumers. The compliance costs of roughly $800 million (in 2002$) were absorbed by generators as a reduction in net income. The impacts to consumers would be greater if generators were allowed to pass through costs (in regulated markets) or if generators incurred additional costs due to site specific factors not addressed in the modeling analysis.

For the EPA waterbody/capacity-based option, the POEMS modeling analysis showed that the consumers would incur total costs of $2 billion (2002$) through 2015 resulting from the application of cooling tower costs derived from industry facility-level estimates, and from consideration of seasonal energy penalties resulting from the combination of outages, increased plant auxiliary power requirements and seasonal derating of steam turbines Producers incur increased costs totaling $9 billion over a 10 year period. Market prices for electricity would be higher in all of the NERC regions in some years, and system reliability would be reduced in 6 regions in the years in which cooling towers are installed. A total of 18 GW of existing generating capacity would be prematurely retired — of which 5.3 GW are directly attributable to the proposed 316(b) requirements. Further analysis of the EPA schedule assumptions, along with the possibility of higher levels of pass-through costs in regulated markets, likely would yield higher estimates.

Finally, to be consistent with the EPA IPM modeling analysis, the POEMS analysis considered the impacts of the 316(b) options separate from the Administration's Clear Skies proposal. Many of the facilities significantly impacted by the Clear Skies initiative also will be affected by the proposed new 316(b) guidelines in a manner that may not be identified through a modeling analysis of 316(b) alone.

Introduction

The proposed rule establishes national technology-based performance requirements applicable to the location, design, construction, and capacity of cooling water intake structures at existing power producing facilities. The proposal applies to existing electric generating facilities that use one or more cooling water intake structures withdrawing water from waters of the U.S., have or require a National Pollutant Discharge Elimination System (NPDES) permit, withdraw 50 million gallons per day (MGD) or more and use at least 25 percent of that water for cooling purposes.

EPA outlines a preferred alternative and invites comment on a broad array of other alternatives. These alternatives range from a stringent technology-based requirement for dry cooling at all existing facilities, required cooling tower retrofits based on waterbody type, to several decision frameworks that would evaluate adverse environmental impact and determine the best technology available for minimizing such impact on a wholly site-specific basis. This requirement has implications not only for the economic viability of these facilities but also has broader impacts for regional electricity markets. The POEMS modeling system was used to assess these impacts in a consistent economic framework.

The Policy Office Electricity Modeling System (POEMS) integrates the Energy Information Administration's (EIA) National Energy Modeling System (NEMS) with a detailed electricity market model Tradelec TM , developed by OnLocation, Inc. The model was designed specifically to analyze competitive electricity markets and the transition from regulated markets. The core of the Tradelec TM model is market-driven electricity dispatch and trade among 69 power centers representing the country's power control areas.

POEMS has been used by the Department of Energy for several studies. Most recently it was used to analyze wholesale trade and congestion in the National Transmission Grid Study, and was also used to support DOE's analysis of the Comprehensive Electricity Competition Act proposed by the Clinton Administration. For various participants in electricity markets, POEMS has been used to assess regional markets, forecasting electricity prices, supply, and demand under alternative economic and fuel price scenarios. The model has also been used to assess the impact of alternative environmental policies on utility industry capital turnover and inter-fuel substitution.

Analytical Objectives

The review and assessment of the EPA modeling analysis, conducted for the Edison Electric Institute by the EOP Group, Inc., identified many issues with the assumptions used in the setup and operation of the IPM model used by EPA. A complete reanalysis of the IPM modeling was beyond the scope of this study, in part because much of the data used in its analysis was classified as confidential business information and the fact that the IPM is a proprietary model that EEI would need to purchase to use. The principal analytical objective of the POEMS analysis was to test several key assumptions used in the EPA IPM modeling analysis in order to better understand the sensitivity of EPA's estimates of electricity market impacts the scope of this effort was limited — it is not intended to be a complete market reassessment.

The POEMS analysis was based upon three modeling scenarios the description and principal analytical objectives for each scenario is summarized as follows

1. A Reference Case absent the EPA rule, that incorporated more recent electricity market information and projections than were used in the EPA IPM base case,

2. An Impingement and Entrainment (I&E) Case that represents the EPA's preferred option for establishing performance standards for the reduction of impingement mortality. This modeling scenario examined the general sensitivity of EPA cost estimates for I&E controls, using the updated reference case market assumptions. This scenario did not examine the market impacts resulting from site specific compliance issues,

3. A Limited Cooling Towers Case that represents EPA's waterbody/capacity-based option one where roughly 50 plants are required to install wet recirculating cooling towers. This scenario examined the market impacts of different assumptions for the cost of cooling towers and the seasonal energy penalties, using the updated reference case market assumptions. This scenario did not attempt to examine the different compliance patterns based on site specific factors. In addition, it was not feasible in this scenario to explore all of the factors that would affect compliance costs, such as different compliance schedules and additional site specific variances in cooling tower retrofit costs.

All three POEMS modeling scenarios assumed that the wholesale electricity markets were fully deregulated. In addition, all scenarios incorporated the estimated impacts of the EPA NOx SIP call, but not the impacts of the Administration's proposed Clear Skies Initiative. These assumptions were chosen in order to provide comparability to the EPA IPM modeling analysis which were based on similar assumptions. These two factors could significantly affect the modeling results and should be examined further in any follow-up analysis.

-In a fully competitive market, the ability of generators to pass through costs to consumers is affected by market forces rather than cost-of-service pricing rules. To the extent that markets are cost-of-service regulated, subject to price caps, or allow for the exercise of market power, the impact of costs incurred for cooling water compliance would affect consumer prices differently.

-The combined cost of compliance with air and water quality requirements could be the critical factor in determining whether certain facilities will be prematurely retired in the future. Many of the facilities significantly impacted by the Clear Skies initiative also will be affected by the proposed new 316(b) guidelines in a manner that may not be identified though a modeling analysis of 316(b) alone.

A detailed description of each modeling scenario, including key assumptions, is appended to this report. Also appended are charts that compare the POEMS assumptions with the EPA IPM assumptions, showing which assumptions were retained and which were modified in the POEMS modeling analysis.

In summary, the principal analytical objective of the POEMS analysis was to test several key assumptions used in the EPA IPM modeling in order to better understand the sensitivity of EPA's estimates of electricity market impacts. This was done by varying the input of several key assumptions, as well as using updated reference economic conditions. The most significant differences were more appropriate data for cooling tower retrofit costs and energy penalty data more accurately reflect real world seasonal variability. However, not all of the issues regarding EPA assumptions raised in Appendix 2 were addressed in the POEMS modeling. The result illustrates the sensitivity that modifying a few of the variables with more appropriate data can have on the model output (impacts on electricity markets). If all the potential shortcomings of the original EPA study were rectified, an even more accurate (and presumable larger) impact on electricity markets would result. This is a critical finding that at least one of the proposed regulatory options (Option 1-waterbody/ capacity-based option), if analyzed more accurately, would likely lead to more significant impacts on electric markets than those identified in the EPA study.

Results from the I&E Modeling Scenario

The modeling results from the I&E Scenario showed that the combination of sensitivities in the costs of I&E controls with updated electricity market projections did have any significant adverse impacts on wholesale electricity market consumers relative to the updated reference case. Producers incur significant compliance costs but these are not passed through to consumers in a competitive market. Instead the compliance costs were borne largely by producers as a reduction in net income. In summary:

-The costs of the I&E technologies, as estimated by EPA, were not large enough to cause additional plant retirements above the Reference Case due to the adoption of the EPA preferred option.

-The changes in wholesale electricity prices were very small (less than 0.1%) and within the "noise level" of the model.

-The total additional costs to producers was estimated at $833 million of equipment investments plus increased O&M costs of $62 million per year, while the net additional cost to consumers was estimated to be negligible. The producer costs are less than the original input costs because of the plant retirements occurring in the Reference Case.

However, as described earlier, the results did not consider possible additional costs due to site specific factors, such as failure of the EPA assumed compliance technologies to meet the proposed performance standards.

An additional sensitivity case was run where it was assumed that all facilities incur costs for installation of I&E equipment near the high end of the range assumed by EPA. The sensitivity analysis showed that some NERC regions would experience a price increase of $0.1/mwh (or 0.2% increase) relative to the reference case. In the sensitivity case, the total cost to consumers would increase by less than $100 million per year.

Further sensitivity analysis could show larger impacts from three possible factors: (1) higher variable O&M cost assumptions would lead to higher wholesale prices, (2) continuation of cost-of-service regulations in certain regions would likely result in higher pass-throughs of costs to consumers, and (3) consideration of the combined impact of 316(b) requirements and new clean air compliance costs likely would result in some premature facility retirements.

Table 5 shows a comparison of the major assumptions used in the EPA IPM modeling analysis of the EPA preferred option relative to the assumptions used in the POEMS analysis. The comparison shows that there are several additional EPA assumptions that were unchanged in the POEMS model that could be subject to further analysis.

Results of the Limited Cooling Towers Modeling Scenario

The modeling results showed that changes in the assumptions of cooling towers costs and consideration of a seasonal energy penalty, combined with updated market projections, resulted in adverse effects on generation capacity, wholesale electricity prices and reserve margins. Both electricity generators and electricity consumers experienced significant additional costs. These impacts are discussed individually in the following parts:

Facility Closures: The model results showed that 18 GW of capacity (of the 64 GW subject to cooling tower requirements) would retire prior to the assumed compliance date for installation of cooling towers. Of the 18 GW, 13.1 GW were marginal facilities that close even in the absence of new 316(b) requirements. The capacity reductions from closures are mitigated by increased additions of new capacity, and by 2015 the industry will need to build roughly 2 percent more capacity than in the Base Case. Table 1 shows the breakdown of plant closures by region and by fuel type. This result is somewhat different from the EPA modeling analysis, which showed 3010 MW of primarily nuclear facility closures due to the installation of cooling towers. Table 2 provides context of capacity projections for the U S as a whole.

Table 1. Facility Retiremments
[see hard copy for table]

Table 2. Total U.S. Summer Rated Capacity (GW)

[see hard copy for table]

Energy Penalties: The modeling analysis incorporated seasonally-adjusted energy penalty estimates, with peak summer penalties ranging from 2.08% to 3.53% depending upon region and fuel type. The model analyzed the combined effect of the energy penalties, facility closures, facility outages for the cooling tower installations, and additional capacity construction in projecting available generation capacity. As an example, Chart 1 shows graphically the net change in available generating capacity in the New England region. For this region, 2010 is the year of the most cooling tower installations when 3405 MW of nameplate capacity is converted. The loss of this capacity in April and May (the assumed outage months) leads to a rescheduling of maintenance for other plants, but available capacity is still reduced by 760 MW for the two months. Peak demand is highest in the winter months, so the maintenance rescheduling primarily affects the summer and fall seasons. The post-retrofit capacity deration is roughly 100 MW.

Available Capacity - New England
[see hard copy for figure]

System Reliability: The reductions in net available generation capacity directly reduce reserve margins, adversely affecting system reliability. The reductions in reserve margins vary by region, by year and by season of the year. Reserve margins are reduced by up to 5.9 percentage points (12.5 versus 18.4), which could have an adverse impact on reliability. The greatest reductions occur in April/May (the assumed outage months) in the years when the towers are installed. Table 3 shows the complete result of estimated changes in reserve margins by region, by year, and by season. The shaded numbers are those with greater than a 1 percentage point drop in reserve margins.

Table 3. Percent Point Change in Reserve Margin (After Maintenance)
[see hard copy for table]

Wholesale Electric Prices: The modeling results show higher wholesale electricity prices, with significant variation by region and by season of the year. The seasons and the years in which the cooling tower retrofits occur show larger price increases because there is less capacity available. Wholesale price increases are up to $1.4 per MWh, mainly in the Western regions of NWP, RA and CNV regions. Table 4 shows a complete breakdown of estimated wholesale prices by region and by season, for three years – 2008, 2010 and 2013. The shaded prices are those that increased in the Towers Case. The modeling results show that prices also are increased in regions that do not have cooling tower retrofits due to electricity trading. In addition, the modeling results show that wholesale electricity prices decline in certain areas, due to the replacement of higher cost steam units with more efficient combined cycle plants.

Total Costs to Consumers and Producers: Consumers will incur roughly $2 billion dollars of higher electricity costs due to higher wholesale electricity prices for the period 2005 to 2015 (in constant 2002$). Electricity generators will incur higher net costs resulting from compliance costs that are not fully reflected in higher prices. These costs include $5.4 billion to install the cooling towers, and $26 billion in additional O&M costs plus $1.2 billion in additional fuel costs over the 10 year period. In addition, the industry will spend $62 billion more to build new generation facilities to replace retired and the derated units.

Table 4: Wholesale Electricity Prices by Region and Season in 2002 Dollars per Megawatt-hour
[see hard copy for table]

Sensitivity Analysis: There are 5 factors that could result in higher estimates than were obtained through the modeling analysis: (1) higher variable O&M cost assumptions would lead to higher wholesale prices; (2) longer down times for equipment installation would reduce net generation capacity and increase princes; (3) a more compressed schedule for installation of cooling towers would increase price effects; (4) continuation of cost-of-service regulation in certain regions would likely result in higher pass-throughs of costs to consumer; and, (5) consideration of the combined impact of 316(b) requirements and new clean air compliance costs likely would result in additional plant retirements.

Table 6 shows a comparison of the principal assumptions used in both the EPA IPM and POEMS modeling analysis of the waterbody/capacity-based option. The comparison highlights the areas where different assumptions were used in the POEMS analysis. The comparison also indicates where certain EPA assumptions were used without change in the POEMS modeling analysis. Additional modeling work could be addressed to some of the other issues in the EPA assumptions that were beyond the scope of the initial POEMS analysis.

Table 5: Comparison of 316(b) Assumptions. Case: EPA Preferred Option
[see hard copy for table]

Table 6: Comparison of 316(b) Assumptions. Case: EPA Waterbody/Capacity-Based Option
[see hard copy for table]

Appendix: Description of the Modeling Scenarios

POEMS Reference Case

The POEMS Reference Case for this analysis is based largely on the current Annual Energy Outlook (AEO2002) projections prepared by the Energy Information Administration. The greatest differences between assumptions in this case and the IPM EPA Base Case 2000 are in fuel prices and electricity demands. In general, the AEO2002 fuel prices are higher than those used in the EPA Base Case that was developed a year or more ago. All else equal, higher fuel prices will lead to higher projected electricity prices and higher penalty costs associated with the 316(b) rulemaking, e.g., heat rate penalties.

Electricity demand, expressed in terms of generation, in the POEMS Reference Case is significantly higher than in EPA's (IPM does not include retail sales, so a comparison of sales cannot be made). EPA derived their projections by taking AEO2001 generation levels and subtracting their estimates of the energy efficiency savings expected from the Climate Change Action Plan programs. The POEMS demand and generation are essentially the same as those in the AEO2002. Note that the POEMS generation in the tables below include large non-utilities and cogenerators as well as utilities.

Input fuel prices and electricity demands were held fixed between the POEMS scenarios, so that focus would remain on impact of the cooling water policies rather than small perturbations caused by energy sector price feedback.

The POEMS Reference Case is initialized with capacity additions that are currently under construction and expected to be on-line by the end of 2002. The May 2001 RDI NEWGen database was used to identify these planned additions between 2000 and 2002. The model then forecasts additional new capacity as necessary. The EPA Base Case is older and therefore does not contain the full wave of new additions that has occurred in the last few years. The addition of significant amounts of new capacity in some regions will increase the propensity for retirements of existing plants.

Wholesale electricity markets are assumed to be fully competitive, with marginal costs determining the generation price. This was also assumed in EPA's analysis. To the extent that markets are cost-of-service regulated,. subject to price caps, or allow for the exercise of market. power, the impact of costs incurred for cooling water compliance would affect consumer prices differently.

Comparison of Baseline Assumptions
[see hard copy for table]

I&E Case

Capital Costs for I&E Technologies

The data provided by EPA for the compliance CWIS technology modification costs varies considerably by plant. The capital costs range from $0 where no modification is necessary (roughly one third of the facilities) to $22 million, with one outlier at $45 million. Because these plants are not identified in the EPA file, and matching these to the EIA-767 data is virtually impossible, an average cost for all steam plants was used. In computing the average, the plants with zero costs were excluded.

The EPA total capital cost for all 539 plants equals $963 million. These 539 represent the 550 facilities, totaling 416 GW of capacity, that are potentially subject to the Phase II rule, with an average plant size of 756 MW (416/550). Assuming that the plants with compliance costs are on average the same size as the rest of the plants, the capacity with non-zero costs represents 260 GW. Spreading the $963 million cost over 260 GW yields an average cost of $3.7/kW or $2.8 million per plant. The capital cost was converted to an annuity, using a capital charge rate of 0.20. The amortized value of $0.75/kW-year is added to the capital addition cost for each steam plant within POEMS.

Averaging the costs leads to an overstatement of cost for plants that would not have to comply, while understating the cost for plants that would have to install the most expensive I&E measures. A sensitivity case was performed to test the impact of the most expensive possibility. If the cost of $22 million for compliance was at a plant of 1000 MW, then the cost would be $22/kW or $4.4/kW-year.

Additional O&M costs

The O&M costs provided by EPA total $27.7 million. These costs are assumed to be incurred by 260 GW of capacity for an average cost of $0.106/kW-year. In POEMS it was assumed that half of these costs would be considered variable and would be added to the marginal costs for determining unit bids and market prices. In addition, each facility is assumed to have a monitoring cost of $75,000 or $90,000, with the total across all facilities of $42.4 million. These costs of $0.104/kW-year are assumed to be fixed and have no direct influence on market prices A parallel worst-case scenario for O&M costs would be $580,000 per year for a 1000 MW plant, or $0.58IkW-year.

Compliance Schedule

All I&E retrofits were installed in 2008.

Limited Cooling Towers Case

All plants except those that must install cooling towers have the same I&E costs as in the I&E Case.

Selection of plants subject to cooling towers

The EIA-767 year 2000 data was used to determine plants using once through saltwater cooling and with design intakes greater than 500 million gallons per day (MGD). Then a second criteria was applied that the plants (sum of all units) have a greater than 15 percent average capacity factor for the years 1995 to 2000. This yields a total of 50 plants with a capacity equal to 62.9 GW. In aggregate this is very similar to EPA's 54 total and 62.5 GW of capacity that they coasted with cooling towers. However, as shown in the tables below, the two sets of plants are not identical. The 767 extract contains less coal capacity, more oil/gas/other steam, and the geographic distribution of nuclear plants is not the same. An inspection of the nuclear plants suggests that in some cases the 767 data lists a plant as using fresh water, whereas it may have an estuary water source. A few additional plants were identified.

Another likely difference is how capacity is aggregated by plant type. In our tabulation each unit of capacity is listed under its fuel type. The EPA table appears to have been prepared with all of the plant capacity listed under one fuel type. This makes some difference although not very significant because only a subset of the selected plants have multiple fuels at one site. Finally, our simplified criteria of design flow greater than 500 MGD may contribute to the difference from EPA.

Capital costs for cooling towers

The cooling tower capital costs for the individual units at the 51 plants were taken directly from Shaw/Stone & Webster. <FN 1> A few units did not have costs in the Shaw list and were identified in the EIA 767 as using once-through cooling. Excluding any combustion turbine units, the same cost per kW was assigned to the missing unit as a similar size unit for the plant that included.

The Shaw costs were provided in a spreadsheet in millions of 2002 dollars. Each of the capital costs was converted to an annuity, using a capital charge rate of 0.15. This was divided by the plant capacity to create a POEMS model input of additional annual capital additions in $/kW, resulting in a range of $8/kW to $45/kW per year.

Candidates for Cooling Tower Retrofits Under the Water-body/Capacity-based Option
[see hard copy for table]

Additional O&M costs

The Shaw/Stone & Webster report estimates O&M costs to be $12 million for mechanical draft towers. Excluding the cost associated with the plant deration, because this is directly represented in POEMS as heat rate and capacity penalties, the net cost is roughly $6.6 million per year. This cost was for a 1100 MW plant, and Shaw advised that the costs could be scaled linearly. A cost of $6.0/kW-year was applied to the O&M of each unit. As with the O&M costs for the I&E equipment, half of this cost was assumed to be treated as variable and half as fixed.

Energy penalties

The EPA data and equations <FN 2> were used to create monthly energy penalties associated with the turbine backpressure penalty due to cooling towers relative to once through cooling. The auxiliary power losses computed by the Shaw report were added, and the totals were combined for the POEMS 2-month seasons. The POEMS seasonal heat rates and net output capacities were adjusted with the seasonal factors shown in the table below, with the exception that the capacity for summer season of July and August was adjusted by the maximum turbine penalties reported by EPA plus the Shaw auxiliary power penalty. The maximum penalties were used for the summer capacity derations, because the peak demand is likely to occur at the time of greatest deration because both are temperature related.

Energy Penalties (Percent Loss of Capacity)

	Nuclear				Fossil			
	Northeast	South	Midwest	West	Northeast	South	Midwest	West
Jan, Feb	1.43%	2.49%	1.39%	1.53%	1.63%	2.39%	1.59%	1.62%
Dec, Mar	1 60%	2 58%	1.60%	1 56%	1.76%	2.44%	1.78%	1.64%
April, May	2.10%	2.46%	2.60%	1.84%	2.10%	2.28%	2.76%	1.89%
June, Sep	2 70%	2 06%	2 78%	2 06%	2.52%	1.94%	2.65%	2.04%
July, Aug	2.75%	2.01%	3.23%	2.19%	2.55%	1.89%	2.99%	2.14%
Oct, Nov	1.91%	2.47%	1.73%	1.67%	1.90%	2.29%	1.72%	1.69%
Reported Max	3.32%	2.22%	3.53%	2.60%	3.04%	2.08%	3.23%	2.50%

Compliance Schedule

The compliance schedule used in the POEMS modeling follows that used by EPA as much as possible. The first installations are assumed to occur in the second year of the first permit cycle, even though facilities will have until the end of the cycle to comply Each plant/unit that was assumed to have a cooling tower added was also assumed to be out-of-service in the retrofit year for an additional two months (i.e., two months in addition to their normal annual maintenance). April and May were selected as the likely months for the outages because demand is generally low during this period.

Tower Candidate Plants by Compliance Year (Nameplate MW)

[see hard copy for table]

Footnotes

1 Spreadsheet of data from Attachment 2 of Shaw/Stone & Webster's report: Engineering Cost Estimate for Retrofiting Closed-Cycle Cooling Systems at Existing Facilities, July 2002. Note: the data in this report is proprietary and confidential.

2 From EPA's Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule, Chapter

5.

EPA Response

See response in file "Comment Response 316bEFR.72.101.wpd", DCN# 6-4001.

Comment ID 316bEFR.072.201

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.0
Costs

EOP GROUP ASSESSMENT OF EPA'S ECONOMIC & BENEFITS ANALYSIS

A CRITICAL ASSESSMENT OF THE EPA ECONOMIC AND BENEFITS ANALYSIS FOR THE § 316(b) PHASE II PROPOSED RULE

Prepared for: Edison Electric Institute

Prepared by: The EOP Group, Inc. Washington, D.C.

August 2002

EXECUTIVE SUMMARY

This paper presents the results of a comprehensive assessment performed by the EOP Group for the Edison Electric Institute of EPA's Economic and Benefits Analysis supporting the Proposed 316(b) Rule for Phase II Existing Facilities (67 Fed Reg. 17, 121-225). This assessment:

-Summarizes and critiques the EPA estimates of costs and benefits for both the EPA preferred option and the Waterbody/Capacity-Based Option;
-Analyzes both methodological issues and specific technical and economic assumptions used in the EPA analysis; and,
-Discusses specific recommendations for modifying the analysis.

The conclusion of this assessment is that the EPA analysis overestimated the benefits of reducing impingement mortality and entrainment and underestimated many of the costs of compliance with the proposed requirements In addition, the EPA analysis did not adequately address the impacts to electricity generators and electricity consumers A summary of the major issues identified by the EOP Group with, the EPA analysis is presented in Tables 1, 2 and 3. If EPA fully responds to the issues and recommendations in this paper, a re-analysis will show that the waterbody/capacity-based option will have net negative benefits, and that the preferred option will have near zero net benefits.

[see hard copy for table]
Table 1. Summary Assessment of EPA Preferred Option (Option 3)

[see hard copy for table]
Table 2: Summary Assessment of Waterbody/Capacity-Based Option (Option 1: All Track I)

[see hard copy for table]
Table 3. Summary Assessment of Impact Analysis

Footnotes

1 EPA used information obtained through EIA form 860A (Annual Electric Generator Report-Utilities) and EIA form 860B (Annual Electric Generator Report-Non-utilities). EPA used the data from 1999, as more recent data was not available as of March 2002.

2 It should be noted that only the estimates for the Gulf Coast and Great Lakes facilities can be recreated using EPA's stated methodology based on the information contained in Part C of the EBA.

3 For some facilities multiple estimates were generated based on different methodologies. This column identifies the study type that is primarily responsible for the baseline loss estimate. The study types are Random Utility Model ("RUM"), Habitat Replacement Cost ("HRC"), and Societal Revealed Preference ("SRP").

4 For the Brayton Point and Monroe studies, HRC was used to define the upper bound loss estimate. The "best" estimate was calculated by averaging the upper and lower bounds. In each of these case studies the upper bound exceeded the lower bound by at least two orders of magnitude heavily influencing the "best" estimate.

5 The "best" estimates for JR Whiting, Pilgrim, and Seabrook are based exclusively on the HRC methodology.

6 Panayotou, Theodore, Basic Concepts and Common Valuation Errors in Cost-Benefit Analysis, at http://www.eepsea.org/publications/specialp2/ACF2DB.html

EPA Response

See responses to comments 316b.EFR.072.202 through 316b.EFR.072.210 for responses to the body of the report.

Comment ID 316bEFR.072.202

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.0
Costs

ASSESSMENT OF THE EPA COST ESTIMATES

I. THE NUMBER OF IN-SCOPE FACILITIES MAY BE UNDERESTIMATED

A. Description of EPA Methodology

EPA's economic analysis relies upon correctly identifying the universe of in-scope facilities that would be affected by the rule. EPA's analytical approach may not have captured all of the covered facilities. If the universe of in-scope facilities is larger than EPA's estimate, then the total cost of the rule is commensurately larger than projected by the current economic analysis.

EPA used information collected by the Energy Information Agency ("EIA") to determine which plants (both utility and non-utility) had non-retired units using steam as a prime driver <FN 1>. EPA then obtained additional information on these plants through a two-tier questionnaire.

-The Detailed Industry Questionnaire (DQ) — gathered detailed information from a sample of the in-scope populations; and,

-The Short Technical Industry Questionnaire (STQ) — gathered less-specific information from a larger number of facilities.

The DQs and STQs provided to the utilities differed from those provided to the non-utilities in order to capture as. much facility-specific information as possible. The sampling designs differ between the utilities and non-utilities.

Initial Screening of Potential In-Scope Facilities: Working from a national inventory of electric generating facilities, EPA determined the subset of facilities that would receive the DQ.
-EPA estimated that 934 traditional generating facilities existed nationwide, based upon the 1999 Form EIA-767 database.
-56 of the 934 facilities were non-industrial non-utility power producers that had been misclassified – these were added to the non-utility sampling frame instead.
-241 were eliminated from the group of potential facilities eligible to receive the DQ because EPA believed that those facilities were unlikely to be in-scope due to either:
--The cooling water intake flow data was missing or zero; or
--The designation of cooling water source was either municipal or well water (which are not subject to 316(b) requirements) or missing.

The total sampling frame (total population from which the sample for the DQ survey could be drawn) consisted of 637 potentially in-scope facilities. A stratified sample of 282 received the DQ survey. The sample frame was first stratified using publicly available data based upon:
-Size (large and small)
-Receiving waterbody type (river, lake, marine/estuarine)

-Cooling-type system (closed cycle, once through, other)

This resulted in ten primary strata. The number of facilities sampled for each of the primary stratum is equal to the percent of the sampling frame in each stratum (except for the smallest stratum, which was over-sampled to prevent misrepresentation). The sampling frame was then further stratified based upon cooling water flow estimates to achieve a representative sample, yielding 26 strata. Each stratum was systematically sampled to represent NERC regions using a random sample.. Facilities in the sampling frame not selected for the detailed questionnaire received the STQ. EPA sent out a total of 282 DQs and 590 STQ5 to utility-owned generating facilities.

Sample Weights: The purpose of the surveys is to create estimates for the entire population of facilities nationwide. To achieve this goal, the sample must be weighted to account for sample size within each stratum and the non-response rate for each survey.

The DQ survey may be used alone to create nationwide estimates, or the DQ and STQ surveys may be combined to construct national estimates. Each type of estimate requires a separate weight for accuracy. Survey estimates produced from the combined DQ and STQ survey responses would be more efficient (same mean, smaller variance due to the larger sample).

Use of the Survey Information: The information obtained in the DQ and STQ was used to determine which plants would be covered by the rule, what compliance responses would be required at each facility, and what the costs of compliance would be for any regulatory option.

Discussion of Issues

1. The Small Sample Size may not have yielded Statistically Significant National Estimates

The relatively small number of facilities (282), divided into 26 strata in the DQ process, raises statistical issues regarding the Agency’s ability to generalize from this information. This could call into question the Agency’s ability to generalize from this information. However, it appears that the only information that was extrapolated from the 282 DQ facilities to those facilities covered by the STQ was design intake flow. As a result, the estimate of the engineering compliance costs for STQ facilities, which are based on design flow, may be biased. It may be appropriate to rely on the extrapolated values only if these biases are not systematic. However, this is not known.

2. The Initial Exclusion of Facilities Not Reporting CWIS information to EIA from the Surveys may have biased the Final National Estimates and Underestimated Costs

EPA excluded 241 facilities from the population from which it drew its stratified random sample. Based on information from EIA databases, EPA excluded facilities for which cooling water intake flow information was missing or zero and facilities for which the source water was missing or reported as municipal or well water. Exclusion of these facilities from further consideration in the EPA survey process leads potentially to an underestimate of the number of in-scope facilities.

There is no basis for assuming that facilities with a reported intake flow of zero, or no reported intake flow, are not subject to the rule. Facilities that did not report this data to EIA may still be covered by the requirements of the rule. However, since these facilities did receive STQs, it is possible that some of these omissions were corrected in the final EPA database. Even if these facilities were identified in the STQ response, they could still bias the final database if they were systemically different from facilities included in the DQ sample frame.

3. EPA did not use the best available data on cooling intake design flows.

Finally, EPA may have introduced errors in the design flow values in its database by not using the best available data. Rather than using the reported values for design flow in the EIA database, EPA estimated design flow based on the relationship between design flow and actual flow contained in the responses to the DQ survey. Since the design flow estimates are used as the basis for estimating compliance costs, these EPA cost estimates would be affected. It is not known whether the EPA approach would have underestimated or overestimated the cooling water design flows.

C. Recommendations for Re-Analysis

1. EPA should check the STQ responses from the facilities excluded based on a lack of EIA data against the assumption that these facilities will not be covered by the rule. The exclusion of facilities could have led to underestimates of costs, particularly in those cases where the missing facilities are from a subpopulation that is particularly sensitive to the costs of compliance.

2. EPA should compare the results of its approach to estimating cooling intake design flows to the actual design flows reported in the EIA 767 database.

EPA Response

The Agency has considered the points raised in the comment and has met the conclusory recommendations of the commenter regarding re-analysis of flow data.

Regarding Discussion of issues, #1:
The Agency notes that 282 is not a small sample size, and division into 26 strata is expected to increase rather than decrease precision. The commenter suggests that bias may arise but provides no evidence, reasoning or data to support the claim.

Regarding "excluded" under Discussion of Issues, #1 & #2, and Recommendations for Re-Analysis, #1

EPA did not exclude any facilities from its final database. All facilities were surveyed with either a detailed questionnaire or a short technical questionnaire. All facilities either reported a design intake flow or the design flow was estimated as described in the record. All reported design flows, and all estimated design flows, were reviewed for consistency with other relevant data. Costs were estimated for all facilities responding to questionnaires (i.e. for those responding to either form of questionnaire, detailed and short technical). The commenter presents no reasoning or data to support the notion of a bias.

Regarding Recommendations for Re-Analysis, 2:
All reported design flows, and all estimated design flows, were reviewed for consistency with other

relevant data. Design flows reported in the survey were certified as correct by the respondent.

The Agency compared the results of its approach to estimating design intake flows for short-technical questionnaire facilities to the design intake flows in the EIA 767 data base. The Agency found that its design intake flows generally exceed those found in the EIA 767 data base (at a facility level) by a median of 25 percent. For short-technical questionnaire facilities within the scope of the final rule, the median ratio of EPA design flow to EIA design flow is 1.35. These facts contradict the commenter's assertion that the methodology used by the Agency for estimating design intake flows for short-technical questionnaire facilities would potentially underestimate design flows (and therefore costs). In addition, the Agency notes that the EIA database lacks flow data on 33 facilities that EPA found had reported a median actual annual intake flow of 48 MGD in the short-technical questionnaire (i.e., their design intake flows would be appreciably above 50 MGD, and therefore within the scope of the rule). This brings into question the validity of the commenter's assertion that the Agency has potentially overlooked in-scope facilities in its short-technical questionnaire.

The Agency compared the design intakes reported through the Detailed Questionnaire to EIA 767 data. This comparison shows that the flows reported to EPA for design intake flow generally exceed those reported to EIA 767 by 2 percent. The median ratio of facility-level EPA design flow to EIA design flow for detailed questionnaire facilities is 1.02. In addition, the Agency notes that the EIA database lacks flow data on 30 facilities that reported to EPA a median design intake flow of 96 MGD (and a median actual annual intake flow of 46 MGD) in the detailed questionnaire. This further brings into question the validity of the commenter's assertion that the Agency has potentially overlooked in-scope facilities in its data collection.

The Agency also compared the EPA and EIA design intake flows for all facilities within the scope of the rule. This comparison shows that the flows used by EPA for design intake flow generally exceed those reported to EIA 767 by 10 percent. The median ratio of facility-level EPA design flow to EIA design flow for detailed questionnaire facilities is 1.12.

The Agency notes that of the facilities that it determined are within the scope of the rule due to the flow threshold (i.e., their design intake flows were above 50 MGD in the EPA database), the EIA data predicts 18 facilities to have design intakes below the threshold. Therefore, had the Agency relied on the incomplete EIA 767 flow data, it would also have under-predicted the number of facilities within the scope of the rule by 18. Therefore, the concerns of the commenter that the Agency would be underestimating the number of facilities within the scope of the rule are again not supported, since the Agency's reliance on data reported in the 316(b) survey has both identified 18 facilities not above the threshold according to EIA 767, but further identified 63 facilities for the in-scope database missing flow data in EIA 767.

Comment ID 316bEFR.072.203

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.0
Costs

THE ESTIMATED ENGINEERING COMPLIANCE COSTS FOR THE PREFERRED OPTION ARE UNDERESTIMATED

A. Description of EPA Methodology

EPA developed costs for three compliance technologies:
1. Traveling screens with fish handling systems.
2. Traveling screens without fish handling systems.
3. Fine mesh screens.

Costs for each facility were estimated based on the installation of one or more of the technologies above depending upon the regulatory option being evaluated and the technologies already in place at the facility.

EPA used vendor estimates of capital costs for new facilities (the same estimates found in The Technical Development Document for the Final Regulations addressing Cooling Water Intake Structures for New Facilities) as the base capital costs of each control technology. The Agency then accounted for the costs of construction, retrofitting, and location (by State, but not by waterbody). EPA's estimate of a utility's total capital/construction cost, therefore, is the result of the following equation:

Total Capital/Construction Cost = (Estimated Total Capital Costs) x (Construction Factor) x (Retrofit Inflator) x (State Specific Capital Cost Factor)

Where:
-Estimated Total Capital Cost = (Vendor Estimate) x (Contingency Factor), and is based on vendor information reflecting the cost of the specified technology at a new facility.
-Construction Factor represents the increases in cost necessary to modify an existing CWIS to accept the specified technology.
-Retrofit Inflation Factor represents the additional cost associated with a retrofit to an existing facility.
-State Specific Capital Cost Factor adjusts for regional differences in construction costs.

Facility-level cost estimates for each compliance option: EPA assumes that any facility selecting the appropriate compliance suite will fall into the compliance ranges required by the proposed rule. The cost analysis, therefore, is based upon a series of compliance option tables that provide the input for the "Estimated Total Capital Costs" variable for the cost equation shown earlier. A facility owner should be able to calculate the total capital and construction costs by taking the appropriate value from one of the tables and inserting it into the above equation. For example, a facility projected to install or upgrade impingement control or survival technologies by including a fish handling and return system would use the applicable value from Table 2-11 in the Technical Development Document:

[see hard copy for table]

Generalized average compliance costs: EPA reviewed the list of in-scope facilities and made certain assumptions regarding the applications of a compliance technology at each facility. EPA then developed an estimate of compliance costs, by facility, in three cost categories: capital costs, annual O&M costs and annual monitoring costs.

B. Discussion of Issues

1. The EPA compliance cost estimates make no allowance for site specific factors.

The EPA lists of facilities and estimated compliance costs does not provide specific information on geographical location, so it is not possible to determine how the assumed compliance technologies are related to specific locations. In addition, the data do not provide any information to determine how differences in fuel sources and site specific factors such as geometry of the intake, were considered in estimating costs.

The EPA cost data were analyzed by performing a statistical regression analysis on the 344 facilities (out of 550 total in-scope facilities) for which EPA provided facility-level cost data. The regression analysis showed that costs were almost entirely correlated to design flow, which would further confirm that site-specific factors were not considered in the cost estimates. The results of the regression analysis are summarized in the following cost curves.

Impingement Controls Only (fish handling and return system)
Capital Cost = 84191 + 1.78678 (design intake flow)
Sample Size = 155 plants
R^2 = 0.97124695

Entrainment Controls Only (Fine mesh traveling screens)
Capital Cost =0.331142 + 7.403304 (design intake flow)
Sample Size = 58 plants
R2 =0 96216887

Impingement and Entrainment Controls
Capital Cost = 8974905 + 8.203129 (design intake flow)
Sample Size = 131 plants
R2=0.9825143

The review of the EPA facility level cost data raises an additional issue, namely the number of facilities that were included in the EPA cost estimate. The EPA discussion of cost and benefits stated that 470 facilities would be required to install either impingement controls only or combined impingement and entrainment controls. However, the facility level cost data only includes 344 facilities, raising a question as to whether all impacted facilities were included in the national cost estimate. The comparison of facilities is discussed in more detail in the discussion of the integrated planning model later in this report.

2. The assumed compliance technologies may not meet the proposed performance standards, thereby

underestimating compliance costs.

EPA assumes that if a given facility adopts the suite of compliance options modeled by the Agency then that facility will achieve the performance levels specified in the proposed rule. There may be site-specific cases where the compliance technologies assumed by EPA may not achieve the proposed performance standards. These facilities, therefore, may not be in compliance with the regulation even if they install one of the technologies considered by the Agency in the proposal. The problem will be exacerbated if the Agency mandates that facilities achieve the maximum values within the required compliance ranges (i.e., 95% reductions in impingement mortality, 90% reductions in entrainment). Other provisions of the proposed rules, such as the cost-cost and cost-benefit tests, and other measures such as trading and environmental enhancements, could help to mitigate the potential for higher costs, but the impact of these measures is uncertain.

C. Recommendations for Re-Analysis

1. EPA should review the database of the compliance cost estimates for each facility to ensure that the cost estimates include all 470 facilities that are assumed to have retrofit requirements.
2. EPA should review and compare the cost and benefit estimates to ensure that both sets of estimates are based on the same number of facility-level retrofits.
3. EPA should review and revise its cost estimation methodology to address site specific factors in addition to only design flow. In addition, EPA should retain and expand the language in the proposed rule regarding:

a) Site Specificity: At a minimum, EPA should retain the cost-cost test, the cost benefit test, and other flexible approaches such as trading and environmental enhancements, and clarify that these provisions may be used in site specific cases where the application of one of the technologies considered by the Agency in the proposal is not technically feasible at a site or will not meet the specified performance levels; and,

b) Presumptive remedy: The language in the proposed rule should provide for a presumption of compliance with the regulatory requirements in the event that a facility either:

-Installs one of the technology suites evaluated by EPA; or
-Installs alternative technologies, engages in habitat restoration, or undertakes a combination of both that produce reductions in impingement and entrainment commensurate with the approved technologies.

In either case, facilities would have the responsibility to demonstrate that they have both installed and operated the compliance technologies correctly. This change, combined with the existing options found at 125.94(a) (3) of the proposed rule, will significantly reduce uncertainty, transaction costs, and costs of the rule without reducing the benefits estimated by EPA.

EPA Response

First the Agency notes that it revised and expanded the set of technologies upon which the costs of the preferred option were based for the NODA (68 FR 13526). The overall national technology upgrade costs of the preferred option increased appreciably for the NODA. In addition, the Agency incorporated construction downtime outages into the assessment of national costs for the technologies forming the basis of the preferred option. As a result, the primary basis of the comparison in the comment is no longer relevant to the costs of the final rule. Also, the commenter's "Description of EPA Methodology" is no longer relevant.

Regarding the assertion that the Agency's compliance costs estimates do not take into account site-specific factors, the Agency points out that it revised the majority of the bases for assessing technology upgrade costs so as to incorporate more site-specificity into its analysis for the final rule. The Agency believes that the methodology utilizing all available site-specific data and the wide range of technologies applied to model facilities has incorporated and accounted for site-specificity in the final rule cost estimates.

Regarding the assertion that the assumed compliance technologies may not meet the proposed performance standards, thereby underestimating compliance costs, the Agency again reiterates that it revised the majority of the basis of its cost estimates for the final rule. Also see response to comment 316b.EFR.306.039.

Regarding the recommendations for reanalysis, the Agency notes that it has adopted these recommendations for the final rule.

Regarding the recommendation of a "presumptive remedy," the Agency notes that the final rule has adopted a set of presumptive technologies and has allowed for Directors to expand the list of presumptive technologies. The final rule meets the recommendations under this category from the comment.

Comment ID 316bEFR.072.204

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.0
Costs

THE COSTS FOR COOLING TOWERS FOR THE WATERBODY/CAPACITY BASED OPTION ARE SIGNIFICANTLY UNDERESTIMATED

A. Description of EPA Methodology

The cost estimates for the waterbody / capacity based alternative were evaluated because EPA stated that this alternative is under consideration for the final rule in section B7- 1 of the Economic and Benefits Analysis: "While EPA is not proposing this option, EPA is considering it for the final rule."

The EPA based its cost estimates on the cooling tower costs developed for the final new facility 316(b) standards. The basic capital cost was derived from a "rule of thumb" cost per gpm obtained from vendors. This rule of thumb figure was modified to attempt to account for installation costs, construction material and splash fill. The Agency then translated this information into a cost equation from which one can calculate cooling tower cost based on flow. To account for the fact that the costs of retrofitting a cooling tower to an existing facility is likely to be greater than the cost of constructing a cooling tower at greenfield facility, the Agency applied a 20 percent adjustment factor to its cost estimates. For purposes of this analysis, the Agency assumed the use of mechanical draft redwood cooling towers with a ten degree Fahrenheit approach for non-nuclear facilities and a mechanical draft concrete cooling tower with a ten degree approach for nuclear facilities.

Capital Costs: For the non-nuclear facilities, the equation for an installed ("greenfield") redwood mechanical draft cooling tower with a 10 degree F design approach and splash fill is:

[see hard copy for equation]

For a nuclear facility needing a mechanical-draft concrete cooling tower system with splash fill:

Y=-6E-5 x^2+87.845 x 31674 (in1999 $)
where x = flow in gallons per minute valid up to 225,000 gpm

These equations represent the starting point for assessing the conversion project costs. The costs are then adjusted by:
-The regional cost factor (same as for the proposed option)
-A 20 percent retrofit factor
-Additional adjustments for makeup and discharge piping.

EPA reported that it tested the conclusions of its estimation equation against actual cooling tower construction projects. However, the details of the comparison were not included in the documentation.

Operation and Maintenance Costs: The O&M cost equation for an installed ("greenfield") redwood mechanical-draft cooling tower with a 10 degree F design approach and splash fill is:

y = -4E-6 x ^2 ÷ 11.617 +2055.2 (in l999 $ for with Splash Fill)
where x = flow in gallons per minute valid up to 225,000 gpm

For a nuclear facility with a mechanical-draft concrete cooling tower system and splash fill, O&M costs are calculated with the following:

y -3E-6 x^2 + 10.305 x + 1837.2 (in 1999 $ for Concrete with Splash Fill)
where x = flow in gallons per minute, valid up to 225,000 gpm.

The O&M cost estimates subtract out the reductions in pumping cost associated with operation of the existing once-through system, but do not include a retrofit factor. The Agency also accounted for the costs of refurbishing condenser tubing where necessary to avoid failures that can be associated with cooling tower retrofit. For this purpose, the Agency assumed that all facilities using brackish water will convert to copper-nickel alloy tubing or better (more corrosion resistant), and all facilities using salt water will convert to stainless steel or better.

Energy Penalty: The energy penalty has two components, the long-term reduction in available capacity for sale and the cost of the connection outage that occurs during the downtime required for the retrofit. The long-term reduction in available capacity resulting from recirculating cooling towers is expressed as a percentage of generating capacity:

Annual Revenue Loss = (Annual Loss of Electricity Sales) x (Electricity Price)

Where:
Annual Loss of Electricity Sales = (Annual Electricity Sales) x (Energy Penalty)

The loss of electricity sales is the result of:
-A reduction in unit efficiency due to increased turbine back-pressure; and,
-Increased auxiliary power requirements to operate the new system.

EPA developed the following table of energy penalties, by region and by fuel type, expressed as a percentage of plant capacity.

Table B1-1: Annual Energy Penalty (% of Plant Capacity) by Facility Type and Geographic Region.
[see hard copy for table]

EPA assumed that the connection outage would add one month to the normal planned outage schedule. EPA monetized the cost of the one month downtime by taking the lost revenue and subtracting the foregone fuel expense:

[see hard copy for equations]

A. Discussion of Issues

1. Redwood Cooling Towers may not be used as widely as EPA assumes, underestimating costs

EPA assumes that all 41 non-nuclear facilities required to install cooling towers will select redwood towers. At some facilities, however, the site-specific conditions may prevent the use of redwood towers, causing those facilities to turn to more costly options. EPA's cost estimate, therefore, may substantially underestimate the true cost of regulatory compliance for non-nuclear generating facilities. For example, EPA's own cost data show that concrete towers using concrete are 25% more expensive than redwood towers. In addition, EPA has not considered the environmental effects of widespread use of redwood lumber.

2. The methodology for calculating the cost of the energy penalty is flawed, and the costs are underestimated.

The EPA estimate was developed by applying an annual average energy penalty factor to annual average revenues. This methodology is flawed and is misleading.

-This methodology implies that the energy penalty leads to a net reduction in electricity sales and consumption. Consumption does not change. Instead, the loss of supply due to the energy penalty is likely to be made up from other sources with higher marginal cost. The increased cost to the consumer is based, not on average price, but rather on the difference in price between the foregone supply and the replacement supply. In addition, if the replacement supply has the effect of increasing the market price of electricity within a regional market, then all consumers will incur higher costs for their entire supply, not merely the replacement supply. The impact on generators is more difficult to estimate, because of potential shifts in generation among facilities and among firms.

-The EPA methodology also fails to account for seasonal impacts. The energy penalty is most pronounced in the summer season, when demand is highest, and when market prices are at their peak. The analysis of the cost of the energy penalty should be estimated seasonally, and not merely on an annual average basis.

3. EPA's cost estimates for cooling towers are substantially underestimated.

Applying EPA's retrofit equation for redwood cooling tower installation yields a rough average cost estimate of $80 per gpm for the redwood towers. Other analyses performed by DOE, the industry, and elsewhere in the literature all find that the costs of tower retrofits are between $140 and $225 per gpm. EPA's estimate is half or less than the costs estimated by other sources. The documentation for these estimates is shown in the table below:

COMPARISON OF COOLING TOWER COSTS
[see hard copy for table]

There are several easily identifiable factors that account for the differences between EPA and industry estimates.

-The EPA estimates exclude the construction cost of modifications to the intake system and costs for "blowdown" systems (i.e., processing of deposits that build-up on cooling tower surfaces). Based on a detailed analysis of costs at two retrofit installations – Salem and Millstone – the costs for intake modifications and blowdown are estimated to add about 5 percent to EPA's estimates.
-The EPA retrofit cost factor is too low. EPA included a cost adjustment factor of 20 percent to account for the higher cost of a retrofit installation compared to the cost of a new installation. Other

industry information suggests that the retrofit factor is more like 50-100 percent.

C. Recommendations for Re-Analysis

1. EPA should revise its cost estimates for cooling towers to reflect the industry cost data In addition, the considerable uncertainty surrounding the EPA assumptions makes it appropriate to use a sensitivity analysis to determine the robustness of the cost estimates.

2. The EPA methodology for estimating energy penalties should be dropped entirely, in favor of a modeling approach that can capture the net effect of a variety of market changes. The IPM model could potentially be used, but there are flaws with the IPM methodology as well (discussed later in the paper).

3. EPA should revise its estimates of the costs of the energy penalty to address seasonal variation The use of annual averages underestimates the effects in the summer season, when both the energy penalty and the reduction in revenues are greatest.

EPA Response

The Agency determined that retrofitting cooling towers was not an acceptable basis for the final regulatory requirements, in part, based on the costs and uncertainties of the technology.

The Agency notes that the following comment is incorrect: "EPA reported that it tested the conclusions of its estimation equation against actual cooling tower construction projects. However, the details of the comparison were not included in the documentation." The Agency did include the documentation of the comparison of its cooling tower construction project estimation in the proposal record. See DCNs 4-2526 and 4-2522.

Nonetheless, the Agency notes the commenter is misled in his interpretation of the Agency's choice of redwood for cooling tower material costs. As documented in the Technical Development Document for the proposal, the Agency selected redwood for cooling tower material because it is the median cost material. The Agency then went on to point out that fiberglass is becoming industry standard for cooling towers (and documented so), which roughly corresponds to the median cost material of redwood. By basing a national cost estimate on a particular material (redwood) that happens to be the median cost item and well correlated to the industry standard (fiberglass), the Agency's actions would in no way ever require facilities to use said material. This point is important for the case of other technologies, and, hence the Agency addresses it here, despite the fact that the cooling tower technology does not form a basis for the final rule.

EPA also notes that the commenter apparently misunderstands how the Agency determined the cost of construction downtimes (and the resultant electricity generation foregone). As the commenter recommends as a solution to fix an perceived error, the Agency indeed did utilize the IPM model to market specific costs of electricity losses.

Comment ID 316bEFR.072.205

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

THE METHODOLOGIES USED BY EPA TO ASSESS THE ECONOMIC AND MARKET IMPACTS OF COMPLIANCE COSTS ARE FLAWED

The estimated compliance costs provide a measure of the total cost to society. The impacts of these costs are then further evaluated, to determine the effect on electricity generators and the effect on electricity consumers. In concept the effect on electricity generators is determined by the change in profits from operations, which is the net effect of increased compliance costs that are not recovered through increased revenues. The effect on consumer would be determined by the change in electricity prices. EPA employed four different approaches to assess these effects:

-Cost-to-Revenue Test (CRT) – a test of effects on generators at both the facility level and the firm level.
-Average Household Impact – a test of effects on consumers.
-Average Electricity Price analysis – a test of effects on consumers.
-Electricity Market Impacts Based Upon an Analysis Using the Integrated Planning Model (IPM) – test of the net effects on both generators and consumers.

As applied, none of the four tests employed by EPA yielded meaningful results. The first three tests have serious methodological flaws, and the IPM modeling analysis is based upon problematic assumptions

EPA Response

Please refer to the following comment responses:

--Cost-to-Revenue Test (CRT): 316bEFR.072.206 (subject matter code 9.01).
--Average Household Impact: 316bEFR.072.207 (subject matter code 9.02).
--Average Electricity Price analysis: 316bEFR.072.208 (subject matter code 9.02).
--Electricity Market Impacts (IPM): 316bEFR.072.209 (subject matter code 9.03).

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

The Cost-to-Revenue Test (CRT) Is Not a Valid Measure of Economic Impact

A. Description of EPA methodology

The CRT compares both average and maximum annual costs per facility against the facility's (and firm's) gross revenue. EPA estimated the CRT at both the individual facility level and the firm level. The CRT for the preferred option was in the range of 0.02% to 32.3%. A detailed breakdown of the EPA estimates is shown in the two tables on the following pages.

B. Discussion of Issues

The CRT methodology completely ignores the fact that gross revenue is a meaningless measure of economic viability (or lack thereof). Commodity industries (including the electric power industry) are generally characterized by low profit margins earned on high volumes of transactions. This means that while gross revenues can be quite large, the net revenues are frequently a small percentage of gross revenues. In electric power, these margins are generally predicted to shrink even further in the wake of expanding deregulation. Thus, a facility or firm with a low estimated CRT may actually have negative net revenues after application of the 316(b) requirements, resulting in facility closure.

By using the CRT, therefore, EPA failed to evaluate the actual economic impact to firms and facilities. A more appropriate measure would be to analyze the impact on the firm's net revenues, with consideration of the portion (if any) of increases costs that can be recovered through higher revenues.

[see hard copy for tables]

C. Recommendation for Re-Analysis

1. EPA should evaluate the effect of the proposed rule by calculating the ratio of the net present value (NPV) of the marginal cost of compliance to the NPV of expected net revenues. This is the method used by financial markets, the ultimate arbiters of the viability of a given investment.

2. The guidelines for economic analysis for E.O. 12866 specifically direct the Agency to consider the relative impacts of a regulation on different segments of the industry. EPA should therefore compare the net present value ratios of discrete groupings of facilities to assess the possibility of competitive harm. These groups should be delineated by factors such as:

-Size
-Location.
-Customer Base

Only by determining the reductions in net present values (as a result of compliance) of the facilities in each group can the Agency determine the actual economic impact on firms and facilities resulting from the rule.

EPA Response

EPA notes that the cost-to-revenue measure is only one of several measures used in the economic analysis of the Phase II regulation. As stated in Chapter B2 of the EBA in support of the proposed rule, and as described elsewhere in these responses to comments (see 316bEFR.005.021), EPA used the cost-to-revenue analysis as a measure of the magnitude of likely compliance costs. Footnote 1 of Chapter B2 of the EBA explicitly states that the measures presented in Chapter B2 are not intended to predict plant closures or other types of economic impacts.

Economic impacts as a result of the proposed rule and the final rule were estimated using an energy market model (the IPM). For each facility subject to the final Phase II rule, this model calculates the Net Present Value (NPV) of future operations. This calculation is done both in the absence of the Phase rule (the baseline) and with the estimated Phase II compliance costs (the policy case). If the NPV of future operations becomes negative as a result of Phase II regulation, the model will predict the facility to close. As such, EPA's analysis explicitly takes into account the impacts of reductions in net present values on economic viability.

In answer to the commenter's request that the impact analysis should be reported by segments within the industry, EPA notes that the IPM analysis is organized and reported according to the most important industry segment framework, the regional electricity markets as defined by the North American Electric Reliability Council regions. EPA also conducted and reported extensive analyses according to entity size classification as required for the Regulatory Flexibility Act assessment of regulatory impacts. EPA would also like to point out that in addition to reporting economic information by NERC regions, many other analyses are reported on a regional basis.

Comment ID 316bEFR.072.207

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.02
Economic impacts on consumers/households

Estimates of Average Household Cost Impacts Are Not Meaningful, and in Fact Misleading.

A. Description of EPA Methodology

EPA estimated the average price increase in energy per household resulting from compliance with the proposed regulatory requirements as another method of assessing the economic impact of the rule. The calculated annual cost per residential consumer ranges from $0.33 in NERC region ASCC to $2.55 in NERC region HI.

EPA evaluated the annual cost per household by multiplying the average annual compliance cost per MWh of sales by the average annual electricity sales per household. Both input variables were calculated by NERC region according to the following methods:
-Average Annual Compliance Cost per MWh of Sales = Total electricity sales divided by total pre-tax compliance costs. EPA compiled the total electricity sales from the 2000 Form EIA-861 database and used utility-level sales aggregated by region.
-Average Annual Electricity Sales per Household = MWh of residential sales divided by the number of households. The raw data came from EIA-861.

B. Discussion of Issues

Average cost per household is not a meaningful statistic – the denominator is so large that it masks the true effects of the rule. This approach is only warranted in those instances where the entire population is homogenous with respect to the percentage of cost shouldered — that is, in those cases where each household can reasonably be expected to see identical increases in costs as a result of rule This is clearly not the case

-EPA states that only 13 percent of existing facilities (representing 50 percent of electricity generation) are in-scope facilities under the proposed rule. However, the average cost calculation is weighted across the entire industry base.

-The impact of the rule is not uniform across regions, or even within regions. Specific localities and/or regions of concern may contain populations dependent upon in-scope facilities. For example, rural populations or those served by government-owned facilities might face a significant increase in the cost of electricity, but that effect would be masked by dividing the total cost to the nation by the number of households. The demand for electricity is ubiquitous across populations, but the elasticities of demand, the constraints on supply, and the expected cost increases are not.

The Agency's presentation of the cost impact assessments masks the true impacts on sensitive subpopulations. Both UMRA and E.O. 12866 specifically direct the Agency to consider the effects of the regulation on sensitive subpopulations. This is impossible when the costs are only calculated as a function of a population-wide average.

C. Recommendation for Re-Analysis

EPA should eliminate this analysis altogether. It cannot provide a meaningful measure of the impacts of the regulation, and in fact leads to erroneous impressions.

EPA Response

The commenter suggests that EPA's analysis of costs per household is not meaningful and misleading and should therefore be eliminated. Specifically, the commenter asserts that because only 13 percent of existing facilities (representing 50 percent of electricity generation) are in-scope facilities under the proposed rule, it is not reasonable to spread the cost across the entire industry base.

EPA disagrees with this comment. EPA notes that its analysis is conservative because it rests on the assumption that affected facilities can pass 100% of their compliance costs on to customers. In fully or even partially deregulated markets, this is unlikely. If any portion of the costs could not be passed on to customers, the estimated cost per MWh of sales, and the resulting cost per household would be lower than presented in EPA's analysis. EPA understands that, if costs were passed on to customers, there is considerable uncertainty over how costs would be distributed among electricity customer classes – residential, commercial, and industrial – and costs could be passed more heavily to the residential customer class than to the industrial or commercial classes. EPA therefore conducted a sensitivity analysis assuming that all compliance costs are passed-through to residential customers – that is, neither the complying facilities nor other customer classes bear a share of these costs.

This analysis showed that in nine of the ten NERC regions, the estimated annual cost per household would be less than $5 per household, ranging from $1.44 to $4.87. Only Hawaii is estimated to bear higher costs of $28.74 per household (see DCN 6-4037 for more detail). The results of this conservative sensitivity analysis do not differ materially enough from the basic analysis to affect EPA's decision with respect to this final rule.

The commenter further states that "The impact of the rule is not uniform across regions, or even within regions. Specific localities and/or regions of concern may contain populations dependent upon in-scope facilities. For example, rural populations or those served by government-owned facilities might face a significant increase in the cost of electricity, but that effect would be masked by dividing the total cost to the nation by the number of households."

EPA disagrees with this comment. EPA notes that rural populations, or those served by governments, do not exist in isolation of the rest of the electricity market. It is difficult to envision a scenario where some customers in a region enjoy the benefits of deregulation while others don't.

EPA further notes that this analysis is only one of several measures used by EPA in support of this final rule. Results from the other analyses support EPA's findings of low likely impacts on electricity markets and electricity consumers.

Comment ID 316bEFR.072.208

Subject Matter Code 9.02

Economic impacts on consumers/households

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

3. The Electricity Price Analysis Test is Not Meaningful and is in Fact Misleading

In order to assess the potential effects of the regulation on electricity prices, EPA compared the average compliance cost per KWh of sales against baseline electricity prices. EPA used the total electricity sales and the consumer prices from the Annual Energy Outlook (AEO) 2002. The analysis assumes that industry passes the full cost of compliance through to consumers. In addition, the Agency assumes that all sectors -- residential, commercial, industrial, and transportation -- bear an equal share of the increase per MWh of purchased electricity.

EPA estimates that the additional costs of compliance resulting from the preferred option will raise the price of electricity:
-0.09% for Residential
-0.10% for Commercial
-0.17% for Industrial
-0.10% for Transportation

Several problems exist with this analysis. First, the estimates do not provide an accurate picture of the compliance impact since the costs of compliance are averaged against total sales. Total sales include the purchase of MWh supplied by facilities that are not in-scope, and therefore exempt from complying with the regulation.

Second, by averaging across entire NERC regions, the EPA analytical approach makes it impossible to assess the impacts on sensitive subpopulations Both UMRA and E.O. 12866 specifically direct the Agency to consider these vulnerable groups.

Finally, it is unrealistic to assume that cost is allocated uniformly across customer groups. In a relatively competitive power market, different types of consumers have different power requirements. This can lead to vastly different elasticities of demand, resulting in some groups paying a proportionately larger share of the rate increases than others.

EPA Response

EPA notes the following:

1. This analysis is only one of several measures used by EPA in support of this final rule. In particular, EPA refers the commenter to its analysis of potential price effects using the IPM. This analysis showed very low expected impacts on energy prices, which supports the findings of this analysis.

2. The purpose of this analysis is not to identify potential impacts to sensitive subpopulations. For more information on potential impacts on small entities see Chapter B4 of the final EBA (DCN 6-

0002). See also response to comment 316bEFR.028.008 for a discussion of potential impacts on small governments.

3. EPA understands that, if costs were passed on to customers, there is considerable uncertainty over how costs would be distributed among electricity customer classes – residential, commercial, and industrial – and costs could be passed more heavily to residential customers than to industrial or commercial ones. EPA therefore conducted a sensitivity analysis assuming that all compliance costs are passed-through to residential customers – that is, neither the complying facilities nor other customer classes bear any of the compliance costs. This analysis showed an estimated increase in prices to residential customers ranging from 0.1% to 0.8% (see DCN 6-4038 for more detail). The results of this conservative sensitivity analysis do not differ materially enough from the basic analysis to affect EPA's decision with respect to this final rule.

The EPA Market Impact Analysis, Using the Integrated Planning Model (IPM), is Flawed.

A. Description of EPA Methodology

The IPM is an engineering-economic optimization model of the electric power industry. It calculates the optimal solution to an objective function equal to the present value of the sum of all capital costs, fixed and variable O&M costs, and fuel costs. The model generates least-cost resource dispatch decisions based upon user specified constraints including:

-Demand Side
---Reserve margin constraints
---Minimum system-wide load requirements
-Supply Side
---Capacity constraints
---Availability of generation resources
---Plant minimum operating constraints
---Transmission constraints
---Environmental constraints

The model is capable of evaluating new resource investment options (capacity expansion/repowering of existing plants and investment in new plants) in addition to existing capacity during the optimization calculations.

Electricity Generating Plant Database: The IPM uses a database of all existing utility-owned, independent, and cogeneration generation units that contribute capacity to the electric transmission grid. Individual generators are aggregated into model plants with similar O&M costs and specific operating characteristics. The EPA Base Case 2000 contains 1,390 model plants. However, the Base Case 2000 was originally created to support air policy analyses, so the facilities subject to the Phase II rule were disaggregated from the IPM model plants and “run” as individual units along with other model plants. This change increased the number of model plants from 1,390 to 1,777.

IPM Regions: The IPM divides the contiguous U.S. power market into 26 regions. For the purposes of evaluating the Phase II rule, the IPM regions were aggregated into NERC regions.

Regulatory Options Modeled: EPA did not ever run the IPM model for the preferred option, as described in the proposed rule. The two runs of the model actually conducted by the Agency were for two other options:
-The waterbody/capacity-based option; and
-The all cooling towers option.

EPA stated that time constraints made it impossible to fully evaluate the preferred option The Agency determined that since the two options evaluated were both more stringent than the preferred option, the results placed an upper bound on the probable costs of the proposed rule EPA made two critical assumptions to adjust the two completed runs of the IPM (for the Waterbody/Capacity-Based Option and for the All Cooling Towers Option) to better reflect the impacts of the preferred option:

-EPA determined that the following NERC regions — ECAR, MAIN, MAPP SPP — did not have any facilities costed with a closed-cycle recirculating cooling water system. The Agency assumed that the modeling results for the waterbody/capacity option could be used to represent the impacts of the preferred option for those four regions.

-EPA then compared the modeled differences between those four NERC regions and the other six NERC regions — ERCOT, FRCC, MAAC, NPCC, SERC, and WSCC. EPA determined that the IPM model overstated the costs for these regions (e.g., some facilities were required to use wet cooling towers that were not assumed compliance measures in the preferred option). The Agency then compared the two regional groups using three characteristics and found no substantive difference. EPA therefore concluded that the results from the four regions that were modeled would be representative of the other NERC regions (that were not modeled). The characteristics were:

---The percentage of total base case capacity subject to the proposed rule;
---The average annualized compliance costs of the proposed rule per MWh of generation;
---The distribution of compliance requirements of the proposed rule.

Model Run Years: EPA only ran the model to generate data for several discrete years:
-2008 – selected based upon the assumption that 2008 represents the industry conditions upon full implementation of the preferred option.
-2010 – identified as a representative year during which facilities that retrofit cooling tower (under the waterbody/capacity-based option) may experience a temporary outage during installation;
-2013 – represents the first full, post-compliance year for regulatory options requiring cooling towers; and,
-2020 & 2026 – these years were run in order to ensure that the model was in balance, although the outputs from these years were not used in the analysis.

EPA primarily relied upon the 2008 model run to analyze the impacts of the preferred option, and the 2013 model run for the analyses of the regulatory options involving cooling towers.

The model assumes that capital investment decisions are only implemented during the run years. EPA used the results of various model run years as representative of particular period. Table B3-2 specifies the results of this “mapping” process.

Table B3-2: Model Run Year Mapping

Run Year	Mapped Year
2008	2005-2009
2010	2010-2012
2013	2013-2015
2020	2016-2022
2026	2023-2030

Source: IPM Model specification for the Section 316(b) Base Case

Model Inputs: The IPM Modeling Analysis used the following impacts.

-Capital Costs
---Costs of construction, equipment, and capital necessary to install compliance technology, with a discount rate of 5.34 percent and a capital charge rate of 12 percent for either the assumed duration of the 30-year book life of the investment or the years remaining on the modeling horizon, whichever is shorter.

-Fixed O&M Costs

-Variable O&M Costs

-Capacity Reductions (Only for facilities with flow reduction technologies)
---Energy penalty.
---Generator down-time.

Model Outputs: The IPM model reported the following outputs.
-Capacity (net summer dependable capacity)
-Generation
-Capacity Revenues
-Energy Revenues
-Energy Prices (annual average)
-Facility Retirements
---Closures of nuclear plants as a result of license expiration.
---Closures due to the estimated negative net present values for future operations.

B. Discussion of Issues

There are a myriad of issues with IPM modeling analysis which lead to a systematic underestimate of market impacts. This assessment identifies a number of the most significant issues, based upon the information made available by EPA. It is likely that there are additional issues in the remaining detailed information on the modeling analysis that EPA did not make available for review.

For discussion purposes, these issues can be grouped into three categories.
1) General assumptions used in the model
2) Scope issues regarding the set up and operation of the model.
3) Technical and economic assumptions specific to the 316(b) rule options.

Each of the three categories of issues is described in more detail below.

1. The General Model Assumptions are Outdated or Biased or Both: The IPM modeling analysis was based on the "IPM Base Case 2000". This base case incorporates market assumptions that have significantly changed over the past two years. Also, some of these assumptions are not consistent with the Administration's Energy Policy Task Force report. As a result, the IPM Base Case 2000 underestimates the key parameters of electricity markets relative to current projections. Underrepresenting these electricity market parameters, in turn, leads to underestimated impacts of the 316(b) regulatory options. The key areas of differences are:

-Electricity demand growth: IPM assumes 1.07% per year load growth between 2005-2015. This estimate also is artificially low because it assumes full implementation of the Clinton Administration's Climate Change Action Program (CCAP). By comparison the current 2002 Annual Energy Outlook (AEO) projection is 1.56% per year, which was the basis for the Report of the Vice President's Energy Task Force.

-Electricity Generation: The IPM model does not account for all new electricity generation projects currently underway. The IPM model projects total electricity generation of 4,366 billion kwh by 2015, 10% lower than 4,841 billion kwh projected in the AEO.

-Prices: The key assumption is the price of natural gas, which is expected to account for an increasing share of electricity generation. The IPM analysis assumes natural gas prices of $2.80 per mmbtu in 2010, declining even further to $2.70 by 2015. The current AEO projection of $3.40 in 2010 is 20% higher, and the 2015 projection of $3.60 is 33% higher than the comparable IPM assumptions.

The net effect of these assumptions is to underestimate impacts. Market impacts of the 316(b) proposed rule are likely to be more significant in a market environment characterized by higher electricity demand and higher fuel costs.

2. The Operation of the Model was Flawed: There are three aspects of the set-up and operation of the IPM model that lead to problems with the results.

-The model was never run for the preferred option; instead, the model results for the preferred option were extrapolated from other model runs: EPA conducted an IPM model run for the waterbody/capacity-based option, but did not conduct a separate model run for the preferred option. EPA assumed that portions of the results of the waterbody/capacity-based model would be representative of the preferred option and then extrapolated the results. Specifically, EPA used the waterbody/capacity-based option results for four NERC regions which were assumed to have no retrofit of cooling towers (the remaining 6 NERC regions did assume some retrofits under the waterbody/capacity-based option). EPA then extrapolated the results of the 4 NERC regions (with no cooling tower retrofits) to the remaining 6 regions in order to approximate a model run supporting the preferred option. This methodological approach assumed that the modeling results for the four NERC regions were unaffected by the cooling water compliance actions in the remaining 6 regions. Furthermore, the extrapolation assumed that the market impacts in the 6 NERC regions (unmodeled for purposes of the preferred option), would be proportional to the impacts in the 4 regions modeled under a different option. There are a number of market characteristics that vary significantly across NERC regions, such as fuel mix, average prices, reserve margins, transmission constraints and others. EPA failed to take these other factors into account in its extrapolation. This combination of analyses has the potential to compound any errors in the original modeling analysis.

-The IPM model modeled the energy penalty associated with retrofit of cooling towers as an annual average penalty, ignoring seasonal impacts that can vary by a factor of at least 2-3 times (or even higher outside the South): The retrofit of cooling towers to existing generating plants reduces the plant's electricity generation for the same amount of fuel use. There are two components of this "energy penalty": (1) increased use of auxiliary power on site to operate the cooling tower equipment; and (2) reduced turbine efficiency due to increased back pressure from less efficient cooling. The latter impact varies by season. In summer months, the recycled cooling water from cooling towers is less efficient in its cooling capability (due to both temperature and humidity). As a result, turbine efficiency is more adversely affected. However, it is in the summer months that most generating plants experience peak level demand, and when electricity market prices are most sensitive to small changes in supply. The IPM model runs did not account for seasonal impacts. As a result, electricity market impacts in the summer season were not adequately assessed. The IPM model has the capability to model some seasonality. It divides, the year into 2 seasons — a 5 month "summer" season and a 7 month non-summer season. However, it appears that, for modeling convenience, the IPM modeling analysis did not assume different energy penalties in the two seasonal periods.

-The IPM model did not address the potential impacts on reliability of electricity supplies. The 316(b) requirements can impact electricity reliability in two ways: (1) permanent derating of facilities due to the energy penalty could reduce reserve margins; and (2) temporary outages of facilities during the installation of 316(b) retrofit measures could result in short term price spikes or supply shortfalls if the outage occurred during a period when the market was very tight. These problems are more likely to occur if several facilities within a region are implementing 316(b) retrofit measures at the same time. The IPM model adjusts to any permanent derating of capacity by assuming that more new capacity is constructed. Thus, on a longer term basis, the model results do not allow for any reduction in reserve margins. However, the IPM modeling analysis was not conducted in a manner that would address the potential for short-term, or transient problems that could occur during the implementation phase of the 316(b) requirements. For example, the model was run only for years beyond 2008, a period when most, if not all, retrofits were already in place. Thus, the model did not attempt to analyze near-term market impacts, including reliability, during the implementation phase when outages would occur due to installation of cooling towers. In addition, the modeling analysis did not adequately address the seasonal effects on reliability due to outages during the retrofit process. The one month average outage for retrofit installation was averaged over the 7 month non-summer season, with no assumed impact on the peak summer season. This underestimates impacts in two ways: (1) the one month outage period is too short, and (2) the outage is most likely to occur during the spring season, especially if the outage is scheduled to occur in conjunction with planned maintenance activities.

3. There are detailed technical and economic assumptions specific to the 316(b) options that lead to underestimates of market impacts. There are a number of specific assumptions regarding the number of facilities impacted by the 316(b) requirements and the cost of compliance that contribute to underestimates of the market impacts. These include:

-Number of In-Scope Facilities: As described earlier in this assessment paper, the number of in-scope facilities may be underestimated due to the bias in excluding from the analysis those plants for which certain data were unavailable.

-Number of Facilities subject to retrofit: There appears to be a significant discrepancy between the number of facilities that EPA assumed to have retrofit requirements and the number of facilities modeled by IPM. This discrepancy lead to a significant underestimate of costs in the EPA estimates for the preferred option in the IPM modeling analysis. The discrepancy in the number of facilities is shown in the table below:

[see hard copy for table]

The table shows that the cost estimate assumed that an additional 126 facilities (195 less 69) have no compliance costs, even though these facilities are assumed elsewhere in the analysis to have retrofit requirements. In addition, the cost estimate has 88 fewer facilities (229 less 131) with costs for combined entrainment and impingement retrofit requirements. Because the Agency has not provided specific designations for these facilities, it is extremely difficult to determine the amount of the underestimate.

-Cost of Screens: As described earlier in this assessment paper, the costs for installation of screens is underestimated in instances where site specific screen performance falls short of the performance standards in the proposed rule.

-Cost of Cooling Towers: The cost of retrofitting cooling towers is underestimated for two major reasons (1) EPA assumes that 41 of the 51 facilities retrofitted with cooling towers can deploy the mechanical draft redwood towers, which cost 25% less than other towers; and (2) EPA cost estimates are significantly below estimates from other sources (as described earlier in the paper).

-Amortization Period: The IPM model appears to use an algorithm for amortizing all capital costs over a 30-year period. When applied to 316(b) compliance costs, this assumption is inconsistent with the 316(b) engineering cost assumptions and results in underestimates of the annual cost impacts of retrofits at those facilities, such as nuclear plants, that have remaining lives of less than 30 years. For example, in the engineering cost analysis of I&E controls, EPA assumed that screens would have a useful life of only 10 years. A number of nuclear facilities has remaining permit lives of less than 30 years, so it would not be appropriate to assume that the capital costs of a retrofit measures could be amortized over a 30 year period.

-Transaction Costs: EPA's estimate of transaction costs (e g, studies in support of permitting actions) is low because of the manner in which the model run for the preferred option was extrapolated from other model runs. The earlier model runs did not account for the higher permitting costs associated with the requirements for the preferred option. The EPA analysis indicated that permitting costs would be 30% higher under the preferred option relative to the other regulatory options that were actually modeled.

-Plant Closures: Although the IPM model has the capability to estimate plant closures, the modeling runs identified no potential additional closures attributable to 316(b) requirements. Modification of the various assumptions discussed above likely would have a compounding effect on market impacts, leading to possible plant closures.

-Temporary Plant Shutdowns & Reliability Impacts: The IPM modeling analysis assumed no additional plant outages due to the installation of screens in cooling water intake structures (i.e., the screen could be installed during periods of scheduled maintenance outages, which usually occur in the Spring or Fall). In addition, the IPM analysis assumes that the installation of cooling towers adds only one month to scheduled outages. These assumptions represent "best case" rather than "average case" situations. For example, the actual downtime for 316(b) modifications to the Calvert Cliffs Nuclear Plant was 5 months per unit with an overlap where both units were down simultaneously for a 2 month period. In addition, the assumptions fail to recognize the industry trend, especially for nuclear power plant refueling, to compress scheduled outage times, making it more difficult to integrate a cooling water system retrofit into this period. For example, nuclear refueling outages are now often less than one month in duration.

A more realistic analysis would consider the possibility of longer outage time intervals. In addition, the additional outage times most likely would occur in Spring or Fall, and could result in temporary higher prices and reduced reliability if the shutdown coincided with a period of abnormally warm weather. Instead, however, the IPM modeled the assumed one month outage time for cooling towers averaged over a 7 month non-summer period, including the winter season when equipment installations are unlikely to occur.

EPA Response

See response in file "Comment Response 316bEFR.72.209.wpd", DCN# 6-4002.

Comment ID 316bEFR.072.210

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code	10.04
	National Benefits

ASSESSMENT OF THE EPA ECONOMIC BENEFITS ANALYSIS

The consideration of the benefits associated with the proposed new requirements for cooling water intake structures at existing generating facilities allows EPA to better compare regulatory alternatives and choose the alternative that meets statutory requirements in the way that results in the greatest net benefit to society EPA's proposal — specifically, the inclusion of a site-specific benefit-cost test — provides the necessary flexibility that recognizes that the installation of specified technologies may not provide benefits that warrant the costs of their installation at all facilities. Thus, the inclusion of this benefit-cost test provides an alternative mechanism for avoiding imposition of new requirements where they will not provide a net benefit to society. However, some of the methodologies used by the Agency to both estimate the benefits of the regulatory alternatives and extrapolate the benefits from individual case studies to national estimates have significant flaws.

A. Description of EPA Methodology

EPA relied on case studies as a means of generating benefit estimates for its regulatory alternatives. EPA's methodology consisted of four steps:

1. Estimation of losses in fish and fisheries yield as a result of impingement and entrainment (I&E) at facilities for which the Agency had case study data.

2. Correlation of I&E case study data to facility flow.

3. Valuation of I&E losses per unit of flow for a variety of water body types and locations.

4. Extrapolation of the value of losses from the case study facilities to generate a national estimate.

EPA's basic method for extrapolation relied of the development of flow and angler day indices for each case study facility. The index is used to extrapolate based on the flow (or angler days) at the case study facility relative to the total flow (or angler days) at all facilities located on the same waterbody grouping. Baseline loss estimates for a waterbody grouping are calculated by dividing the estimated losses at the case study facility by each index and then taking the average of the two calculated values.

For example, the Tampa Bay case study facilities had a midpoint baseline loss estimate of $809,000 for impingement. These facilities were also estimated to account for 19.24 percent of the flow and 20.28 percent of the angler days for all Gulf Coast facilities. The baseline impingement loss estimates for all Gulf Coast facilities was, therefore, calculated as the average of $4,204,000 – $809,000/0.1924 – and $3,989,000 – $809,000/0.2028. <FN 2>

The following chart shows the source of baseline loss estimate information and the relative contribution of each case study to the overall estimate of baseline losses.

[see hard copy for table] <FN 3, 4, 5>

Using this general framework, EPA estimates the benefits of its preferred option at $735 million. The Agency estimates the benefit of a water body /capacity based option at just over $1 billion and an option requiring the universal retrofit of cooling towers at $1.2 billion.

B. Discussion of Issues

In performing this analysis, EPA made a number of simplifying assumptions and methodological errors that overestimated the benefits estimates for all of these options. This assessment identified 4 major issues affecting the validity of the EPA benefits estimates:

1. The methodology for extrapolating national benefits estimates from case studies is flawed
2. The valuation methodologies chosen by the Agency are problematic.
3. Double-counting of angler days resulted in an inflation of estimated benefits.
4. Estimates of I&E impacts (and benefits) are not proportional to cooling water flows.

Each of these issues is discussed in more detail in the following sections.

1. The methodology for extrapolating national benefits estimates from case studies is flawed

The benefits estimates are based upon an extrapolation from five of case studies, supplemented with information from six other studies. This process has two serious problems: (a) the case studies are not representative; and, (b) the small sample of case study facilities magnifies any biases.

a) The choice of case study facilities does not constitute a representative sample that can be used as the basis for extrapolation to national estimates of benefits: EPA chose case studies based on those facilities that had the greatest amount of available data. As a result, the sample facilities are not a random (or representative) sample of the affected population. Moreover, the facilities that have the most data are likely to be the facilities that have come under the most scrutiny under the existing program. These facilities are more likely to be representative of facilities where concern with I&E impacts may have existed, not of the general population of facilities. Any extrapolation from these facilities, therefore, will overstate the impacts of I&E losses, and consequently, overstate the benefits of I&E controls.

b) A small sample size magnifies the bias associated with individual studies: The concern over the bias on the sample facilities exacerbates the bias that is created by extrapolating from a very small sample, in many cases a single facility, to the entire population. This magnifies the upward bias in the estimate at individual facilities. For example, the Salem case study is the basis for 55 of the total baseline loss estimates.

2. The valuation methodologies chosen by EPA are problematic

EPA makes a number of egregious methodological errors that are not supportable by resource economics, nor are they consistent with the EPA's own Guidelines for Preparing Economic Analyses. These shortcomings are discussed in great detail in comments filed by UWAG and others on the proposed rule. This section highlights some of the methodological issues that are likely to have the greatest impact on the conclusions drawn from EPA's assessment of the benefits.

a) EPA ignores sound science in favor of a baseless "precautionary approach." The appropriate method of valuing losses associated with the operation of cooling water intake structures is based on the changes in fisheries stocks and related catch levels. This has long been recognized as the correct approach by both biologists and economists. A large body of peer reviewed research supports this approach through the use of bioeconomic models such as "stock recruitment" models. EPA chooses to replace this large body of peer reviewed science with a normative approach thinly disguised as scientific. EPA labels this "a precautionary approach." This approach appears to serve no purpose other than to inflate the benefits estimates through the application of a number of questionable to clearly invalid methodologies.

b) Avoided cost methodologies, such as Habitat Replacement Cost, have no basis in economic theory or practice: EPA used habitat replacement cost as a means of estimating the benefits of reducing I&E in five case studies. The "values" from two of these studies were extrapolated to 38 other facilities. In total, the Habitat Replacement Cost methodology is responsible for about 25 percent of the total estimated benefits of the regulation. Moreover, any additional benefits associated with the EPA's Waterbody/Capacity-based option will come disproportionately from HRC values, since the benefits estimation for facilities on oceans is derived entirely from this methodology.

Habitat replacement cost is an avoided cost method of estimating value. Avoided cost methodologies attempt to impute value based on the cost of replacing a good by some other means. In EPA's case studies, the habitat replacement cost is always significantly higher than the estimated value of lost organisms. Because replacement cost does not tell us anything about the demand side of the equation, however, it is useless as a means of estimating value. Put another way, just because we can spend money on a good, does not mean we are willing to – the true measure of value. All the avoided cost methodology does is describe an arbitrary point on the supply curve – it cannot describe the value of a good.

EPA also uses an avoided cost methodology for measuring the value of forage species losses as part of its "precautionary approach" in some of the studies that do not rely on HRC. While this methodology is not discussed in detail here, it is invalid for all of the same reasons as HRC, and leads to an overstatement of costs in each of the instances where it is used.

The limitations of avoided cost methodologies are well accepted in environmental and resource economics. "A particularly inappropriate use of costs to measure benefits is the replacement cost approach, especially when it is not based on revealed preference (as in the cases of aversive or preventative behavior, or shadow project approach). Engineering replacement or remediation cost estimates are totally devoid of any "revealed preference" content; therefore, they have no foundation in social welfare economics and cannot be taken as measures of value. They lie along a supply curve, but we have no information at what point this curve interacts with a demand (or preference) function." <FN 6>

As an illustration of the limitations of avoided cost methodologies, we will take an example from outside of environmental regulation. Say that someone threatens to put a two inch scratch in your car unless you pay her $100. Such a scratch would cost $200 to repair. EPA's methodology would suggest that the value of avoiding the scratch in your car is $200 and you should pay the fee, making everyone better off by $100. This may seem to make intuitive sense, however, there is insufficient information in this example to be able to draw this conclusion.

For example, we do not know where on the vehicle this scratch will be made. If it is on the door, we may have one response, whereas if it is inside the trunk, we may have a completely different response. Even though the two scratches cost the same amount to repair, the value of that repair is very different depending on how we perceive the scratch.

Similarly, you could be selling the car and you know that the scratch will only result in a $50 reduction in the price you can get for the car. Again, the value avoiding the scratch has nothing to do with the cost of repairing it. In fact, there are an infinite number of ways of dealing with the scratch, up to and including replacing the entire car. Avoided cost would suggest that the cost of whichever solution was arbitrarily chosen as the basis of comparison is the value of avoiding the scratch.

Lastly, you have no underlying information about the underlying condition of the car. It could be a junk heap where an additional scratch would not be noticed. In this case, the marginal value of avoiding the next two inch scratch would be near zero. Again, the cost of repairing the scratch gives us no valid information on its value.

By now it should be clear that avoided cost is an invalid means of assessing value. To make matters worse, the particular replacement cost chosen by EPA, Habitat Replacement Cost, is invalid. EPA asserts that replacement of habitat is superior to more direct (and generally cheaper) forms of replacement because habitat creation generates additional benefits such as groundwater filtration and flood control. While it is likely that these benefits exist, they have nothing to do with the resource that is lost through impingement and entrainment. In fact, the value of these additional benefits should be subtracted from the cost of creating new habitat to isolate the cost of replacing individual organisms.

EPA also incorrectly uses HRC as a means of assessing the value of forage species and to infer the non-use value of these resources. Appropriate methodologies exist for assessing the forgone values of these organisms. For example, bio-energy models can be used to assess the contribution of lost forage to higher trophic levels that can be assessed using more direct
methods. It should also be noted that biomass lost through I&E is not, in fact, destroyed. It is merely consumed by different species than may otherwise consume those organisms. For very low trophic levels and life stages there may be little impact on the overall ecosystems. While there are also more direct means of assessing non-use value, such as contingent valuation, these methods are also problematic. The state of the science on these methods still makes it difficult to properly differentiate between use and non-use value.

These fundamental methodological concerns indicate that any conclusions drawn from this portion of EPA's benefits assessment are invalid. Replacement cost methodologies have no basis in welfare economics and should not be used in the manner that EPA has attempted to use them.

c) Societal Revealed Preference is an inappropriate measure of value: In its two San Francisco Bay studies EPA uses an "innovative" approach they term societal revealed preference. In this instance the innovation appears to be ignoring principles of sound economics and invalidating the basis of benefit-cost analysis.

Like habitat replacement cost, this method does nothing more than look at costs and deem them to be benefits. Under this approach all governmentally imposed costs are assumed to be at least as great as the benefits There is no basis for this assumption in economic theory or empirical observation. If this assumption were true, there would be no need to do benefit-cost analysis of government regulation. Where the avoided costs methodologies make the false assumption that if you can spend money on a good, it must be worth the price, the societal revealed preference assumes that if someone makes you spend money on a good, it must be worth the price. Neither of these assumptions is very compelling. Any conclusions drawn from application of this methodology are completely invalid.

d) EPA's use of a "rule of thumb" to estimate non-use values is completely arbitrary: EPA uses a unique rule of thumb that assumes that non-use values associated with a good, in this case recreational fishing, is equal to 50 percent of the use value. There is absolutely no basis for this assumption and its use in these studies inflates the costs artificially.

e) EPA inflates the benefits estimate by valuing losses further up the value chain than is appropriate: The EPA develops a series of multipliers to translate dockside market value into larger numbers to reflect secondary economic benefits. These multipliers are not based on any significant empirical data. Moreover, they ignore the additional value added at each step of the market chain, leading to an upward bias in the perceived contribution of losses to social cost. Lastly, they lead to an unfair comparison of costs and benefits, since the costs associated with reducing impingement and entrainment are measured at the equivalent of the dockside and are not adjusted by similar multipliers to account for their movement through the value chain. For these reasons, EPA's benefits estimates should be based on dockside loss estimates only.

f) EPA application of otherwise valid approaches was flawed: Some of the approaches used by the EPA, such as random utility models, do have a sound foundation in economic theory. However, application of these models to individual case study facilities was uneven. EPA relied on questionable "benefits transfer" and other approaches to draw conclusions that may not be applicable to the actual facility being studied.

These shortcomings are best discussed in the context of the individual case studies. This discussion is beyond the scope of this paper. The reader should refer to the comments submitted by individual companies and by the Utility Water Act Group for a more detailed discussion of potential misapplication of these methods.

3. Double counting of angler days results in an inflation of the estimated benefits

EPA extrapolates baseline losses from case study facilities based on an "angler day index "This index is based on the number of angler days estimated to occur within 120 miles of the case study facility relative to the number of angler days estimated to occur within 120 miles of all other facilities in the same waterbody grouping Angler days were computed for any county in which a facility was located plus any county in which 50 percent of the population of that county lived within 120 miles of a facility.

Unfortunately, the EPA did not account for facilities that were located within 120 miles of each other. This results in a much larger number of angler days in the denominator of the angler day index equation. This larger denominator, in turn results in a lower index for the case study facility, which leads to a larger multiplier of the baseline losses at the case study facility and a significant upward bias in the extrapolated value of baseline losses.

The facilities covered by the proposed rule were mapped in order to determine how prevalent this overlap of these areas of influence might be, This mapping exercise demonstrated that 100% of the areas in the eastern half of the United States fall within the area of influence of at least two facilities.

Another approach to assessing the degree of double counting involves looking at the counties whose angler days would be counted more than once The analysis showed that only 5 percent of the counties in the United States are correctly incorporated into the denominator of the angler day index. Another 14 percent were not miscounted because they are not within 120 miles of any facility. 49 percent of the counties were counted at least ten times.

4. Estimates of I&E impacts (and benefits) are not proportional to cooling water flows

EPA assumes that I&E impacts are directly correlated with flow at a facility. However, EPA's own data in the one instance where it composed multiple facilities in the same pool indicates that this proportionality assumption is incorrect. Moreover, in the case extrapolating impingement losses, there is not even much of an intuitive link between flow and impingement. Impingement is likely to be affected by temporal factors, biological factors, and intake velocity long before total flow becomes a factor. When combined with the fact that the sample facility is likely to have an uncharacteristically high impact per unit of flow, the affect of the assumption will be to overstate the benefits.

C. Conclusions and recommendations for Re-analysis

EPA's valuation of the benefits of its proposal and alternatives is fraught with methodological errors. Thirty-one percent of the benefits estimated by the Agency are based, in whole or in part, on cost-based methodologies that have no basis in economic theory or practice. The remaining 69 percent are inflated through the use of questionable methodologies. 55 percent of the benefits estimated by the EPA are based on a single case study. The extrapolation methodology chosen by the Agency also creates a significant upward bias in the benefits estimates.

Prior to promulgation of a final rule, the EPA must correct these errors so that its final determination of the correct regulatory approach is based on the best available science and analysis.

EPA Response

The four main comments in this section are addressed in turn:
1. The methodology for extrapolating national benefits estimates from case studies is flawed.

In response to this comment and others like it, EPA has reviewed and revised the case study approach to estimating national benefits. For the section 316(b) Phase II benefits cost-benefit analysis EPA examined impingement and entrainment (I&E) losses, and the economic benefits of reducing these losses, at the regional level. All extrapolation is based on losses per unit of average annual operational flow.

The estimated benefits were then aggregated across all regions to yield a national benefit estimate. The primary objective of the regional approach is to refine the scale of resolution of the benefits case studies conducted for proposal, so that extrapolations were within regions rather than nation-wide. In addition to extrapolating at a regional level only, EPA also collected and analyzed data for a greater number of facilities.

Thus, for the analysis for the final rule, extrapolation was needed for a smaller number of facilities, was based on a broader range of analyzed facilities, and was performed between facilities in the same region.

2. The valuation methodologies chosen by the Agency are problematic.
EPA has addressed this issues in the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule.
Please refer to EPA's detailed response to the following comments:

#316b.EFR.005.035 (HRC methodology)
#316b.EFR.005.006 (societal revealed preference methodology)
#316b.EFR.005.029 (commercial fishing methods)

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits.

EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E.

EPA no longer uses a benefits transfer approach to estimate recreational losses and benefits. Rather, EPA has developed a random utility model (RUM) to estimate benefits for each region. For further detail on the new methods please refer to the regional study document, Chapter A11: Estimating Benefits with a Random Utility Model (RUM).

3. Double-counting of angler days resulted in an inflation of estimated benefits.

In the cost-benefit analysis of the benefits for the final Section 316(b) Phase II rule, EPA no longer uses the angling index to extrapolate benefits.

4. Estimates of I&E impacts (and benefits) are not proportional to cooling water flows.

As noted in the response to #1, all extrapolation is based on losses per unit of average annual operational flow. EPA's new regional extrapolation methods are designed to better address temporal factors, biological factors, and intake velocity.

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

NERA REPORT ON THE VALUATION OF POWER COSTS IN ASSESSING THE COSTS OF ALTERNATIVES UNDER SECTION 316(b) OF THE CLEAN WATER ACT

Prepared for Edison Electric Institute

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EXECUTIVE SUMMARY

This report reviews the U S Environmental Protection Agency's ("EPA") valuation of energy penalties due to regulatory alternatives for existing facilities under Section 316(b) of the Clean Water Act ("Section 316(b)"). On April 9, 2002, EPA issued a proposed rule ("316(b) Phase II Proposed Rule," 67 FR 17121) that would establish requirements for cooling water intake structures ("CWIS") for in-scope existing power producing facilities. The proposal involves methodologies for determining the "best technology available" ("BTA") that Phase II facilities with CWIS would be required to adopt. In support of its Section 316(b) Phase II Proposed Rule, EPA released an Economic and Benefits Analysis ("EBA") as well as several detailed case studies of the benefits of Section 316(b) alternatives. In contrast to the thousands of pages devoted to benefits assessment, the EBA provides very little discussion of costs and only four pages on energy penalties. Energy penalties include the power losses due to installation of various compliance technologies, such as cooling towers. <FN 1> The value of the energy penalties can be substantial, comprising the majority of the overall social cost for some Section 316(b) control technologies.

The EPA's methodology for valuing power losses—that is, the dollar values of the power losses—uses estimates of the average historical revenue per kilowatt-hour for the owner of the affected facility to measure future values. This valuation methodology is too simplistic and does not provide an adequate basis for estimating this important component of the costs of Section 316(b) regulatory alternatives. Perhaps more importantly, the valuation methodology provides misleading guidance to permitting agencies and permit applicants that will be faced with implementing whatever approach is ultimately promulgated in any final Section 316(b) rule for Phase II facilities.

This report provides an alternative framework for valuing power losses that is both practical and more accurate than the simple methodology developed by EPA. Well-established alternatives are available that provide sound and practical estimates of the dollar value of energy penalties due to Section 316(b) compliance alternatives. This report summarizes three practical alternatives that can overcome the disadvantages of the EPA methodology. Generation owners and permit issuers should be encouraged to implement these alternative methodologies in order to base individual Section 316(b) decisions on accurate and complete benefit-cost analyses.

A. Limitations of the EPA Methodology for Valuing Power Losses

Power losses represent one component of a full benefit-cost assessment of alternative Section 316(b) controls. Implementing a given Section 316(b) alternative— such as retrofitting a unit with a cooling tower— leads to social benefits and social costs. <FN 2> A benefit-cost analysis includes evaluation of alternative approaches and identification of the alternative that would maximize net benefits (i.e., benefits minus costs). <FN 3> To provide useful information, however, the benefit-cost analysis must be based upon sound estimates of the various benefit and cost components. With regard to energy penalties, sound analysis requires accurate assessments both of the power losses and of the dollar values of these effects. This report focuses on the second item in these calculations— placing a dollar value on power losses.

EPA's methodology for estimating the dollar value of power costs consists of calculating the historical average annual revenue for each utility and using that historical average to measure the social cost of future projected energy losses. This methodology is incorrect for several reasons.

2. The average revenue values do not reflect the enormous differences over the course of a year in the cost of power. Many control options involve valuing losses in particular months or seasons.

3. The average revenue values do not necessarily incorporate the costs incurred to replace losses in capacity or the losses in the ability of the unit to operate at peak level (and thereby avoid deterioration in the reliability of electric supply). In many markets, capacity is effectively a separate "product" that would not be included in energy prices. Any effects on capacity should be included as elements of social costs.

4. The historic sales revenue may not properly incorporate future emission costs, in part because the emission regulation regime may be different in the future. The historic prices used by EPA do not reflect recent characteristics of emissions markets, including developments in NOx markets and implementation of Phase II of the Clean Air Act SO2 cap-and-trade program.

Well-established methodologies are available to overcome these difficulties and provide forward-looking and complete estimates of the value of power lost as a result of Section 316(b) control technologies.

B. Sound Methods of Valuing Power Costs

This report describes three types of models that can be readily used to measure the social cost of power losses resulting from regulatory requirements that could be promulgated as part of a final rule under Section 316(b). The three alternatives are the following:

1. Cost-based modeling;

2. Futures prices and extrapolations; and

3. Modeling of market prices using econometric models.

All three can provide forward-looking and complete estimates of energy penalties. The choice of which method is more appropriate depends upon several factors, including cost (in light of existing modeling capabilities), data availability, and the individual utility's role in the national energy market. (For example, cost-based modeling may be more appropriate in the case of a utility with a load-serving responsibility; the social cost analysis then focuses on how the integrated utility would replace the energy and capacity lost due to the Section 316(b) alternative.)

1. Cost-Based Modeling

Cost-based models have been developed over decades to simulate costs in an integrated electricity system .These models provide a highly detailed representation of electricity generation, transmission and dispatch .The basic approach is referred to as a cost-based model because the models focus on the production costs of meeting given levels of electricity demand at different time periods over the course of each year. Prominent cost-based models include PROMOD and GE-MAPS. The GE-MAPS model for New York, for example, includes all generating units in the New York Independent System Operator ("ISO"), the New England ISO, and the Pennsylvania-New Jersey-Maryland Interconnection ("PJM"), as well as possible supply from Canada and the East Central Area Reliability Council ("ECAR"). The units include those likely to come into service over time.

These models can overcome the disadvantages of the EPA historical approach. The models are forward looking, can be used to assess the social costs at different periods of the year, and can incorporate capacity and emissions costs through extensions of the basic modeling approach. The models are used to predict the generation sources that replace power lost due to a Section 316(b) compliance alternative; this information is used to calculate the cost of the replacement power. Emissions costs are included directly in the production-cost model results if emissions are included in cap-and-trade programs, in which case future allowance prices are included in the production costs. Incorporating capacity costs involves estimating the costs of adding capacity necessary to maintain the same system reliability.

2. Futures Markets

In many regions of the country, electricity is traded, with prices quoted and available in a futures market. The futures market represents the current market value of future electricity production; quotes are available for different time periods, including different months and on- and off-peak periods.

Use of futures market prices to forecast the value of future power losses avoids the expense of developing a detailed representation of the electricity system. Market prices are used as measures of the expected social costs of future power losses. These prices represent the value (at the margin) of reduced generation and thus provide a measure of future social costs based upon actual market price information rather than simulated electricity system/market results. Because futures prices are available only for several years, the method must be extended by developing projections based upon the likely future costs of additional generation (including capacity and emissions effects).

This modeling approach also overcomes the disadvantages of the EPA approach. Like the cost-based method, the use of futures market prices sometimes must be supplemented by additional analyses of capacity and emissions costs Some electricity systems include separate capacity markets, which can be used to provide social cost estimates for capacity changes. Futures prices include costs of emissions subject to cap-and-trade programs; the costs of other emissions can be estimated separately.

3. Econometric Modeling of Future Prices

The econometric modeling method also involves the use of market prices to measure social costs. Rather than using futures prices, however, this method uses historical price information to develop econometric estimates of the factors that influence electricity prices, including demand-supply balances, weather patterns, and other factors that influence real world prices. <FN 4> These relationships can be used either directly to estimate future prices—in various relevant time periods—or as a supplement to the basic estimates provided by the cost-based methodology. The objective in both applications is to provide estimates of the future set of market prices in the electricity market in which the in-scope facility participates. These projected future market prices are then used in conjunction with the future power losses to calculate the social cost of replacement power.

As with the other two methods, the econometric modeling approach~ overcomes the disadvantages of the EPA method. The detailed statistical relationships allow estimates of future prices in detailed time periods. As with futures markets, whether capacity and emissions are included directly depends upon whether there is a separate capacity market and whether

emissions are subject to cap-and-trade programs both in the historical period and the future (relevant) period.

C. Conclusions and Recommendations

A sound methodology for valuing energy losses should have three important features (1) it should reflect future conditions, (2) it should allow for seasonal and other temporal differences, and (3) it should account for all types of potential costs (i.e., reductions in generation, capacity losses, and air emissions changes). EPA's methodology for estimating the value of lost power due to Section 316(b) alternatives is inadequate by all three criteria. Before issuing final Section 316(b) regulations, EPA should revise its methodology for valuing energy losses to correct these limitations.

Because the EPA's analyses can influence choices by Section 316(b) permit applicants and issuing authorities, it also would be useful for EPA to indicate the range of methodologies that would be appropriate to measure energy penalties in individual circumstances. The three basic methodologies outlined in this report all would provide conceptually sound and complete measures of the future social costs of energy penalties due to Section 316(b) control alternatives. The various methods differ in ease of application, in applicability in light of the state of deregulation in various markets, and in respect to how they capture the various components of replacement power costs (i.e., energy, capacity and emissions costs). The choice of methodology should be left to the individual applicant—taking into account cost and existing modeling capabilities—with review by permitting agencies focusing on the validity of the method and the sensibility of its application in the particular case.

I. INTRODUCTION

This report considers economic methodologies that can be used to value the replacement power costs of modifying cooling water intake structures ("CWIS") in response to potential requirements for electric facilities under Section 316(b) of the Clean Water Act Replacement power costs result from reductions in the energy and capacity of electric generating units as well as changes in emissions due to the effects on electricity markets. The report also evaluates the methodologies that the U S Environmental Protection Agency ("EPA") has used to value replacement power costs in the context of its evaluation of proposed policies to implement Section 316(b).

A. Background

In April 2002, EPA proposed regulations ("316(b) Phase II Proposed Rule," 67 FR 17121) implementing Section 316(b) of the Clean Water Act for certain existing facilities, including electricity generation facilities EPA at the same time released various technical documents, including an Economic and Benefits Analysis ("EBA," U S EPA 2002a) that outlines key elements of the methodologies EPA uses to assess the costs and benefits of the proposed regulatory requirements.

The EBA includes the methodologies EPA uses to assess the overall costs and benefits of the proposed Section 316(b) regulations as well as those of various regulatory alternatives The costs include several components related to energy costs involved in converting a cooling system from a once-through system to a re-circulating system with wet cooling tower or a dry cooling system The components identified in the EBA include a one-time, temporary outage of the plant when the new system is connected to the plant's existing cooling system, as well as an energy penalty from the operation of the re-circulating or dry cooling system, which would constitute a long-term reduction in the available capacity of the facility. The EBA includes EPA' s monetary valuation of the energy penalty and the cost of downtime.

B. Need for the Study

The EBA contains a relatively short description of EPA's methodology for valuing power costs (U.S. EPA 2002a, p. Bl-8 to B1-9). This treatment contrasts with the detailed analyses of other components of costs as well as the dramatically greater attention given to benefits valuation, including lengthy and detailed case studies.

The relative lack of attention to power costs maybe explained by the fact that EPA estimates that the proposed rule will result in no energy penalties or connection outages, and thus that this category is not important (see US EPA 2002a, p B 1-16). This judgment appears to suggest that the proposed rule would not require any existing facility to switch to a recirculating system from a once-through system and that no other Section 316(b) technologies entail energy cost. Such conclusions would be important to confirm, but regardless of whether these judgments about the proposed rule are correct, the calculation of energy penalties due to potential Section 316(b) alternatives is important for several reasons:

-Alternatives to the proposed rule do involve the introduction of re-circulating systems and thus lead to energy penalties that are included in the EPA cost estimates.

-Permit writers evaluating Section 316(b) permits for individual facilities are likely to consider the possibility of switching to a re-circulating system..

-Other control alternatives short of a switch to a cooling tower—such as a requirement for seasonal flow controls or modifications of intake screens—do seem likely to involve energy penalties.

It is important, therefore, to develop valid methodologies that can be used to assess the likely power costs associated with Section 316(b) alternatives. The methodologies should be complete, identifying and valuing all of the costs.

EPA’s methodology is an historic methodology that is based on the average revenue that utilities have received from power sales over the 1995 to 1999 period. This methodology has an inherent flaw. It assumes that the social costs of replacement power can be measured by reference to the average revenue per unit of electricity sold over an historic period. This is wrong for several reasons, including the following:

1. The historical period is not necessarily representative of the future,, particularly in terms of the demand-supply balance. EPA’s historical prices include surplus sales in shoulder and off-peak hours, which do not reflect prices in hours when capacity is constrained. The methodology should be forward-looking rather than backward-looking to reflect future conditions.

2. The average revenue values do not reflect the enormous differences over the course of a year in the cost of power. Many control options involve valuing losses in particular months or seasons.

3. The average revenue values do not necessarily incorporate the costs incurred to replace losses in capacity or the losses in the ability of the unit to operate at peak level (and thereby avoid deterioration in the reliability of electric supply). In many markets, capacity is effectively a separate “product” that would not be included in energy prices. Any effects on capacity should be included as elements of social costs.

4. The historic sales revenue may not properly incorporate future emission costs, in part because the emission regulation regime may be different in the future .The historic prices used by EPA do not reflect recent characteristics of emissions markets, including developments in NOx markets and implementation of Phase II of the Clean Air Act SO2 cap-and-trade program.

The net result is that the EPA materials do not provide appropriate guidance for estimating power costs related to Section 316(b) compliance alternatives. <FN 5>

In addition to the need to be complete in assessing all potential energy costs, it is also important to assess the relative advantages and disadvantages of alternative methods that involve greater or lesser data development, modeling, and overall cost. One of the critical elements of any cost analysis methodology is that it be sensitive to the costs of implementation. It would not make sense, for example, to require detailed and expensive modeling to assess power costs in cases in which relatively small penalties are involved. Similarly, using crude rules of thumb where power costs are an important component—whose value could alter substantially the Section 316(b) cost-benefit assessment—would not be sensible.

It also is important to clarify that these valuations are focused on estimating the resource costs related to Section 316(b) alternatives (i.e., the costs that will be incurred by society—also referred to as social costs). Deregulation in many areas of the country has shifted the burden of environmental compliance costs from customers to generating facility owners.

From an economic efficiency perspective—which is an appropriate perspective for a cost-benefit assessment of Section 316(b) alternatives—it is irrelevant whether customers or plant owners ultimately bear the costs.

C. Objectives of this Study

The objectives of this study can be listed as follows.

-Identify the situations in which power costs will be incurred and the types of power costs involved as a result of Section 316(b) requirements at an electricity generation facility.

-Critically review EPA's treatment of power costs related to Section 316(b) alternatives.

-Develop recommendations for methods of valuing power costs that are:

---Consistent with sound economic methodology;

---Achievable at reasonable cost, in light of the data that are available; and

---Understandable to those that will implement the techniques, as well as to those who will review the studies.

-Provide examples of how some of the methods could be implemented.

D. Outline of the Report

This report is organized as follows. Chapter II provides an overview of the circumstances in which Section 316(b) compliance alternatives could give rise to energy costs as well as the general components of those costs. In light of this overview, the chapter provides a review of the approach in the EBA, including general assessments of its limitations. These limitations include the possibility that some potentially important components of energy costs are omitted, as well as the fact that it employs a relatively simplistic method for calculating the one cost component that is included. Chapter III discusses three methodologies that can be used to measure the full social costs of power reductions associated with Section 316(b) compliance alternatives and discusses the situations in which the various methods may be most effectively applied. Chapter IV discusses the issues associated with developing estimates for elements thatmight not necessarily be included in the modeling, specifically the value of lost capacity and air emission costs. Chapter V provides brief concluding remarks.

II. OVERVIEW OF POTENTIAL POWER COSTS DUE TO SECTION 316(B) CONTROL ALTERNATIVES AND EVALUATION OF EPA VALUATION METHODOLOGY

This chapter provides an overview of the potential components of power costs associated with various potential Section 316(b) control technologies. The chapter also considers EPA's approach to valuation in light of this overview.

A. Situations Leading to Power Costs Due to Potential Section 316(b) Control Technologies

As noted by EPA, a technology installed to comply with possible Section 316(b) regulations could lead to electricity-related costs in two major ways:

1. Construction outage. Implementation of the technology may require that the facility be shut down for a period of time. In the case of the retrofit of a cooling tower for a once-through system, the facility typically would have to be shut down while the new system is added.

2. Ongoing power losses. Implementation of the technology may involve losses in the output of the facility, either over the course of the year or for certain periods. Requirements to reduce flow during periods of high biological activity, for example, would entail ongoing power losses during those periods.

Note that these two situations differ in the circumstances but not the nature of the power costs. The general methodology for evaluating both types of energy penalties is similar. Consider an example of installing a cooling tower that requires a six-month construction outage and a reduction of five percent in the ongoing generation of the unit. These two situations would reduce generation at the plant, one for six months and the other over the remaining life of the facility. There is no conceptual reason to value the lost kilowatt-hours differently in these two cases. (As noted below, the situations may differ in terms of whether costs would be saved at the facility; but the basic method of valuing the reduced output should not differ in the two circumstances.) There may be some practical differences in the modeling, but it is useful to be clear that the general nature of the penalty is the same in both cases.

This general rule—that situations do not change the conceptual approach to assessing the value of lost power—extends to the situation in which adopting a given control alternative would make operation of a unit uneconomic. Suppose that a requirement to retrofit with a cooling tower would lead a facility to shut down <FN 6> The kilowatts lost in this case—equal to the amount that otherwise would have been generated by the unit—would be valued using the same methodologies as for a construction outage or operating penalty. Indeed, one could think of a premature shutdown as an extension of either of these other cases.

B. Components of Power Costs

Power costs include several distinct categories. The following are the three general cost categories that could be relevant for any given control technology:
1. Generation;
2. Capacity; and
3. Air emissions.

1. Electricity Generation

The Section 316(b) control technologies can decrease the output of the unit. So long as this output is being provided at a time when this power has social benefits, these decreases represent a cost to society. A unit provides a social benefit whenever it would be more costly to replace the unit's generation with some other unit's generation or whenever demand could not be met without the unit's generation. Utility plants in both regulated and deregulated areas have substantial incentives to run only when the social benefits of electricity production exceed the costs.

2. Electricity Capacity

The requirement that supply and demand for electricity must be in continual balance to avoid losses in voltage or even blackouts creates an additional social value for electricity generators—the value of generating capacity. At any given time, large amounts of nongenerating, but potentially generating, capacity are required. Without this capacity, the social costs of power would be much higher, since a kilowatt-hour lost due to blackout has a much greater value (perhaps 50 to 100 times) higher than the marginal kilowatt-hour because of the emergency services (and other high-value uses) that might be lost.

These considerations mean that electricity capacity has a value in addition to the actual electricity generated. As a rough conceptual approximation, the value of each kilowatt of capacity is equal to the product of two values (1) the probability that the system will in fact run short of capacity (a figure that depends on the supply-demand balance at any given time); and (2) the value of lost kilowatt-hours.

3. Air Emissions

Electricity generation can lead to various other external effects, the most notable of which might be air emissions. Many generators produce air emissions, most notably CO2, SO2, NOx, and particulates. <FN 7> Changes in the output of one unit and replacement of this power by other units will lead to changes in emissions, and therefore to social cost. These changes in social cost represent additional costs or benefits.

C. Evaluation of EPA's Power Cost Methodology

This section provides an evaluation of the methodology for assessing, power costs contained in EPA's EBA. We consider the components that are covered as well as the methodology used to evaluate the components that are evaluated.

1. The EBA Methodology for Estimating the Value of Lost Generation is Deficient

The EBA methodology focuses on estimating reduced revenues to the individual facility whose kilowatt-hours are reduced due to the installation of a cooling tower:

The energy penalty and the connection outage represent a cost to the facilities that incur them. For the energy penalty, this cost manifests itself as a reduction in revenues, (the same amount of fuel is required to produce less electricity available for sale). For the connection outage, this cost is a loss in revenues offset by a simultaneous reduction in fuel costs (while the plant is out of service, it loses revenues but also does not incur variable costs of production) (U.S. EPA 2002a, p. B 1-8).

The EBA implemented this approach by estimating the average wholesale price received by each utility. This calculation involved estimating each utility's revenues for resale and dividing by its sales for resale. <FN 8> This calculation provides EPA's estimate of the average revenue that the utility owner would lose for each kilowatt-hour of reduced production.

This set of values has several deficiencies as a set of values that can be used to assess the social costs of reduced electricity generation due to Section 316(b) alternatives.

a. Changes in Facility Revenue are Not Necessarily a Measure of Social Cost

The recent EPA Guidelines for performing economic analyses provide a definition of social costs:

The total social cost is the sum of the opportunity costs incurred by society because of a new regulatory policy; the opportunity costs are the value of the goods and services lost by society resulting from the use of resources to comply with and implement the regulation, and from reductions in output (U S EPA 2000, p. 113).

The implication of this definition is that lost generation should be valued at its value to consumers if the output is not compensated for by increased generation elsewhere, or at the additional resource costs required to compensate for the lost generation if such compensation is projected to occur. Such. values would include losses in consumer and producer surplus associated with any rise in the price (and decrease in the output) of electricity.

As noted above, if the change in generation is relatively small, the price of electricity is not likely to be affected by the Section 316(b) alternative. <FN 9> In this situation, the social cost of reduced generation at one facility could be measured by the increase in cost to provide the equivalent generation at other facilities. For a large change in generation, the effects of price changes on consumer surplus would also have to be considered.

Note also that the revenue lost to a utility from reduced generation sales is not necessarily equal to the added costs at other facilities to compensate for, that reduction, or the market price of electricity Although the utility’s revenue loss certainly is a cost to the utility, this cost would not necessarily measure the total cost to society. As the EPA Guidelines make clear, it is social costs that should be used in benefit-cost assessments.

b. Historical Information May Not Reflect the Future

A second deficiency of the EBA approach is its focus on historical information The values to be included in a benefit-cost analysis of potential regulatory alternatives under Section 316(b) should reflect expectations about the value of relevant parameters in the relevant future timeframe—namely, the period between when the retrofit is introduced and when the unit would be retired. For example, if a facility were retrofitted in 2005 and the facility were scheduled for retirement in 2025, the benefit-cost assessment would require values for the period from 2005 to 2025.

The EBA approach is based upon information from 1995 to 1999, without any effort to update or project values into the future. Although such projections are of course uncertain, a projection that the value of generation would be constant at the historical value seems too crude, particularly since there are reasons to suspect that the relevant social costs will be higher in the future as a result of developments in electricity markets.

One reason for higher future social costs is that the utility sales from 1995 to 1999 most likely include surplus power sales, as well as sales at peak hours. Surplus power is the power available in excess of load requirements from the existing capacity owned by the utility. Because the period from 1995 to 1999 was characterized by substantial excess capacity, the average revenue from power sold during this period is likely to be lower than it will be in the future, when capacity is expected to become more constrained. As a result, the estimates in the EBA may not be representative of the future value of power losses that would be anticipated as a consequence of various regulatory alternatives for existing sources under Section 316(b).

c. Average Values Do Not Allow for the Wide Variability in the Social Cost of Generation in Different Time Periods (Months, Years)

A third deficiency or limitation of the EBA approach is its focus on an average annual value. The social cost of electricity generation vanes dramatically over the course of a year. Many of the Section 316(b) compliance alternatives will have different effects on electricity use over the course of a year (e g, requirements to reduce flow in periods of high biological activity. Using an average value obscures such differences and prevents the methodology from determining accurately the social costs of losses in particular seasons or months.

This means that the EBA approach should calculate potential electricity generation losses by month and also provide information on replacement cost estimates that differ by month. In the case of a three-month connection outage, for example, it would be important to assess the likely months of the outage and the relevant monthly prices. EPA's use of average annual values is too crude a methodology.

2. The EBA May Exclude Two Important Categories of Power Costs

The EBA focuses on just one of the three categories of power costs identified above, the value of lost generation. The relatively brief description of the monetary valuation (p. B 1-8) includes only a discussion of the methodology to value lost kilowatt-hours. EPA does not appear to account for the two other categories identified above:

-Capacity. Implementation of modifications to the CWIS can reduce a unit's capacity, not just its electricity generation. This loss in capacity has a social cost that should be included in a complete assessment of energy costs.

-Air emissions. Shifts in generation due to modifications to the CWIS typically will lead to changes in air emissions or changes in the costs of meeting air emission targets. These changes—which could be positive' or negative—constitute social costs (or benefits) that should be included in a complete assessment of energy costs.

These elements can be significant parts of the overall social costs of energy penalties due to Section 316(b) alternatives.

D. Summary

Various Section 316(b) alternatives involve energy penalties that should be evaluated as part of a complete social cost analysis. The EPA methodology contained in the EBA provides a simple method based upon historical information This simple method does not provide an accurate or complete assessment. The following chapter provides examples of three general approaches that can provide accurate and complete estimates of the relevant energy penalties.

[comment continued in 316bEFR.072.302]

Footnotes

1 This report uses several roughly equivalent terms to describe electricity losses due to Section 316(b) compliance technologies, including power losses, energy penalties and replacement costs. The energy losses include various potential losses, including capacity reductions as well as penalties due to on-going operations of compliance technologies (such as a reduction in unit efficiency due to increased turbine back-pressure and an increase in auxiliary power requirements to operate the cooling tower).

4 Note that although this method uses historical prices, the use is very different than in the EPA methodology. In the EPA methodology, historic prices are used directly as measures of future prices. In contrast, the econometric method uses historical prices only as data to develop statistical models. These statistical models then are used in conj unction with projections of future underlying conditions (e.g., demand, temperature, capacity additions) to project future prices.

5 This report does not discuss issues related to the specific power losses due to various control technologies. The limitations listed here concern the unit value of the replacement power required. There also may be further concerns about the quantity of replacement power required. EPA's analysis appears to imply that that replacement power costs result only from cooling tower retrofits, but not from other CWIS modifications, such as screens or variable speed pumps. Other evidence suggests that other CWIS modifications can affect power. generation. Although we do not consider the quantity of replacement power that would be required as a result of specific CWIS modifications, the estimates of power losses will of course affect the cost of 316(b) compliance.

6 Assessing whether the unit would shut down would involve modeling the relevant power markets based upon the revised cost of the unit (with retrofit). The major difference in the modeling results is that electricity prices may be affected and thus the assumption that overall electricity demand is not affected would not hold.

7 Recently, regulatory attention has also included interest in certain metals found in fossil fuels, such as mercury.

8 The resale sales are used to reflect wholesale prices, rather than retail prices that reflect the price of additional value-added services provided by the company.

9 Market prices would change if the change were substantial, which would be the case (for example) if a large unit were to out of service (e.g., for a connection) or if 316(b) requirements lead to premature retirement of a large unit.

EPA Response

EXECUTIVE SUMMARY / INTRODUCTION

The commenter criticizes EPA's methodology of assigning monetary values to the energy penalty of cooling towers and the cost associated with installation downtime. The commenter states:

"EPA's methodology for estimating the dollar value of power costs consists of calculating the historical average annual revenue for each utility and using that historical average to measure the social cost of future projected energy losses. This methodology is incorrect for several reasons.

1. The historical period is not necessarily representative of the future, particularly in terms of the demand-supply balance. EPA's historical prices include surplus sales in shoulder and off-peak hours, which do not reflect prices in hours when capacity is constrained. The methodology should be forward-looking rather than backward-looking to reflect future conditions.

2. The average revenue values do not reflect the enormous differences over the course of a year in the cost of power. Many control options involve valuing losses in particular months or seasons.

3. The average revenue values do not necessarily incorporate the costs incurred to replace losses in capacity or the losses in the ability of the unit to operate at peak level (and thereby avoid deterioration in the reliability of electric supply). In many markets, capacity is effectively a separate "product" that would not be included in energy prices. Any effects on capacity should be included as elements of social costs.

4. The historic sales revenue may not properly incorporate future emission costs, in part because the emission regulation regime may be different in the future. The historic prices used by EPA do not reflect recent characteristics of emissions markets, including developments in NOX markets and implementation of Phase II of the Clean Air Act SO2 cap-and-trade program."

EPA RESPONSE:
EPA notes that for the Notice of Data Availability and the final rule, EPA changed its methodology of valuing power losses. Instead of relying on historical average revenues, EPA used revenue projections from the Integrated Planning Model (IPM), which was used to support EPA's economic impact analysis, including potential impacts on facilities and the energy market. This model corrects/accounts for each of the faults listed by the commenter:

1. The IPM is forward looking.
2. The IPM takes into account seasonal variations when estimating prices and determining revenues.
3. The IPM takes into account the value of capacity. This is expressed in the form of capacity prices and capacity revenues.
4. The IPM base case includes current federal and state air quality requirements, including future implementation of SO2 and NOx requirements of Title IV of the CAA and the NOx SIP call as implemented through a cap and trade program.

The commenter outlines three available methodologies that overcome the alleged short-comings of EPA's proposal methodologies (see response to comment 316bEFR.072.302 in subject matter code 9.03).

Finally, the commenter makes two related assertions:
"The choice of methodology [of estimating the cost of power losses] should be left to the individual applicant— taking into account cost and existing modeling capabilities— with review by permitting agencies focusing on the validity of the method and the sensibility of its application in the particular case."

and

"[T]he EPA materials do not provide appropriate guidance for estimating power costs related to Section 316(b) compliance alternatives."

EPA RESPONSE:
EPA notes that the analysis conducted in support of the national Phase II regulation is not intended to provide guidance to individual permit applicants or permitting authorities. EPA believes that the methodologies used in this analysis are the most appropriate to estimate effects on a national level. However, national modeling approaches always rely on assumptions and simplifications that, on average, yield robust results, but may not provide the best estimate for each individual facility.

II. OVERVIEW OF POTENTIAL POWER COSTS DUE TO SECTION 316(B) CONTROL ALTERNATIVES AND EVALUATION OF EPA VALUATION METHODOLOGY

The commenter “provides an overview of the potential components of power costs associated with various potential Section 316(b) control technologies. The chapter also considers EPA’s approach to valuation in light of this overview.”

The commenter states that electricity-related costs associated with (1) construction outage and (2) ongoing power losses “differ in the circumstances but not the nature of the power costs.” EPA agrees with this statement. The commenter further states that this principle extends to premature closures, the situation in which the final Phase II rule would lead a facility to shut down. Under this approach, a premature closure would be valued in terms of electricity production lost. EPA agrees that this approach, if implemented correctly, is one approach of valuing the cost of a premature closure. EPA notes that under this approach, to avoid double-counting, the Agency would have to subtract regulatory compliance costs estimated for each generating unit that would pre-maturely close from the estimate of total social cost. However, EPA used a different approach. The decision of a facility, in the face of regulatory compliance costs, to close rather than to comply with the rule implies that the net present value (NPV) of the facility’s future operations is less than the NPV of the compliance costs. As such, EPA’s compliance costs provide an upper bound or ceiling of the value of any generating unit projected to close as a result of the final Phase II rule.

The commenter lists three cost categories that might entail power costs:
1. Generation;
2. Capacity; and
3. Air emissions.

1. The commenter alleges that EPA’s methodology for estimating the value of lost generation is deficient for the following reasons:

(a) “Changes in Facility Revenue are Not Necessarily a Measure of Social Cost”
The commenter states that “lost generation should be valued at its value to consumers if the output is not compensated for by increased generation elsewhere, or at the additional resource costs required to compensate for the lost generation if such compensation is projected to occur. Such values would include losses in consumer and producer surplus associated with any rise in the price (and decrease in the output) of electricity.”

EPA RESPONSE:
EPA agrees with the commenter’s concept for valuing the social cost of generation capability lost due to the 316(b) rule. Further, EPA judges that its analysis of the cost of lost generation provides a reasonable approximation of this concept. For its analysis, EPA assumes that consumer demand will be met by alternative generation resources to those affected by installation outage, energy penalty (though none of the technologies expected to be installed for the final rule entail energy penalties), or premature retirement of capacity. As a result, the appropriate social cost concept is the amount by which the electricity production cost of facilities that replace the energy not produced due to outage or other generation losses exceeds the production cost of the Phase II facilities experiencing the

installation outages. In addition, the social cost should include the cost to society of any reductions in system reliability or other capacity reduction effects resulting from the loss in generating capacity. Because all demand is assumed to be met by the replacement energy sources, there will be no changes in producer and/or consumer surplus resulting from reduced total consumption. Thus, the Agency focused on this increased cost to society, regardless of its distribution between producers and consumers.

For the final rule analysis, EPA used the IPM-based estimate of net revenue loss in 316(b) facilities to value the social cost of lost generation. The IPM analysis incorporates a forecast of future electricity prices; these prices include both an energy price and a capacity price. In addition, because IPM assumes competitive, deregulated market conditions as the framework for its analysis, the social cost of replacement energy (including both energy and capacity price effects) will generally be very close to the net price (price less short run production cost) otherwise received in the market by the generating units experiencing installation outages or generating loss effects – that is, replacement energy is assumed to be supplied by a generating unit(s) whose production cost is essentially equal to the price otherwise prevailing in the market. Given the very small overall effects of the 316(b) final rule on total capacity and capacity margins in the electricity market regions, EPA judges that the extent to which yet higher production cost units would need to be called into service is small and thus that this framework provides a reasonable approximation of the social cost of lost generation.

EPA acknowledges that other analytic frameworks could be used to estimate the total effect of lost generation, including the incremental production cost of replacement energy and the cost to society of lost capacity per se. Indeed, the IPM framework is able to incorporate these effects; however, for the social cost analysis they cannot be isolated in terms of the individual components such as the social cost of lost generation. In addition to its principal cost analysis, EPA used the IPM framework to develop a total social cost estimate; this estimate confirmed the overall estimate of social cost developed by EPA for the final 316(b) rule (see DCN 6-4011).

(b) “Historical Information May Not Reflect the Future”
EPA RESPONSE:
EPA agrees with the commenter’s point. EPA notes that the information used in the valuation of power losses are forecasted values from the IPM. EPA therefore no longer relied on historical information for the valuation of power losses for the final rule.

(c) “Average Values Do Not Allow for the Wide Variability in the Social Cost of Generation in Different Time Periods (Months, Years)”
The commenter argues that “[t]he social cost of electricity generation varies dramatically over the course of a year.” As a result, the commenter states that EPA “should calculate potential electricity generation losses by month and also provide information on replacement cost estimates that differ by month.”

EPA RESPONSE:
As stated previously, for the final rule analysis, EPA used information generated by the IPM. EPA documented the potential limitation of its analysis of installation outages in Chapter B3 of the EBA. These limitations are due to an averaging of the downtime not over the entire year, but over the 7-month period, October though April, which includes the off-peak spring and fall periods, and the

winter period, which for most electric market regions is not the annual peak demand period. When calculating the cost of downtime, however, EPA used annual estimates generated by IPM, including the higher-priced peak demand period. While EPA generally agrees with the commenter's point, it notes that the average prices and revenues realized over the year, on a national level, are a good, if not conservative, proxy for the social cost of generation in different time periods. Facilities faced with the necessity of installation outages have an incentive to schedule these outages during off-peak periods when their revenue and profit losses would be minimized and when system-wide capacity reserve margins are greatest. Indeed, if facilities are able to schedule installation outages entirely during the off-peak spring and fall periods, the estimate of installation outage cost based on the annual average would be higher than the expected actual values. Given the strong incentive to schedule as much outage time during low-price periods, but the realities inherent in the need to maintain system reliability, EPA believes that the averages, as used by EPA, provide a good estimate that incorporates the potential variability due to differences in time periods.

2. The commenter alleges that EPA may have excluded power costs associated with capacity and air emissions.

-- "Capacity. Implementation of modifications to the CWIS can reduce a unit's capacity, not just its electricity generation. This loss in capacity has a social cost that should be included in a complete assessment of energy costs."

EPA RESPONSE:
EPA notes that the IPM analysis includes the cost associated with capacity losses. The value of capacity is explicitly considered in the form of capacity prices and revenues, which are included in EPA's estimate of the loss of outages.

-- "Air emissions. Shifts in generation due to modifications to the CWIS typically will lead to changes in air emissions or changes in the costs of meeting air emission targets. These changes— which could be positive or negative— constitute social costs (or benefits) that should be included in a complete assessment of energy costs."

EPA RESPONSE:
Changes in air emission technologies as a result of the final rule are explicitly analyzed in the IPM. The annualized increase in capital costs (estimated for run year 2010) as a result of such changes is less than $3 million. EPA finds that these costs are negligible in the overall context of the Phase II rule. Omission of these costs from the social cost estimate will not materially affect the decisions made by EPA.

[comment continued from 316bEFR.072.301]

III. METHODOLOGIES FOR VALUING ELECTRICITY LOSSES DUE TO SECTION 316(B) ALTERNATIVES

This chapter develops methodologies that can be used to value changes in electricity due to the implementation of potential Section 316(b) regulatory alternatives.

A. Conceptual Considerations

The loss of power due to the implementation of a Section 316(b) alternative could in theory be sufficient to alter electricity prices and thus overall electricity demand. But if the change is small relative to the overall market, the power and capacity lost will be replaced by power and capacity at other generating units. In this case, the social cost of the energy penalty is the added resource cost of providing the equivalent power under the new regulatory constraints of Section 316(b). The modeling approaches in this chapter generally assume that the demand-curtailment effect through higher price is negligible. This assumption will not be justified in cases in which the change would be substantial, such as the case in which a Section 316(b) requirement leads to the premature retirement of a major unit. Similar modeling approaches can be used in this case, but they would have to be expanded to include estimates of the social cost of reduced electricity consumption due to higher prices.

In the absence of price effects, the method to value electricity generation changes due to the implementation of Section 316(b) regulatory alternatives at a facility includes the following two potential categories:

-Additional resource costs at other facilities. The energy lost at the facility due to a given fish protection alternative would be replaced by increased generation and capacity at other units. This increased generation would result in increases in resource costs (e g, fuel, labor, materials, and emissions costs) at the other units, resulting in social costs.

-Cost savings at the facility (if any). If the unit is not operating, costs would not be incurred for fuel and variable operations and variable maintenance costs. For each kilowatt-hour of reduced energy at the facility, these fuel and variable operations and maintenance costs would not be incurred, and emissions savings would be realized. Consequently, these savings constitute reductions in social costs.

The second category depends on the specific costs at the individual facility. Note that these cost savings do not include capital costs and any fixed costs that would be incurred regardless of whether the facility was operating.

The net result of these calculations is an estimate of the value of the lost generation, i.e., the net additions in resource costs of producing the same generation at other facilities. These values could differ dramatically depending upon the time period of the lost generation (e.g., year, season) as well as its location (i.e., PJM or other power market).

B. Components of Resource Costs

The additional resource costs fall into three categories:
1. Generation costs;
2. Capacity costs; and
3. Emissions costs.

1. Generation Costs

The first set of costs relates to the direct costs of producing power: incremental fuel, incremental operating and maintenance costs and other direct consumables. The direct way to derive these costs requires a knowledge of which plants will supply the incremental power and knowledge of the specific costs at that unit.

2. Capacity Costs

The second set of costs relates to the cost of reliability, which is generally termed capacity cost. Society benefits not just from the energy provided by generating units but also from their capacity. Capacity above and beyond that which is needed at any given time to generate lowers the probability of catastrophic blackouts and brownouts. This capacity value can be a substantial part of the value of a generating unit. Indeed, for peaking generators that run very little, capacity value is the major component of total social value.

Conceptually, the value of capacity in any hour is equal to the expected un-served energy (“EUE”) times the value of lost load (“VOLL”). For example, if we have a one percent chance of losing one MWh, the expected loss is 0.01 MWh. If VOLL is equal to $5,000/MWh, the value of a MW of capacity in that hour is $50.00. Of course, in many hours, the probability of losing load is so small that the value of capacity is negligible. In other hours, particularly near the system peak, capacity can be extremely valuable.

If the need for capacity is sufficiently large, the optimal treatment is not to bear the higher costs of outage, but rather to construct new capacity. The cost of this added capacity then represents the social cost, since but for the implementation of Section 316(b) regulatory alternatives, this capacity could have been made proportionately smaller. Thus, the long-run cost of a loss of capacity is the capital cost of replacing that capacity through new construction or the delay in the retirement of units.

3. Emissions Costs

The third set of costs are indirect costs related to emissions costs, either because the incremental rights to emit a pollutant must be purchased in the market or because pollutants have costs that are borne by society, even if the individual emitter has no particular cost to pay. The calculation of the correct inputs to calculate these costs is sufficiently complicated that a fuller discussion is given in Chapter IV.

The information requirements to calculate all of these costs can be daunting, although such analysis is routinely performed by many utilities in their planning process so that useful results may have already been created for other purposes. In some cases there may be less complicated methods to create effective proxies for these costs. We turn to both the direct and indirect methods for estimating these costs in the next section.

C. Alternative Methodologies for Valuing Costs of Lost Electricity

This section provides an overview of the methodologies that might be employed to value reductions in electricity as a result of the installation of CWIS to comply with Section 316(b) regulations. We consider three general approaches:
1. Cost-based modeling;
2. Use of futures market prices; and
3. Modeling of market prices using econometric models

All three of these methodologies have the ability to be forward looking EPA's model takes historical revenues as representative of future revenues, whereas these models use historical information to model the future. In addition, all three of these models have the ability to take variability among different periods into account.

Finally, these models are all complete, taking into account generation, capacity, and air emissions costs. The issue of completeness, however, is quite complex and is discussed in more detail in the sections below.

1. Cost-Based Modeling

This approach to estimating the social costs of reductions in electricity focuses on the costs incurred to replace the reduced output.

a. Overview

Models to simulate costs in an integrated electricity market have been developed over decades. These models provide a highly detailed representation of electricity generation, transmission and dispatch. Electricity market modeling is a detailed approach to quantifying the social cost of providing replacement power cost that is appropriate when significant changes in power output are involved.

b. Basic Cost-Based Model

Cost-based models can be used to estimate the changes in resource costs due to reductions in generation at particular units. The models include detailed representations of the potential alternative generating units. These models can overcome the deficiencies of the EBA approach—they can be forward looking and provide estimates of the added costs of compensating for reductions in generation for detailed time periods within a year.

The basic approach is referred to as a production-cost model, because the models focus on the production costs of meeting given levels of electricity demand at different time periods over the course of each year. The standard methodology involves projection of future demands for electricity as well as detailed representations of the individual units in the relevant market, including units connected to the market through transmission interconnections. Prominent production-cost models include PROMOD and GE-MAPS The GE-MAPS model for New York, for example, includes all generating units in the New York Independent System Operator ("ISO"), the New England ISO, and the Pennsylvania-New Jersey-Maryland Interconnection ("PJM"), as well as possible supply from Canada and the East Central Area Reliability Council ("ECAR"). These units include those likely to come into service over time. Appendix A provides a description of the GE-MAPS model.

These models work by creating an optimal dispatch of the system at any point in time the model selects the set of units that would provide just enough generation to match projected load at the lowest cost. Available as outputs from such a model are:

Marginal costs;
Total emissions; and
Indices of reliability, e.g. expected unserved energy or reserve margin.

Electricity market models can be used to evaluate the effects of implementing a Section 316(b) alternative on the social costs of providing electricity services by comparing the results of two cases: (1) a baseline (i.e., assuming no Section 316(b) requirements); and (2) a case assuming the implementation of a Section 316(b) regulatory alternative.

These models can be used to estimate the social cost of reduced generation at a particular facility in various time periods. In order to do this, models simulate the operation of the relevant electricity market with and without the unit in service and accounting for replacement capacity (i.e., capacity added in response to the Section 316(b)-induced change), if appropriate. These two simulations can then be used to estimate the replacement power costs with and without the unit in each of the relevant time periods.

For small changes in power output, it may not make sense to model various scenarios explicitly. For example, if a facility were to derate by five percent, one could simply multiply the market price of electricity predicted by the model by the resulting change in generation at the affected facility. In such a situation, the market model could be used to estimate the hourly market prices for power. This approach works in the case of small changes in power output when the change would itself have only a marginal impact on system operation. While the cost of custom-assembling such an analysis can be quite large and is probably not worthwhile for smaller proposed modifications, there may be readily usable analyses that were prepared for other purposes. In such cases, only minor modifications might be necessary to derive the costs in question. The smaller the modification, the less likely the need to run two scenarios, which requires the modeling of the specific plant modifications. In such cases, the system-wide effects are so small that the marginal costs of energy and capacity can be used directly.

c. Accounting for All Categories of Cost

Electricity market models can capture the response of the systems to specific reductions in energy output, either temporary or permanent. These models can capture replacement energy costs in terms of fuel, variable operating and maintenance ("O&M") and purchased power. Further, these models can also capture differences in emissions, which may also be valued in the model. The modeling of emission costs includes both modeling how emissions from the various units affect the system dispatch and modeling the total emissions costs incurred. For emissions covered by cap-and-trade programs, this modeling involves projecting allowance prices in the relevant emissions markets.

These models generally do not account for capacity costs. Any replacement capacity is represented in the model, but the carrying cost of that replacement capacity must be accounted for outside of that model. Replacement capacity is represented in the model in order to maintain equivalent reliability to the situation where no power loss is experienced. Generally, a power reduction with permanent consequences will result in capacity replacement in a situation where a vertically integrated utility is planning to serve load. However, there may be situations where replacement is lagged or where, due to the temporary nature of the power loss, capacity is not replaced. In these situations, the capacity impacts should be measured as the loss in reliability, that is, the increase in expected un-served energy times the value to customers of that un-served energy. Some models are capable of this calculation. However, in order to fully capture these impacts, it is sometimes necessary to use a more detailed reliability model that captures the uncertainty in both the availability of supply and the uncertainty in load. In circumstances where the capacity margin is tight, a lag in replacement may result in substantial reliability impacts. Chapter IV describes how capacity costs, as well as air emissions costs, can be estimated in a separate analysis.

d. Summary

A typical electricity model analysis would explicitly represent the dispatch of the system, the reduction in power output, and replacement capacity if appropriate. A model analysis would then use the model to estimate the change in fuel costs, variable O&M costs, purchased power costs, and emission costs. The model analysis would then be supplemented with a further analysis to calculate the cost of replacement capacity.

Such modeling is particularly sensible when the Section 316(b) facility is owned by an integrated utility with a load-serving responsibility (though such utilities could use a market-price approach instead). Because load-serving entities have a responsibility to meet certain generation requirements, a cost-based model is likely an accurate reflection of the true social cost in these situations. The social cost analysis then focuses on how the integrated utility would replace the energy and capacity lost due to the implementation of Section 316(b) regulatory alternatives, including quantifying any emission costs that would be incurred. Because such modeling is a relatively complex and costly activity, it generally would not be sensible to develop an electricity model if the Section 316(b) alternatives have only a modest effect on power output.

2. Futures Prices and Extrapolations

The second method estimates social costs of reduced output indirectly by looking at observed prices in futures markets for wholesale electricity.

a. Overview

The future wholesale prices that are available in some regions can be used directly to develop estimates of the value of lost power. These prices represent the value (at the margin) of reduced generation due to Section 3 16(b) alternatives, i.e., the cost incurred by society to compensate for lost generation.

b. Basic Futures Price Model

Futures prices allow one to use actual market information rather than simulated market information to develop the forward-looking set of prices over various time periods. Thus, futures prices provide important information that is objective and can be easily obtained. The use of futures prices has some limitations, however.

For one thing, futures prices are only quoted for block products that have consistent delivery patterns. Hence, they can only be used to evaluate power reductions that would occur at reasonably constant levels over all peak hours or over all hours.

In addition, because futures markets generally only provide forward prices for one or two years in the future, prices for later years must be projected. Such projections use the futures prices as starting points. Escalation rates can be based on the change in total capital and operations costs of new capacity. To determine capital and operating costs in future years, individual cost components for new capacity are escalated. The individual cost components are then combined in each year to arrive at an aggregate energy cost escalation rate that can be used to escalate the monthly forward prices determined in the market. It is necessary to ensure that the forward cost converges to the estimated cost of new entry, since new entrants are expected to break even under long-run equilibrium.

c. Accounting for All Categories of Cost

Care must be exercised in evaluating futures-based prices to make sure that all three categories of cost (energy, capacity, and emissions) are included. In many regions, capacity is remunerated via a capacity market. Capacity targets are established and those entities that cannot demonstrate sufficient capacity are forced to pay a penalty, which can be regarded as a maximum value of capacity. Where this is the case, there are often observed market prices for capacity. Since capacity requires long lead times to construct, futures prices for capacity can establish going rates for capacity with fairly long lead times. Estimates of future prices can be constructed from the cost of new generation construction.

Generally, the cost of emissions that are subject to cap-and-trade programs will be included in futures prices. Adders for non-traded emissions may be required for emissions outside a cap-and-trade program Chapter IV provides the methodology for developing these types of adders as well as those for capacity costs.

d. Summary

For short-term power outputs of a constant level over all hours, futures prices can be directly used. In long-term applications, the futures prices must first converge toward market equilibrium and can then be escalated.

The use of future prices is well suited to situations where a market analysis is desired and a quick and objective market reference is sought. Generally, such an analysis is less costly than a cost-based model.

3. Modeling of Market Prices Using Econometric Models

A third way to estimate the social costs of replacement power costs is to use a market-price approach.

a. Overview

In lieu of futures prices, which are only available for the near-term and for blocks or constant levels of production, hourly market price forecasts can be developed on a long-term basis. As with futures prices, the use of a price forecast to represent social costs is valid from an economic perspective so long as all the relevant costs are internalized in the market price.

b. Basic Econometric Model

Where there is a reasonably large series of observed market prices, one can use statistical techniques to estimate future prices as a function of supply and demand balance and known uncertainties such as weather patterns that are not explicitly reflected in cost-based models. Because the aggregate potential supply of electricity changes very slowly, observations of prices at various levels of demand will effectively trace out the observed supply curve for power. Once adjustments are made to account for future generating capacity, predictions can be generated from econometric models that relate forecast prices to projected future supply-demand balances. Econometric models can also be used to adjust cost-based models in order to forecast hourly market prices.

c. Accounting for All Categories of Cost

The market price forecasts developed using these tools can include relevant social costs, including internalized emissions costs and capacity costs except those that would be compensated in a separate capacity market such as those that exist in New York, New England and PJM As with the other models, emissions costs are generally internalized when they are subject to cap-and-trade programs In most other situations, a separate valuation of emissions costs is necessary. Chapter IV provides the methodology for evaluating air emissions costs and capacity costs separately.

d. Summary

Econometric models can use historical information to model future prices. These models consider a number of factors in order to reflect the substantial price volatility that is often observed in electricity markets from period to period.

A market-price approach is especially suited for generation owners without a planning responsibility. Integrated utilities that retain a planning responsibility will be able to specify the changes to their costs of serving load resulting from a power reduction caused by a compliance alternative. However, generation owners without a planning responsibility will likely not replace power reductions.

D.Conclusions

The three methodologies outlined in this chapter can provide complete and economically sensible estimates of energy penalties from Section 316(b) alternatives. In some instances, these approaches can be even used in combination. For example, a production-cost model can be used to understand the relationships among units along the supply curve, and to forecast which units will be marginal suppliers of electricity in particular regions. One could use this analysis to form the input to an econometric approach that will better predict price behavior under future demand conditions. In certain cases, however, the methods may not include full estimates of capacity costs and emissions costs. The next chapter provides methods for supplementing the modeling in these cases.

[comment continued in 316bEFR.072.303]

Footnotes

10 A more detailed methodology might consider additional emissions such as fine particles and mercury.

11 This argument is an extension of the logic of the previous chapter in the context of estimating the value of changes in generation, for example, using a production cost model in a single scenario setting

12 Because the pollutants we consider here are primarily of regional or global concern, and because the emissions costs are a secondary component of overall social cost, it should be acceptable in this context to disregard the possibility that shifts in generation will result in differential exposure, because of the location of the generating stations. In some cases, however, for example, where this issue is salient in a permitting decision, the permitting authority may wish to consider the implications of changes in exposure. These can be better addressed using the differential analysis described in the first paragraph of this discussion.

13 Note that some of the facilities within the scope of the Section 3 16(b) Phase II Proposed Rule are nuclear generating stations, which have no emissions of NOx, SO2, or CO2.

14 CSI was recently introduced in the U.S. House of Representatives as H.R. 5266.

EPA Response

This comment presents methodologies to value changes in electricity generation due to the implementation of potential Section 316(b) regulatory alternatives.” EPA has reviewed the considerations and methodologies presented by the commenter. EPA notes that its analysis of the economic impacts of the final Phase II rule uses the Integrated Planning Model (IPM), which is a cost-based model, one of the methodologies suggested by the commenter. The IPM exhibits all the attributes of a cost-based model.

See also response to comment 316bEFR.072.301 in subject matter code 9.03.

Comment ID 316bEFR.072.303

Author Name Thomas R. Kuhn
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

[comment continued from 316bEFR.072.302]

IV. METHODOLOGIES FOR ESTIMATING COSTS NOT INCORPORATED IN MODELS

Changes in capacity and emissions costs may not be included in the modeling results. There are, however, means of including these factors explicitly. This chapter discusses methodologies that can be used to assess capacity and emissions costs when these are not reflected in the methodologies described in Chapter III.

A. Estimating Capacity Costs When Not Explicitly Captured in the Methodology

1. Overview

In the long run, a reasonable measure of capacity costs is the cost of replacement peaking capacity. This capacity provides very little energy and thus represents a pure reliability replacement. The calculation of the cost of such capacity is an essential feature of any study that values capacity losses over an extended period of time.

In the short run, however, this cost may over- or understate capacity costs. If capacity is abundant, it may be cheaper in the short run simply to bear the increased risks of shortages and advance the date slightly at which the next capacity increment is required. Under these circumstances, using the cost of replacement peaking capacity may overstate capacity costs. On the other hand, if a CWIS modification is required suddenly, this proxy may understate capacity costs, because planning and construction of new capacity typically requires several years.

For modifications that entail small changes of capacity in an otherwise appropriately sized generating system, the proxy of the costs of a new peaking unit is probably a close approximation to the correct costs. For large changes, or in systems that face tight constraints on new construction, however, direct simulation of the costs of decreased reliability may be necessary. This section provides a sketch of modeling techniques that can be used to estimate the cost of lost capacity when either the production-cost approach or market-based approach employed has not already included a reliability-based component. The key to the modeling of capacity value involves modeling its two components, EUE and VOLL.

2. Modeling the Expected Unserved Energy (EUE)

EUE can be estimated with all probabilistic production cost models (e.g. PROMOD) that allow the supply-demand balancer to randomly fluctuate. Even where the model estimates EUE, one should ensure that the estimate includes both outages due to supply uncertainty and outages due to demand uncertainty. For those that do not (e.g. GE-MAPS), we can use the outputs from runs that predict supply-demand balance hour-by-hour to calculate an EUE in each hour. This is done by taking data on the outage rates of individual generating equipment and transmission lines and performing Monte

Carlo studies to calculate the probability that insufficient capacity will exist in a particular area to serve load. Even where the production-cost approach does not provide a useful EUE figure, simulations can fairly readily determine a reasonable figure for the probability of lost load at any particular supply-demand balance.

Econometric-based models use as their main predictive variable the supply-demand balance at any time. Consequently, the same sort of Monte Carlo analysis can be used to create estimates of EUE. In futures-based analyses, a separate analysis of supply-demand balance will generally be required to carry out the same sort of analysis.

3. Modeling the Value of Lost Load (VOLL)

VOLL is modeled by means of a number of survey techniques. Statisticians studying VOLL continue to produce a large body of literature that is constantly refining its techniques. Because VOLL varies from time to time and even from customer to customer, any measure is necessarily an approximation. Figures of $5,000-$6,000 per lost MWh, however, are fairly typical.

B. Estimating Emissions Costs When Not Explicitly Captured in the Methodology

This section considers how emissions costs can be included in the energy modeling. We evaluate three types of emissions that are of regulatory interest: <FN 10>

1. Sulfur dioxide (SO2);
2. Nitrogen oxides (NOx); and
3. Carbon dioxide (C02)

The section discusses methods to estimate allowance prices for SO2 and NOx, pollutants that are regulated under cap-and-trade systems. Under a cap-and-trade approach, a regional or national cap limits the total amount of emissions from facilities subject to the regulation. Facilities must hold an allowance for each ton of pollutant emitted, and allowances may be traded among participants. In this case, the value of excess (or reduced) emissions at participating facilities is given by the system-wide marginal cost of abatement, which, in an efficient permit market, will equal the market price of an allowance.

We also consider how to measure emissions impacts where a cap-and-trade system does not apply, using NOx as the most significant element. Finally, we consider how to deal with differences in CO2 emissions, which represent additional complications because of uncertainty in future domestic and international regulations.

We begin with an overview of conceptual issues.

1. Conceptual Issues

Emissions costs can be an important component of total social cost in two situations. The more general case concerns a regional or national shift in generation that would occur as a consequence of a policy shift affecting many facilities. This case would apply for example to analysis of the benefits and costs of an EPA regulatory alternative under Section 316(b) that has the potential to alter generation at many facilities. In this case, assuming that the change is significant, one would use the models described in the previous chapter to forecast future electricity generation under two scenarios: a baseline scenario representing the world in the absence of the regulation, and a control scenario representing implementation of the regulation. In some cases, these models will fully incorporate emissions costs. If not, the analyst can estimate emissions costs separately under the two scenarios and compare the difference in order to obtain the net effect of emissions changes on social cost.

A second case applies when one considers a policy shift that will affect one facility or perhaps have a small effect on a few facilities. This case would apply, for example, when a permitting authority wishes to consider the implications of a permit requirement that would result in reduced power output from the affected generating station. Provided that the shift in generation is small, it may be safe to assume that power prices will remain unchanged. Accordingly, it may not be necessary to generate two scenarios in order to estimate the emissions costs. <FN 11> Instead, one may be able to obtain a reasonable approximation by comparing the emissions rate of the affected facility to the emissions rate of the facility or type of facility that is likely to replace any lost output. The difference in emissions rates multiplied by the magnitude of the shift in generation will approximate the net change in emissions. <FN 12> In the next several sections, we examine the application of this approach to specific types of emissions under various applicable air pollution regulatory regimes. Note that the considerations discussed in the following sections apply both to the particular facility or facilities directly affected by Section 316(b) regulations and to the facilities that would increase generation to compensate for power losses. <FN 13>

2. Sulfur Dioxide (SO2) Allowance Prices

Sulfur dioxide is emitted by coal- and oil-fired power plants and other sources. Utility emissions are currently regulated under the Clean Air Act's Acid Rain Program—one of the first successful examples of a cap-and-trade program.

a. Current Regulation

Title IV of the 1990 Clean Air Act mandates an allowance trading system for SO2 emissions from electric utilities (see Ellerman et. al. (2000) for details on the SO2 trading program). This program applies nationwide. The program, which was implemented in two phases, caps the allowable utility SO2 emissions and allows utilities to trade SO2 allowances. (An allowance gives the owner the right to emit one ton of SO2). Allowances also may be banked for use or trade in future years. The cap on Phase I plants (263 units) started at 7.1 million tons in 1995 and dropped to 6 million tons in 1999. In 2000, Phase II plants were added, expanding the universe of regulated facilities to include existing coal-, oil-, and gas-fired utility units serving generators with an output capacity of greater than 25 megawatts and all new utility units, or over 2,000 units in all. The current cap on annual emissions from this universe of facilities is 8.95 Mt SO2 per year.

b. Prospective Regulation

The future of SO2 regulation is unclear, but it is likely that implementation of existing Clean Air Act provisions (under Title I) will result in further reductions in allowable SO2 emissions, either for particular air quality regions or at a national level. EPA's 1997 revisions to the National Ambient Air Quality Standards ("NAAQS") for fine particles ("PM") increase the stringency of ambient PM standards, and apply them to particles with diameter of 2.5 microns or less, to which SO2 emissions contribute in the form of sulfate aerosols. As a result of litigation, EPA has not yet begun to implement these standards. However, it is likely that the revised PM NAAQS would result in more stringent SO2 standards, either in the form of a nationwide cap-and-trade program similar to the NOx SIP Call (discussed below) or in individual state permit requirements.

Congress is also considering additional controls on utility SO2 emissions. The Bush Administration has proposed to reduce SO2 emissions through the Clear Skies Initiative ("CSI"), which would amend the Clean Air Act through legislation. <FN 14> Under CSI, SO2 emissions from power generators would be capped at 4.5 million tons in 2010 and 3.0 million tons in 2018. Although the CSI may not become law, caps at these levels could be used as an indication of possible future controls.

c. How Social Costs of SO2 Can Be Modeled

Since emissions of SO2 are regulated by national cap-and-trade programs, one can measure the social cost of changes in SO2 emissions using SO2 allowance prices. Because SO2 emissions are capped, expected emissions of SO2 are unlikely to change, despite output reductions related to Section 316(b). Instead, we would expect those facilities providing replacement power to acquire SO2 allowances, if needed, to cover any emissions associated with their additional output. <FN 15> Because the replacement power facilities are likely to have emissions rates that are different from the affected in-scope facility's, overall emissions would change unless additional control measures were implemented. The SO2 allowance market would adjust accordingly, so that any potential increase in SO2 emissions would be controlled through increased use of abatement measures. <FN 16> The costs of any increased control measures would be included in the total social cost of electricity replacement. For small potential changes in emissions, we can calculate the cost of the control measures using the allowance price.

If production cost or other electricity models are used to evaluate the added costs of shifts in electricity generation, however, no additional modeling would be required to measure the social costs of these potential increases in SO2 emissions. In competitive wholesale energy markets—as reflected in these models—the prices would reflect the cost of all resources used by the marginal unit (i.e., the most expensive unit), including the cost of additional air emissions. Consequently, the wholesale market calculations used to estimate the social cost of changes in energy already would reflect the cost of additional SO2 emissions for replacement power. Thus, in this case, no additional calculations would be necessary to capture the cost of changes in SO2 emissions from other facilities.

If there were interest in projecting the impact of potential future air emissions regulations, either as a result of implementation of the 1997 PM NAAQS or as a result of legislative modifications to the Clean Air Act, it would be necessary to estimate the effect of these actions on SO2 permit prices EPA has already estimated the effects of the CSI proposal on future SO2 allowance prices. These estimates could be integrated with forecasts of wholesale prices to capture the emissions effect of regulations or permit modifications under Section 316(b) under a scenario that reflects prospective changes in air emissions limits.

3. Allowance Prices for Nitrogen Oxides (NOx)

NOx is emitted by stationary and mobile sources as a by-product of combustion. Utility NOx emissions are covered by various regional regulatory programs.

a. Current Regulation

In contrast to SO2, there are several cap and trade programs for NOx. In addition, NOx has been addressed on a regional and seasonal basis.

(1) Ozone Transport Commission NOx Budget Program

In 1994, a group of Northeastern states participating in the Ozone Transport Commission (OTC) committed themselves to achieving region-wide NOx emission reduction targets by 1999 and 2003 through an emissions trading program. (See NESCAUM / MARAMA (1996) for details on the NOx Budget Program.) The NOx Budget Program is a “cap-and-trade” program that allows large generators of NOx emissions to trade allowances to meet the emission targets in a cost-effective manner. Emission targets are limited to a five-month control period from May to September.

The participating states have committed to achieving a 75 percent reduction from 1990 levels in NOx emissions (55 percent in northern areas) by the year 2003. The target will be achieved in two stages, one in 1999 and the second more stringent stage coming into effect in 2003. Allowances are distributed based upon the allocation formulas established in each state’s implementing rule. Firms are allowed to trade emissions allowances, so long as they hold enough allowances to cover actual emissions. Allowances may be banked, though their value may be diminished if the quantity of banked allowances in the region is high.

(2) Section 126 Federal NOx Budget Trading Program

EPA has established a second federal NOx trading program under Section 126 of the Clean Air Act Section 126 provides that states may petition EPA to take action to address regional transport of NOx because of its contributions to ozone Eleven Northeast states and the District of Columbia petitioned EPA under this section to find that certain major stationary sources in upwind states emit NOx in violation of the Clean Air Act prohibition on amounts of emissions that contribute significantly to ozone non-attainment or maintenance problems in the petitioning State. In response to four of these petitions, in May 1999, EPA established the Federal NOx Budget Trading Program to address NOx emissions from 12 upwind states (DE, IN, KY, MD, MI, NC, NJ, NY, OH, PA, VA, and WV) and the District of Columbia. EPA issued the final program rules in January 2000 (64 FR 28250, May 25, 1999; 65 FR 2673, January 18, 2000). Under this program, electric utility generation sources in these states are subject to an annual ozone-season emissions limit of 289,983 tons, beginning in May 2004. <FN 17,18> These emissions targets are based on an emissions factor of 0.15 lb/mmBtu. (64 FR 28250, May 25, 1999; 65 FR2673, January 18, 2000; EPA 2002b)

(3) NOx State Implementation Plan (SIP) Call

The EPA has also promulgated regulations that will require 21 states and the District of Columbia to revise their SIPs to reduce NOx emissions. <FN 19> The so-called NOx SIP Call includes two major components:

-Individual State NOx Caps — State NOx caps (“budgets”) are based upon emissions targets for individual sources using standard emission factors and projected 2007 activity levels (U.S. EPA 1998). The emission targets for electric power sources are based on an emission factor of 0.15 lb/mmBtu, (roughly comparable to an 85 percent reduction in emissions for most units). Thus, many utilities in states with large amounts of coal-fired power have to make large reductions or trade for NOx allowances from utilities in other states.

-Cap-and-Trade Program for NOx — The SIP Call allows for a cap-and-trade program for NOx emissions during the ozone season across all 22 states Trading would be allowed among electric power and large industrial boilers, which together account for about 90 percent of the required emissions (US EPA 1998).

To address delays resulting from resolution of issues in litigation, the U S Court of Appeals for the DC Circuit ordered that the original 2003 implementation date for the NOx SIP call be extended to May 2004 EPA has also recently proposed that the implementation date for sources in two states--Georgia and Missouri--be extended to May 2005 (67 FR 8395, February 22, 2002).

(4) Other Regulations

In addition to the three federal cap-and-trade programs described above, states and regions (e.g., California's South Coast Air Quality Management District) have local regulations—and in some cases emission trading programs — that govern NOx emissions. Many electric utility sources are also subject to other federal regulations, for example, performance requirements under the New Source Review program, and Clean Air Act Title IV requirements. The Title IV requirements establish an effective emissions rate of between 0.4 and 0.86 lb/mmBTU for many boilers, depending on the type of boiler.

b. Prospective Regulation

As with SO2, utility NOx emissions may be subject to additional future regulations, either under a cap-and-trade framework or in the form of emissions rate limits. At least some of these standards are likely to involve year-round limits on NOx emissions. EPA's 1997 revisions to the PM NAAQS increase the stringency of the ambient PM standards, and focus them on particles with diameter of 2.5 microns or less. Although the science is still developing, EPA presently considers NOx to contribute to PM in the form of nitrate particles. Moreover, EPA's 1997 revisions to the NAAQS for ozone increase the stringency of these ambient air quality standards. As NOx is a primary precursor to ozone, it is likely that NOx would be further regulated in order to assist states in complying with the revised ozone NAAQS. Because of litigation, neither NAAQS has been implemented yet. Nevertheless, it is likely that implementation would occur within the next ten to twelve years.

Another possibility is that NOx would be included in legislative revisions to the Clean Air Act, such as those discussed above for SO2. For example, the Bush Administration has also proposed to reduce NOx emissions through CSI. Under CSI, NOx emissions from power generators would be capped at 2 1 million tons in 2008—1,582,000 tons in the East and 538,000 tons in the West—and 1 7 million tons in 2018 (1,162,000 tons in the East and 538,000 tons in the West). Although CSI may not be enacted, caps at this level could be used as an indication of possible future controls. In particular, the levels of the proposed Western caps are intended to reflect actions that are already planned in the West to address regional haze under the leadership of the Western Regional Air Partnership. Thus, even if the CSI is not adopted, this cap is indicative of the emissions constraints that Western generators may face.

c. How Social Costs of Capped NOx Can Be Modeled

For those sources for which one or more of the cap-and-trade programs described above sets the binding constraint on NOx emissions, the social cost of additional NOx emissions during the relevant season. <FN 20> would be reflected in the NOx permit prices for the program that sets the binding constraint on a source's emissions. As with SO2 emissions, the increased compliance costs associated with meeting the caps would be included in electricity market models that incorporate air emissions costs, including the opportunity cost of allowances used. If production-cost models are not used, social costs could be estimated by taking into account any differences in the emissions rates of the affected and replacement power facilities, as discussed above for SO2.

If there were interest in considering possible future NOx requirements as part of the development of cost estimates, EPA's projections of the effects of CSI on future NOx allowance prices could be integrated with existing market models. Appendix B provides an example of estimating future NOx allowance prices.

4. Modeling Social Cost of NOx Not Covered by a Cap-and-Trade Program

For NOx sources that are either (1) not covered by one of the existing regional programs or (2) face a binding constraint on emissions outside of one of these programs, emissions requirements will be determined by a technology requirement or emissions limit In these situations, an alternative methodology must be used to value the social costs of air emissions

NOx presents the most significant case of air emissions that must be valued this way, since SO2 emissions are covered by a national cap-and-trade program (CO2 emissions are discussed in the subsequent section.)

a. General Methodology

The social cost of the potential increase in NOx emissions could be a mix of increased compliance costs and increased emissions damages, or "dis-benefits." As noted above, the mix of these two types of social costs would depend upon how many and which sources were regulated in which way. The NOx emissions costs from these facilities will be determined by the marginal cost of control for excess tons of NOx, and to the extent that any such constraint is not initially binding (such that emissions can increase), the social cost will also include the disbenefits associated with the additional tons of NOx emissions.

Additional dis-benefits could be calculated using a series of steps:

1. Estimate changes in ambient air quality (PM and ozone) resulting from changes in NOx emissions;

2. Estimate changes in nitrogen and sulfur deposition resulting from changes in NOx emissions;

3. Estimate changes in exposure to PM and ozone.

4. Use concentration-response (C-R) functions to estimate effect of ambient air quality changes on human health;

5. Value the changes in human health endpoints using available valuation methods;

6. Add the aggregate monetized human health effects to other effects associated with changes in nitrogen and acid deposition to obtain the social cost of increased NOx emissions.

Figure 1 illustrates these steps.

Figure 1 Components of NOX Emissions Impact

[see hard copy for figure]

b. Specific Applications

In specific applications, it would be appropriate to use existing information on the likely dis-benefits of NOx emissions. Generally, these emissions are not likely to account for enough of the total energy penalty to justify an independent study of these various relationships.

5. Accounting for Differences in Carbon Dioxide (CO2) Emissions

Carbon dioxide (CO2) is emitted by a large number of sources that burn fossil fuels. Currently, CO2 is not subject to substantial regulation in the United States, although there is considerable international interest in regulating CO2 and other greenhouse gas emissions globally. Because of these regulatory uncertainties, it will be useful to develop a general methodology that relies upon judgments and the existing literature.

a. Current Regulation

No regulations currently constrain emissions of carbon dioxide (CO2) on a nationwide basis in the U.S. Two states, Massachusetts and Oregon, do, however, have some regulations on CO2 emissions from power plants. The Massachusetts program, which began in April 2001, limits CO2 from six generating stations to historical 1997-99 emissions beginning in 2004 for most plants and 2006 for new plants or plants that have made major modifications. Beginning in 2007 or, for those plants with the later deadline, in 2010, emissions will be capped at a level of 1,800 lb/MWh. Off-site reductions or sequestration may also be used to offset emissions. Under the Oregon program, which began in 1997, the Oregon Energy Facility Siting Council sets CO2 emissions standards for new facilities. For base load natural gas plants, the standard is 0.675 pounds of CO2 per kilowatt-hour, and for non-base-load power plants, the standard is 0 7 lb CO2/kWh, regardless of fuel type. With the Oregon program too, offsets can be used to meet the standards. Applicants also have the choice of paying $0.85 per ton of CO2 to Oregon Climate Trust in lieu of undertaking controls or offsets, thus, the Oregon program is more properly viewed as a tax program rather than a cap-and-trade program.

b. Prospective Regulations

Much of the discussion, of global regulation of greenhouse gas emissions is in the context of the Kyoto Protocol, which was signed in December 1997 but has not yet been ratified by sufficient numbers of countries to go into force. The Kyoto Protocol calls for significant reductions of greenhouse gas (GHG) emissions from Annex 1 countries (mainly developed countries) by the period 2008-2012. The Kyoto treaty set a U.S. target of reducing CO2 emissions by seven percent below 1990 emission rates during the 2008-2012 commitment period. The Bush Administration has indicated that the US will not ratify the Kyoto Protocol. Instead, in February 2002, President Bush announced a strategy on climate change that sets a voluntary goal of reducing greenhouse gas (including C02) emissions intensity by 18 percent over the next ten years, from 183 metric tons per million dollars of GDP to 151 metric tons per million dollars of GDP. Potential controls on utility CO2 emissions, which would establish a domestic cap-and-trade program for CO2, are being considered in Congress.

c. How Social Cost of CO2 Can Be Modeled

This section provides a general strategy for estimating the social costs associated with changes in CO2 emissions due to Section 316(b) control alternatives. This strategy involves a two-step process.

1. Project future regulatory requirements, and

2. In light of future regulatory requirements, develop projections of allowance prices and/or dis-benefits from additional CO2 emissions.

(1) Assess Prospective Regulations

The appropriate procedure for estimating the cost of changes in CO2 emissions is highly dependent on future regulatory requirements. Thus, the first step in evaluating these costs is to consider the likely future regulatory requirements. The regulatory requirements may consist of one or more of the following:

-No binding regulations or voluntary agreements.
-Voluntary agreements to reduce emissions;
-Emission limits;
-Cap-and-trade program.

Note that the judgments about which types of regulations are likely may differ over the time period being considered. It may be reasonable to assume, for example, that there will be no binding regulations in the next decade and a cap-and-trade program thereafter.

In addition to assessments of the general type, it would be necessary to develop assessments of the likely level of stringency (e.g., the level of any national utility cap on CO2 emissions). These assessments would set the stage for the second step, to develop specific values.

(2) Estimate Values Based on Literature

After evaluating the nature and extent of likely regulatory requirements, the analyses would include assessments of the likely allowance prices (cap-and-trade programs), compliance costs (binding emission limits), or dis-benefits (no regulations or non-binding emission limits).

Numerous estimates have been developed of likely CO2 allowance prices under alternative assumptions regarding the likelihood of international trading in CO2 allowances Although less numerous, there are studies that assess the likely dis-benefits of CO2 emissions.

C. Summary

Both capacity and emissions costs can be estimated separately if they are not included in the overall modeling approaches. These methods can supplement the modeling results. As with the general modeling, it would be important to assess the likely significance of these effects before undertaking major studies of these effects.

V. CONCLUDING REMARKS

The three methods discussed in this report all can be used to develop economically valid measures of the social costs of energy penalties due to various Section 316(b) regulatory alternatives. All three basic approaches can overcome the major difficulties of the simple approach used by EPA in the EBA. Because the EPA methods might influence the evaluation of Section 316(b) regulatory alternatives at a national level in this rulemaking as well as the development of Section 316(b) alternatives in a particular permit case, it is important that EPA modify its analyses to include one or more of these approaches, or at least note that other methodologies are appropriate to develop accurate and complete estimates of the social costs of energy penalties.

The choice among methods in a particular Section 316(b) application should be left to the Section 316(b) permit applicant—assuming all elements of social cost are included— because there is no one approach that is best in all situations. The choice of a particular modeling approach depends upon various factors:

-Availability and applicability. In some cases, the data or modeling framework may not be available. Regions that have forward prices do not cover all energy facilities, and thus the forward price approach may not be an option.

-Complexity and cost. The various approaches differ in their complexity and the cost of implementation. Moreover, the added cost depends upon the nature of the modeling the Section 316(b) applicant is doing for other purposes. For example, if a utility has an established model in-house, the added costs of doing model runs for Section 316(b) alternatives maybe modest.

-The size of the likely energy costs. The usefulness of developing detailed estimates will depend in part on the likely size of the Section 316(b) energy penalty. Clearly, a more complex and detailed model will be more appropriate where the penalties are large than if they are a small element of overall social cost

-Coverage. The choice of model also will depend upon its coverage—whether it□includes all relevant elements or if some elements (e.g., capacity) of social cost need to be developed outside the model.

-Input projections and other uncertain ties. Most of the modeling approaches require key inputs to be projected into the future. These inputs include natural gas prices, oil prices, coal prices, future capacity expansion, and future emission allowance prices. Uncertainties in these inputs create uncertainties in the overall projections. There are techniques that can be used to evaluate these uncertainties, although the techniques increase the cost of the modeling.

Although these factors may not point to a single modeling approach, the elements can be used to develop a methodology for calculating energy penalties due to Section 316(b) alternatives that is both economically sound and cost-effective in light of the specific circumstances.

Footnotes

15 It is possible that some of these allowances would come from the facility affected by 316(b).

16 Similarly, any potential reduction in overall emissions (due to a higher emissions rate at the affected in-scope facility) would result in reduced use of existing abatement measures.

17 The ozone season extends from May 1 to September 30.

18 The program implementation date was recently delayed from May 1, 2003 until May 31, 2004 (67 FR 21521, April 30, 2002).

19 The original rules included an additional state—Wisconsin—but EPA has proposed to exclude Wisconsin in response to court rulings.

20 If a source participates in a cap-and-trade program only during the ozone season, it will be necessary to value changes in non-ozone-season emissions using the methodologies described in the next section.

EPA Response

This comment discusses “methodologies that can be used to assess capacity and emissions costs when these are not reflected in the methodologies” (see comment 316bEFR.072.302 in subject matter code 9.03). Specifically, the commenter discusses two types of costs: (1) capacity costs and (2) emissions costs.

(1) The IPM, which was used for the economic impact analysis of the final Phase II rule, explicitly accounts for capacity costs.

(2) The IPM estimated changes in air emission technologies as a result of the final rule. The annualized increase in capital costs (estimated for run year 2010) as a result of such changes is less than $3 million. While the emissions allowance function in the IPM was not enabled for the section 316(b) Phase II analysis, EPA conducted an analysis to assess the changes in emissions of SO2, NOx, and CO2. These analyses showed minimal changes in emissions as a result of the final Phase II rule. In 2008, the year when some Phase II facilities were modeled to experience installation downtimes, the highest emissions increase was for NOx, which increased by less than 0.4% compared to the baseline. In all other years, the maximum increase for the three pollutants was less than 0.1%. The estimated change for SO2 in 2010 was a decrease of 0.5%. EPA therefore finds that omission of these emission changes and their societal cost (or benefit) from the social cost estimate will not materially affect the decisions made by EPA.

In the concluding remarks, the commenter notes several factors that should determine the choice of a particular modeling approach. Among other factors, the commenter notes that “[t]he usefulness of developing detailed estimates will depend in part on the likely size of the Section 316(b) energy penalty. Clearly, a more complex and detailed model will be more appropriate where the penalties are large than if they are a small element of overall social cost." EPA agrees with this comment and notes that the Phase II final rule is expected to cause no operational energy penalties with generating losses resulting only from temporary shutdown of facilities during installation of compliance equipment or, in very few instances, from earlier closure of older generating facilities. Given the limited energy effects of the final rule, EPA judges that the use of the IPM framework and the character of analyses that EPA has performed and reported for energy effects meet or exceed the commenter's recommendation on choice of a modeling approach.

See also response to comment 316bEFR.072.301 in subject matter code 9.03.

Comment ID 316bEFR.072.304

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

APPENDIX A. PRODUCTION COST MODELS EXAMPLE OF GE-MAPS

Production cost models have been developed over the last decades to simulate the workings of electricity systems. This appendix provides a description of one prominent model, that developed by General Electric Energy Consulting. The model is the Multi-Area Production Simulation model, or MAPS. <FN 21>

A. GE-MAPS Capabilities

MAPS is a highly detailed model that calculates hour-by-hour production costs while recognizing the constraints on the dispatch of generation imposed by the transmission system. When the program was initially developed over twenty years ago, its primary use was as a generation and transmission planning tool to evaluate the impacts of transmission system constraints on the system production cost. In the current deregulated utility environment, the acronym MAPS may also stand for Market Assessment & Portfolio Strategies because of the model's usefulness in studying issues such as market
rower and the valuation of generating assets operating in a competitive environment.

The unique modeling capabilities of MAPS use a detailed electrical model of the entire transmission network, along with generation shift factors determined from a solved ac load flow, to calculate the real power flows for each generation dispatch. This enables the user to capture the economic penalties of redispatching the generation to satisfy transmission line flow limits and security constraints.

Separate dispatches of the interconnected system and the individual companies' own load and generation are performed to determine the economic interchange of energy between companies. Several methods of cost reconstruction are available to compute the individual company costs in the total system environment. The chronological nature of the hourly loads is modeled for all hours in the year. In the electrical representation, the loads are modeled by individual bus.

In addition to the traditional production costing results, MAPS can provide information on the hourly spot prices at individual buses and on the flows on selected transmission lines for all hours in the year, as well as identifying the companies responsible for the flows on a given line.

Because of its detailed representation of the transmission system, MAPS can be used to study issues that often cannot be adequately modeled with conventional production costing software. These issues include:

Market Structures — MAPS is being used extensively to model emerging market structures in different regions of the United States. It has been used to model the New York, New England, PJM and California ISOs for market power studies, stranded cost estimates, and project evaluations.

Transmission Access - MAPS calculates the hour spot price ($/MWh) at each bus modeled, thereby defining a key component of the total avoided cost that is used in formulating contracts for transmission access by non-utility generators and independent power producers.

Loop Flow or Uncompensated Wheeling — The detailed transmission modeling and cost reconstruction algorithms in MAPS combine to identify the companies contributing to the flow on a given transmission line and to define the production cost impact of that loading.

Transmission Bottlenecks — MAPS can determine which transmission lines and interfaces in the system are bottlenecks and how many hours during the year these lines are limiting. Next, the program can be used to assess, from an economic point of view, the feasibility of various methods, such as transmission line upgrades or the installation of phase-angle regulators for alleviating bottlenecks.

Evaluation of New Generation, Transmission, or Demand-Side Facilities — MAPS can evaluate which of the available alternatives under consideration has the most favorable impact on system operation in terms of production costs and transmission system loading.

Power Pooling — The cost reconstruction algorithms in MAPS allow individual company performance to be evaluated with and without pooling arrangements, so that the benefits associated with pool operations can be defined.

Table 1 shows how MAPS models the bulk power system and yields an accurate through-time simulation of system operation.

Table 1. MAPS Models the Bulk Power System

[see hard copy for table]

B. GE-MAPS Modeling

MAPS has evolved to study the management of a power system's generation and transmission resources to minimize generation production costs while considering transmission security. The modeling capabilities of MAPS are summarized below:

Time Frame — One year to several years with ability to skip years.

Company Models — Up to 175 companies.

Load Models — Up to 175 load forecasts. The load shapes can include all 365 days or automatically compress to a typical week (seven different day shapes) per month. The day shapes can be further compressed from 24 to 12 hours, with bi-hourly loads.

Generation — Up to 7,500 thermal units, 500 pondage plants, 300 run-of-river plants, 50 energy-storage plants, 15 external contracts, 300 units jointly owned, and 2,000 fuel types. Thermal units have full and partial outages, daily planned maintenance, fixed and variable operating and maintenance costs, minimum down-time, must-run capability, and up to four fuels at a unit.

Network Model — 30,000 buses, 60,000 lines, 100 phase-angle regulators and 10 multi-terminal High-Voltage Direct Current lines. Line or interface transmission limits may be set using operating nomograms as well as thermal, voltage and stability limits. Line or interface limits may be varied by generation availability. Transmission losses may vary as generation and loads vary, approximating the ac power flow behavior, or held constant, which is the usual production simulation assumption.

Marginal Costs — Marginal costs for an increment such as 100 MW can be identified by running two cases, one 100 MW higher, with or without the same commitment and pumped-storage hydro schedule. A separate routine prepares the cost difference summaries. Hourly bus spot prices are also computed.

Operating Reserves — Modeled on an area, company, pool and system basis.

Secure Dispatch — Up to 5,000 lines and interfaces and nomograms may be monitored. The effect of hundreds of different network outages is considered each study hour

Report Analyzer — MAPS allows the simulation results to be analyzed through a powerful report analyzer program, which incorporates full screen displays, customizable output reports, graphical displays and databases The built-in programming language allows the user to rapidly create custom reports.

Accounting — Separate commitment and dispatches are done for the system and for the company own-load assumptions, allowing cost reconstruction and cost splitting on a licensee-agreed basis. External economy contracts are studied separately after the base dispatch each hour.

Bottom Line — Annual fuel plus O&M costs for each company, fuel consumption, and generator capacity factors.

C. GE-MAPS Applications

The program's unique combination of generation, transmission, loads and transaction details has broadened the potential applications of a production simulation model. Since both generation and transmission are available simultaneously with MAPS, the user can easily evaluate the system and company impacts of non-utility generation siting and transmission considerations.

In addition to calculating the usual production cost quantities, MAPS is able to calculate the market clearing prices (marginal costs or bus spot prices) at each load and generation bus throughout the system. For the load buses, the price reflects the cost of generating the next increment of energy somewhere on the system, and the cost of delivering it from its source of generation to the specific bus. Because the production simulation in MAPS recognizes the constraints imposed by the transmission system, the market clearing prices include the costs associated with the incremental transmission losses as well as the costs incurred in redispatching the generation because of transmission system overloads. Figure 2 shows the variation in market clearing prices of two separate companies. The company wide clearing price is the weighted average of the clearing prices at the load buses.

Figure 2. Market Clearing Prices Vary with Time and Location

[see hard copy for figure]

MAPS is also able to calculate and constrain both the actual electrical flows on the transmission system and the scheduled flows assigned to individual contract paths. The actual real power flows on the network are based on the bus-specific location of the load and on the generation being dispatched to serve the load. The scheduled flows include firm company-to-company transactions that are delivered from the seller to the buyer over a negotiated path. The scheduled flows also include the generation from remotely owned units, which is delivered to the owning company over an assigned path, and generation that is delivered to remotely owned load.

The simultaneous modeling of actual and scheduled flows is especially important in modeling the Western region of the US where the scheduled flows often have a major impact on the operation of the system. Figure 3 shows the hourly flows on one of the WSCC interchange paths where the scheduled flows on the path are limiting while the actual flows are not, resulting in ‘the generation dispatch being constrained by scheduled rather than actual physical limits. This is important in identifying the contract paths that have available transfer capability and could be used to deliver power from potential new development sites.

Figure 3. Example of Hourly Actual and Scheduled Flows 300

[see hard copy for figure]

APPENDIX B. CASE STUDIES ON THE VALUATION OF LOST GENERATION, LOST CAPACITY, AND INCREASED AIR EMISSIONS

This appendix describes three examples of assigning dollar values to economic losses at power plants—in the form of lost generation, lost capacity, and increased air emissions. The examples given here are designed to demonstrate the method rather than the precise values, which will change over time as the underlying data changes.

D. Case Study on the Valuation of Lost Energy Generation

This appendix provides an example of developing dollar values for lost electricity generation resulting from Section 316(b) control alternatives. The methodology in this example is based upon the forward price approach. The example concerns the value of generation in the Pennsylvania-New Jersey-Maryland Interconnection (“PJM”). The example was developed in 2000 in the context of a specific Section 316(b) permit application. <FN 22> Nevertheless, the general methodologies discussed here—if not the specific dates and data—could be used to develop estimates for many facilities facing regulatory or permit requirements under Section 316(b).

1. Methodology for Calculating Cost of Replacement Energy

The cost of replacement energy to compensate for lost generation at the facility is calculated by multiplying prices for energy in PJM wholesale markets by the appropriate quantity of lost energy. The basic methodology for determining energy prices is as follows:

1. Year 2002. Monthly energy prices are based on the current forward prices for energy in 2002. Monthly energy prices are the hourly weighted average of on-peak, weeknight, and weekend prices. Forward market prices were provided by PSEG Energy Resources and Trade (2000).

2. Years 2003 to 2015. Energy prices are escalated using energy prices in 2002 as a starting point. Prices over this period are based on projected changes in the cost of new generation.

Escalation rates for the years 2003 to 2015 are based on the change in total capital and operations costs of new capacity, which is assumed to be a combined-cycle unit. To determine capital and operating costs in future years, individual cost components for a combined-cycle unit are escalated. The individual cost components are combined in each year to arrive at an aggregate energy cost escalation rate that is used to escalate the monthly forward prices for 2002. The following assumptions are used in developing the escalation rates for individual components and for aggregating these components:

-Construction Costs and Unit Heat Rates Based on ETA data (U S Department of Energy 1999)

-Natural Gas Prices. Natural gas prices over the period 2001 to 2005 are based on the assumption that current futures prices (as reported in the Wall Street Journal) trend toward EIA's natural gas price forecast for 2005 (U S Department of Energy 1999). Prices for the period 2005 to 2015 are based on the ETA natural gas price forecast (U S Department of Energy 1999).

-Firm Gas Reservation Charge and Gas Transportation Tax and Surcharge. Both the firm gas reservation charge and the gas transportation cost, tax and surcharges are assumed to remain constant in nominal terms (Federal Energy Regulatory Commission 2000).

-Fixed and Variable O&M. Fixed and variable O&M are escalated at the forecast GDP implicit price deflator, as reported by the ETA (US Department of Energy 1999).

-Utilization Rate. An 80 percent utilization rate is assumed.

Table B-1 provides the escalation rates for the individual cost components. Table B-2 provides estimates of the average energy costs for the period 2002 to 2015, weighted by facility generation. This table reflects the average cost of replacing generation at facility.

Table B-1. Escalation Factors Used in Estimating Future Cost of Potential Entrant

[see hard copy for table]

Table B-2. Monthly Average Energy Costs for 2002 to 2015

[see hard copy for table]

2. Construction Outages

The monthly cost of replacement energy during an outage is estimated by multiplying the quantity of lost energy (i.e., the quantity the facility would have otherwise generated) by the PJM wholesale market prices for peak, off-peak and weekend load periods. The quantity of lost energy is based on average monthly utilization levels in each load period for the years 1998 to 2000.

The cost of lost energy is estimated net of fuel and variable operations and maintenance savings at the facility, since these costs would not be incurred. The variable cost of energy production (including fuel and variable operations and maintenance) is $20 per megawatt-hour from October to April, and $25 per megawatt-hour during the ozone season (May to September) (Marusiak 2000). Total annual costs are calculated by summing the monthly costs for all months in which there is a construction outage. The total cost is calculated by summing annual energy costs across years, with appropriate discounting.

3. Changes in Continuing Operation Associated with All Intake Modifications and Closed-Cycle Cooling

For changes in continuing operation associated with all intake modifications and closed-cycle cooling, the cost of lost energy reflects only the cost of replacement energy. The cost of replacement energy for these changes to continuing operation is estimated for every month by multiplying the energy loss in each month (in MWH) by the wholesale energy market prices for peak, off-peak, and weekend periods. Energy losses reflect auxiliary power requirements for intake modifications and the combination of auxiliary power requirements and heat rate penalties for closed-cycle cooling systems. The annual cost of lost energy for each year is estimated by summing costs across months. The total cost is calculated by summing annual energy costs across years, with appropriate discounting. The magnitudes of the energy losses for each alternative depend on these auxiliary power requirements and reductions in plant efficiency.

4. Changes in Continuing Operations Associated with Seasonal Flow Reductions

There are two components to the cost of lost energy associated with seasonal flow reductions in the months of April, May, and June: <FN 23> (1) energy savings from reduced auxiliary power, and (2) energy losses that occur from reductions in energy generation due to the decline in cooling water flow. Auxiliary power savings is calculated for every month by multiplying the change in energy in each month by the monthly PJM wholesale market price for peak, off-peak, and weekend load periods. The annual cost of lost energy for each year is estimated by summing costs across months. The total cost is calculated by summing annual energy costs across years, with appropriate discounting. The magnitudes of the energy savings depend on auxiliary power requirements.

Seasonal flow reductions would also result in a reduction in energy generation, since the flow reductions would reduce the facility’s maximum generation capacity. The quantity of lost energy is the quantity of energy above this constrained capacity that the facility otherwise would have generated. The cost of energy losses is calculated for every month by multiplying the energy loss in each month by the monthly PJM wholesale market price for peak, off-peak, and weekend load periods. The variable cost of energy production (including fuel and variable operations and maintenance) is $20 per megawatt-hour from October to April, and $25 per megawatt-hour during the ozone season (May to September) (Marusiak 2000). Estimates are based on average monthly utilization levels in each load period for the years 1998 to 2000. Lost energy is estimated net of fuel and variable operations and maintenance savings at the facility, since these costs would not be incurred. The annual cost of lost energy for each year is estimated by summing costs across months.

The total cost is calculated by summing annual energy costs across years, with appropriate discounting.

E. Case Studies on the Valuation of Lost Capacity

This section provides an example of developing dollar values for lost capacity resulting from Section 316(b) control alternatives. The methodology in this example is based upon the forward price approach. The example concerns the value of capacity in the Pennsylvania-New Jersey-Maryland Interconnection ("PJM"). The example was developed in 2000 in the context of a specific Section 316(b) permit application. <FN 24> As above, the example is designed to demonstrate the method rather than the precise values, which will change over time as the underlying data changes. The methodology used here relies on forward market prices to forecast future energy prices.

1. Methodology for Calculating Costs of Lost Capacity

Estimates of the social cost of lost capacity for the facility are based on market price projections for the PJM installed-capacity ("I-Cap") market. Demand in this market is driven by capacity obligations on load serving entities ("LSEs") that are imposed by PJM to ensure that there is adequate capacity to maintain the reliability of the PJM system. The capacity obligation is defined as the amount of installed capacity necessary to meet the annual peak load plus a reserve component, which is typically 20 percent LSEs can obtain capacity through bilateral contracts or purchases on the I-Cap market conducted by PJM. <FN 25>

Capacity costs in the year 2002 and 2003 are based on forward market prices (PSEG Energy Resources and Trade 2000). Prices in the years 2004 to 2015 are based on an extrapolation of prices using prices in 2003 as a starting point. Escalation rates are based on an estimate of the change in capital cost for new capacity, which is assumed to be combined cycle gas generation. This real escalation rate ranges from 1.3 percent to 0.6 percent annually (Department of Energy 1999) Table B-3 presents the monthly capacity prices used in this study.

Table B-3. Monthly Capacity Prices for the Period 2002 to 2015

[see hard copy for table]

2. Construction Outages

The monthly cost of lost capacity for construction outages is estimated by multiplying the facility's monthly rating (in MW) by the PJM market capacity price (in $/MW-day) for each of the days during the outage. Annual capacity cost is calculated by adding the monthly capacity cost over the outage's duration. The total cost is calculated by summing the annual costs, with appropriate discounting.

3. Changes in Continuing Operation

The cost of lost capacity for changes in continuing operations are estimated under two different conditions:

1. Permanent reductions in capacity; or

2. Scheduled reduction in capacity due to construction outages or seasonal flow reductions.

The methodology for estimating the cost of lost capacity under each of these conditions is described below.

a. Permanent Reductions in Capacity

A permanent increase in load and/or decreased efficiency in a unit represents an effective change in the unit's capacity rating. The monthly cost of lost capacity for each alternative is estimated by multiplying the PJM capacity market price (in dollars per megawatt-month) by the effective monthly derate (in megawatts). Annual capacity cost is calculated by adding the monthly capacity cost over the outage's duration. The total cost is calculated by summing the annual costs, with appropriate discounting.

b. Construction Outages and Reductions for Seasonal Flow Reductions

The monthly cost of lost capacity for construction outages or seasonal flow reductions is estimated by multiplying the reduction in the facility's rated capacity for April, May and June (in megawatts) by the PJM market capacity price (in dollars per megawatt-month) for each of the days during the outage. Annual capacity cost is calculated by adding the monthly capacity cost over the outage's duration. The total cost is calculated by summing the annual costs, with appropriate discounting.

F. Case Study on the Valuation of Air Emissions

This section provides an example of developing dollar values for changes in air emissions resulting from Section 316(b) control alternatives. The example concerns the value of air emission changes relevant for a facility in the PJM. The example was developed in 2000 in the context of a specific Section 316(b) permit application. <FN 26> The example is designed to demonstrate the method rather than the precise values, which will change over time as the underlying data changes.

1. Sulfur Dioxide (SO2)

Some fish protection alternatives would lead to reductions in emissions from the facility over certain periods of time. During construction outages, for example, the facility would not produce emissions, though it would have had there been no outage. The social costs of these changes in emissions are calculated by multiplying forecast allowance prices per ton of emissions by the quantity of additional tons of emissions. Emissions from the plant are based on average utilization levels over the period 1998 to 2000, heat rate data for the plant (in kilowatt-hours per Btu), and SO2 content data (U S Department of Energy 1999)

Allowance price forecasts are based on the current allowance price index from Cantor Fitzgerald (2000) for future years. This index is based on the price of actual trades and current buyer and seller offers. (The average price for 2002 allowances over the three-month period from July to September 2000 was $154 per ton of SO2). Vintage permit prices were used to develop permit price estimates for the years 2003 and 2004. Vintage permits can be purchased today, but are not valid for use until the permit's vintage year, at which time they can be used for compliance or banked. <FN 27> Permit prices after the year 2004 are adjusted based on the change in vintage permit prices between 2003 and 2004, which are the last two years of vintage permit price data. The final values for permit prices used in each year are included in Table B-4.

Table B-4 Air Emissions Costs From Lost Power (Year 2000 $/Ton Emissions)

[see hard copy for table]

2. Oxides of Nitrogen (NOx)

For alternatives that would result in reduced NOx emissions from the plant, the methodology used to estimate these social cost savings is similar to the methodology used for SO2 emissions These emission savings are calculated by multiplying forecast allowance prices per ton of emissions times the quantity of additional tons of emissions. Emissions from the plant are based on average utilization levels over the period 1998 to 2000, heat rate data for the plant (in kilowatt-hours per Btu), and average NOx emission rates (U.S. EPA 1998a, U.S. EPA 1998b). Note that if the plant is equipped with SNCR scrubbers, the use of average NOx emission rates likely overstates the estimates of NOx emission savings.

Allowance price forecasts are based on the current allowance price index, for example from Cantor Fitzgerald (2000). This index was based on the price of actual trades and current buyer and seller offers. The average price for 2002 allowances over the three-month period from July to September 2000 was $538 per ton of NOx. At the time of the example study, vintage permit prices were not available for NOx permits beyond 2002. Consequently, prices for years beyond 2002 were based on SO2 vintage price adjustments. The final values for allowance prices used in each year are included in Table B-4.

Note that since NOx emissions would only lead to cost increases during the summer NOx season when emission caps are imposed, using permit prices for annual tons is likely to misstate the actual emission savings unless steps are taken to account for emissions during outside of the summer NOx season.

3. Carbon Dioxide (CO2)

The cost of CO2 emissions is based on increases in emissions at other facilities and, for some types of power losses, increases in emissions at the plant. Seasonal flow reductions and constructions outages would lead to both reductions in CO2 emissions at the plant and increases at other facilities. Changes in auxiliary power and heat rate penalties would lead only to changes in emissions at other facilities The cost of changes in emissions at other facilities and at the plant are estimated as follows:

Emission Changes at Other Facilities

-Period 2002 to 2004. The costs of CO2 emissions are based on the quantity of additional CO2 emissions from replacement power, multiplied by the disbenefits value per ton of emissions The quantity of additional CO2 emissions is based on PJM market simulations using the PROMOD model.

-Period 2005 to 2015. The costs of CO2 emissions are based on the incremental cost of electric power under a carbon-cap regime <FN 28> relative to business-as-usual conditions. The incremental cost (cost per kilowatt-hour) is multiplied by the quantity of auxiliary power to arrive at the cost of CO2 emissions.

Emission Changes at the plant

-Period 2002 to 2015. The savings (per kilowatt-hour) of reduced CO2 emissions at the facility is based on the cost per ton of emissions permits under a carbon-cap regime and the quantity of emissions generated by a unit of energy (i.e., tons CO2 per kilowatt-hour). Total costs are calculated by multiplying the emissions per unit of energy by the reduction in facility energy generation. These estimates are based on average utilization levels over the period 1998 to 2000, heat rate data for the facility (in kilowatt-hours per Btu), and CO2 content data (U.S. Environmental Protection Agency 1999).

The following sections provide further details on the calculation of CO2 costs.

a. CO2 Costs Due to Emissions Changes at Other Facilities

(1) CO2 Impacts 2002 to 2004

To arrive at a marginal impact value, an average is taken of studies estimating the social impact resulting from climate change, summarized in the IPCC's Climate Change 1995 (Bruce, Lee, and Haites 1996) monograph <FN 29> The report summarizes the marginal impact estimates at different future dates, assuming a "business as usual" policy where no additional regulations are instituted. Marginal impact estimates for years in between those presented are estimated by a linear interpolation of the marginal impact value for the two closest years. Table B-4 presents estimates of the marginal value of additional CO2 emissions used in this study.

(2) CO2 Costs: 2005 to 2015

Estimates of the cost of additional CO2 emissions from 2005 to 2015 are based on an estimate of the marginal cost of reducing CO2. This estimate is based on an analysis of the Kyoto Protocol by the Energy Information Administration (EIA) (U.S. Department of Energy 1998). ETA's analysis assumes that the U.S. achieves some emission reductions through international emissions trading so that the resulting annual domestic emissions are 9 percent above 1990 levels. <FN 30> The analysis also assumes that domestic reductions are achieved through an emissions trading program. <FN 31> Since this policy is the least-cost approach to achieving domestic reductions, estimates of the costs of additional CO2 emissions under these assumptions are conservative.

These additional social costs of CO2 emissions can be estimated by examining the change in electricity price with the assumption that a carbon-cap regime is imposed. Since replacement power for the plant will generate additional CO2 emissions, these increases must be offset by reductions from other facilities, resulting in additional costs. The price change that would occur under the CO2 caps reflects the change in resource costs at the unit providing replacement power (i.e., the marginal unit) to reduce CO2 emissions such that the emissions cap is maintained.

EIA's analysis provides estimates of the average annual electricity prices in the MAAC region under business-as-usual (BAU) conditions and under the implementation of the Kyoto Protocol. <FN 32> The cost of additional CO2 per megawatt-hour is thus the difference in prices between ETA's BAU and Kyoto scenarios. Table B-5 provides annual estimates of the incremental cost per megawatt-hour of additional CO2 abatement measures that would be required to maintain the desired emissions cap based upon ETA analysis.

TABLE B-5. Cost of Additional CO2 Emissions (2000$ / MWh)

[see hard copy for table]

b. Emission Changes at the Plant

(1) CO2 Impacts 2002 to 2007

As with changes emission changes at other facilities, the savings from emission changes at the facility over the period 2002 to 2007 are based on the marginal impacts of additional CO2 emissions Table B-5 presents estimates of the marginal value of additional CO2 emissions used in this study.

(2) CO2 Permit Costs: 2008 to 2015

Prices for CO2 allowances after 2008 are based on the ETA study of the Kyoto Protocol discussed in relation to CO2 costs from other facilities. Allowance prices used in this study are based on the same scenario discussed above (i.e., emissions at 1990 plus 9 percent levels). The permit costs in this case are $44 per ton of CO2 in 2010, and $38 per ton of CO2 in 2020. <FN 33> To calculate values between 2008 and 2021, a linear extrapolation of the 2010 and 2020 values is made. The permit prices used in the analyses are presented in Table B-5.

Footnotes

22 The calculations of energy costs were developed by National Economic Research Associates, Inc. as part of the permit application submitted by PSEG for the Mercer generating facility.

23 These months are the period of peak entrainment at the facility.

24 The calculations of energy costs were developed by National Economic Research Associates, Inc. as part of the permit application submitted by PSEG for the Mercer generating facility.

25 In the event that an LSE does not obtain adequate capacity to meet its obligation, it must pay a penalty set by PJM. That penalty is currently set at $177 per megawatt-day, although the penalty doubles to $354 per megawatt-day when capacity throughout PJM is deficient (i.e., there is inadequate capacity to fulfill the aggregate obligation of all LSEs). In practice, LSEs do not pay penalties, since capacity can be obtained more cheaply through bilateral contracts or wholesale markets.

26 The calculations of energy costs were developed by National Economic Research Associates, Inc. as part of the permit application submitted by PSEG for the Mercer generating facility.

27 In contrast, current allowances may be used in the current year or banked for future use. Ellerman et. al. (1997) discuss reasons for differences between current and vintage prices

28 At the time the original study was completed the US was still considering ratification of the Kyoto Protocol.

29 The values for studies by Cline were not included in the averages, since some of these studies assume zero discount rates. For each study, the mid-point of the range of values is used.

30 See Note 28.

31 The analysis assumes domestic implementation using a CO_2 tax. As EIA points out, however, the analysis and results are equivalent to that for an emissions trading program.

32 The MAAC region includes roughly the same geographic area as PJM.

33 These are converted from values of $129 per ton of carbon in 2010 and $123 per ton of carbon in 2020, using a conversion factor of 3.67 to convert CO_2 to carbon.

EPA Response

The commenter provides a description of a production cost model, GE-MAPS. EPA has reviewed this description. However, since the description does not contain a comment on the Phase II rule, EPA provides no further response. EPA notes that Chapter B3 of the Economic and Benefits Analysis (EBA) in support of the final rule contains a discussion of how EPA selected the IPM for the Phase II analysis (see DCN 6-0002).

The commenter also provides three examples of "assigning dollar values to economic losses at power plants— in the form of lost generation, lost capacity, and increased air emissions." EPA has reviewed these examples. However, since the examples "are designed to demonstrate the method rather than the precise values" and do not contain a comment on the Phase II rule, EPA provides no further response.

See also response to comment 316bEFR.072.301 in subject matter code 9.03.

Comment ID 316bEFR.072.401

Author Name Thomas R. Kuhn

Organization Edison Electric Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

IN-SCOPE FACILITY MAPS AND DESCRIPTION OF LOST ANGLER DAYS DOUBLE COUNTING

EDISON ELECTRIC INSTITUTE

To: Richard Bozek
From: Jeremy Snider
Date: July 25, 2002

Subject: EPA In-Scope Power Plants

The Project Consulting Group (PCG) was tasked to (i) graphically depict the 539 plants listed by EPA as 'in-scope' and (ii) determine the extent of EPA over-counting of lost angler days related to the number of plants within a 120-mile radius of a single county. PCG was able to map 530 of the 539 plants along with their 120-mile radii (or 'buffers'). All but two of these 530 plants had radii that overlapped the radius of at least one other plant.

Using mapping and database software, PCG calculated the degree to which at least 50% of a county's area (as a proxy for at least 50% of its population) was within 120 miles of one or more plants. 2,710 counties in 47 states plus the District of Columbia fell at least 50% within the 120-mile radii of the 530 identified in-scope plants. Of these, just 172 counties fell within only one plant's radius; the remaining 2,538 counties (94% of the total) are counted multiple times. In fact, more than half are counted 11 times or more (as much as 51 times). This means these counties fall within the 120-mile radii of this many plants.

Additionally, PCG was asked to identify the type of water (fresh or salt) the in-scope plants use for cooling. In most cases, specific data was available from plant operators on the cooling system used. In other cases, PCG inferred the water type from the body of water on which the plant was located. Of the 530 in-scope plants, 416 (78%) use fresh water for cooling; the other 114 (22%) use salt water.

The process involved in making these determinations is highly technical and required many steps. A summary of this process follows:

1) Created database file of EPA 'in-scope' plants. In order to be able to map the plants on EPA's list of in-scope facilities, we had to match them to a database of power plants in POWERmap, a mapping software application produced by Platts, a division of the McGraw Hill Companies. To do this, we first exported the entire list of plants from POWERmap into a Microsoft Access database. We then set up a form to facilitate the matching process. Environment's staff assistant, Donna Rutherford, matched a majority of the plants on the EPA list to plants in the database. PCG completed the matching process, finding plants who were not as easily identified. We succeeded in matching 530 of the 539 plants. 4 plants could not be identified. Another 5 are currently unaccounted for. We are cross-checking our work to track down these plants.

2) Created map of EPA plants and identified plants within 120 mile of each other. By linking the selected plants to POWERmap's map data, we were able to create a map of the 530 plants. We then created individual 120-mile radius 'buffers' around each plant. Using a mapping function that detects overlap, we found that all but two buffers directly overlapped another buffer.

3) Determined which county segments fell within plants' 120-mile buffer. To be able to calculate the percentage of a county falling within a plant's buffer, we had to separate each buffer into individual pieces for each county it overlapped. We essentially used the counties layer as a cookie cutter to slice through all of the buffers. In this way, we were able to create a unique combination of plant-buffer and county segment that would allow us to calculate the percentage of a county within a buffer and the number of times a county fell within different plant's buffers.

4) Calculated how many times individual counties were overlapped 50% or more by different plants' 120-mile buffers. To accomplish this, it was necessary to import the new plant-buffer-county segment data into Access. There we compared the area (in square miles) of a county segment associated with a plant (i e , falling within a plant's 120-mile buffer) with the total area of that county to determine the percentage overlap. We selected the county segments that were at least 50% the area of the whole county. As each county segment was associated with a plant, we were also able to count how many different plants' buffers overlapped a county by 50% or more.

5) Prepared report of counties and plants that overlap them (attached). We used the queries above as the basis for a report that shows for each affected county: (i) the in-scope plants, grouped by operator, whose 120-mile radii overlap that county by at least 50%; (ii) the percentage of the county's land area each plant's radius overlaps, and (iii) the number of plants whose radii overlap the county. This last value was considered to equal the extent of over counting.

6) Determined cooling water type for in-scope plants. PCG obtained data concerning the source of water used for cooling (fresh vs. saltwater) primarily from Utility Data Institute (UDI), as reported by plant operators. In some cases (approximately 40% of in-scope plants), data reported by plant operators were not sufficient to ascertain whether freshwater or saltwater is used in cooling. For those plants, the waterbody on which the plant is located was used to infer whether fresh or salt water is used for cooling. For example, plants located on an ocean, ocean harbor, tidal portion of a river, or ocean bay were considered to use saltwater. Plants located on inland harbors, inland rivers, lakes, or reservoirs were considered to use freshwater. This system may not result in 100% accuracy, but we believe it accurately reflects the broad picture.

7) Prepared maps of in-scope plants and affected counties. Two sets of maps were prepared to demonstrate the extent of overlap of multiple plants to counties The first set, "EPA In-Scope Power Plants", depicts the 528 plants whose 120-mile radius buffers overlap the buffer of at least one other in-scope plant. Maps are included for all 528 plants, as well as just those plants using freshwater cooling and those using saltwater cooling. The second set of maps, "Counties Affected by EPA In-Scope Power Plants", depicts for each county how many different plants are within 120 miles of at least 50% of the county's area. This is a graphic representation of the report by the same title. This set also includes individual maps for the counties affected by plants using freshwater cooling and by those using saltwater cooling.

[see hard copt for figures and tables]

EPA Response

In the cost-benefit analysis of the benefits for the final Section 316(b) Phase II rule, EPA no longer uses the angling index to extrapolate benefits. Rather, all benefits are now extrapolated based on average annual operational flow. Please see EPA's response to comment #316bEFR.041.041 for a discussion of issues related to extrapolation of losses and benefits.

EPA agrees that, when looking a 120-mile radius surrounding a plant, most facilities overlap with other facilities. Multiple facilities impinging and entraining aquatic organisms within an ecosystem can have a significantly larger effect on the ecosystem than a single facility. This is especially true with migrating species and other species that move inland and offshore on a seasonal basis, causing them to pass multiple CWIS on their journey. EPA believes that evaluation of I&E should be done at the watershed and regional level as well as on the plant level.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Glenn Kramer

On Behalf Of:

Amerada Hess Corporation

Author ID Number:

316bEFR.073

Comment ID 316bEFR.073.001

Author Name Glenn Kramer

Organization Amerada Hess Corporation

Subject Matter Code 3.01

Definition: Existing Facility

Applicability of Rule Needs to be Clarified:

The proposed rule, specifically, 40 CFR 125.91(a) states “This subpart applies to an existing facility, as defined in § 125.93, if it:

(1) Is a point source that uses or proposes to use a cooling water intake structure;

(2) Both generates and transmits electric power, or generates electric power but sells it to another entity for transmission;

(3) Has at least one cooling water intake structure that uses at least 25 percent of the water it withdraws for cooling purposes as specified in paragraph (c) of this section; and

(4) Has a design intake flow of 50 million gallons per day (MGD) or more. Facilities that meet these criteria are referred to as “Phase II existing facilities.”

However, the proposed rule as currently written under 40 CFR 125.91 Subpart J does not exclude existing facilities whose primary business is not power generation. This is not consistent with the language in the preamble to the proposed rule.

Specifically, Section IV of the preamble “Overview of Facility Characteristics (Cooling Water Systems & Intakes) for Industries Potentially Subject to Proposed Rule” states “Today’s rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by cogeneration” (67 FR 17135).

Additionally, Section III of the preamble “Summary of Data Collection Activities” (67 FR 17131) states “Nonutility facilities are classified under SIC codes 4911 and 493 if the primary purpose of the facility is to generate electricity, and it is these non-utility facilities that are potentially subject to this rule.” EPA specifically states in the preamble the category of facilities that would meet the proposed cooling water intake structure criteria for existing facilities are electric power generation utilities and non-utility power producers (67 FR 17123).

While it is apparent from the preamble language that EPA intends to include only electric power generation utilities and non-utility power producing facilities whose primary business activity is power generation, it is important that the language in the final rule include this clarification. EPA should make clear that 40 CFR Part 125 Subpart J only applies to existing facilities whose primary business activity is power generation. Accordingly, we respectfully suggest adding to the end of 40 CFR 125.91(a)(1) “and power generation is the primary business activity of the facility.”

EPA Response

See response to 316bEFR050.002.

Comment ID 316bEFR.073.002

Author Name Glenn Kramer

Organization Amerada Hess Corporation

Subject Matter Code 3.01

Definition: Existing Facility

EPA Needs to Define “Generates and Transmits”:

The proposed rule would apply to an existing facility that both “generates and transmits” electric power. However, EPA has not defined “generates and transmits” which is an explicit requirement of the applicability of 40 CFR 125.91 to an existing facility. In the absence of a definition of “generates and transmits”, it is unclear whether a facility that generates electrical power for internal use only would be considered an “existing facility” as defined in 40 CFR 125.93. EPA needs to define “generates and transmits” in the final regulation.

EPA Response

EPA has not defined “generates and transmits” in the final rule. The Agency does not believe that defining such common terms is necessary to ensure the scope of the rule is clear, especially in view of the clarifications EPA has included in the final rule. See response to 316bEFR050.002.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Doug Dixon

On Behalf Of:

EPRI (Electric Power Research Inst)

Author ID Number:

316bEFR.074

Comment ID 316bEFR.074.001

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

Nearly 30 years of national and international research on cooling water intake structure (CWIS) impacts and fish protection technologies has demonstrated that impacts and technology effectiveness are a site-specific issue. EPA's 1977 draft guidance reflects this knowledge. Improvements to both the site-specific assessment process (as noted herein) and fish protection technologies since publication of that guidance help make that process much more effective. A structured site-specific approach, using EPA's own Ecological Risk Assessment process would allow for efficient determination of impacts and installation of effective fish protection technologies where those impacts are determined to be adverse.

EPA Response

EPA disagrees. Please refer to the preamble for a discussion of the framework of today's rule. Also refer to the preamble to the final rule for information as to why EPA is promulgating today's final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.074.002

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

We continue to recommend defining "adverse environmental impact" (AEI). EPRI supports the definition -- adverse environmental impact is a reduction in one or more representative indicator species (RIS) that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure. This definition embodies both scientific and social considerations.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.074.003

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.0

Environmental Impacts

Nearly 30 years of historical data and analysis indicate that AEI attributable to CWIS are extremely limited or not occurring. New analyses funded by EPRI further indicate that water withdrawal impacts are insignificant relative to other environmental factors and that there is no direct relationship between water withdrawal and ecosystem health. Unlike in the 1970s when data and analyses were limited and aversion to risk was scientifically and socially justifiable, the data base and knowledge that exist today afford EPA the opportunity to avoid a stance of total aversion to any risk (or unnecessarily embracing the "precautionary approach").

EPA Response

EPA agrees that most facility-sponsored studies in the past 30 years have not shown a significant impact to fish populations that can be directly attributable to a specific cooling water intake structure. However, EPA does not believe that the facilities are causing zero impact to fish populations and the results of the studies point more to the fact it is extremely difficult to prove undeniably that the cooling water intake structure is at fault; indeed it may be impossible unless a facility commences or significantly changes operation and the nearby populations instantly crash in response. Many anthropogenic activities work concurrently on the environment. It is extremely difficult to separate the effects of any one factor. A facility will always be able to blame another factor and claim that it is not the real source of the problem. In addition, changes in the populations may be masked by the considerable natural variation in the size of fish populations. The intention of section 316(b) of the Clean Water Act is to minimize the adverse environmental impact specifically of cooling water intake structures and does not seek to eliminate stress on fisheries due to other factors such as habitat alteration, dredging, coastal development, overfishing, industrial pollution, nutrient pollution, wastewater runoff and climate change. There are a number of different stresses acting on the nation's fisheries at any one time. Section 316(b) is an important tool to reduce one stressor recognized by Congress: the continued killing of billions of fish yearly by cooling water intake structures. This rule will complement fishery management plans and water quality improvements that aim to reduce stress on the nation's fisheries.

Comment ID 316bEFR.074.004

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.02

Benefit Estimation Methodology

EPA's biological, engineering, and economic analyses that support the proposed rule have numerous conceptual and implementation flaws that result in grossly overestimating fish losses at CWIS and the potential economic benefits that may accrue from their protection. Drs. Lawrence Barnthouse (Appendix A) and Elgin Perry (Appendix B) both note the conceptual and parameter errors in estimating fish losses on a case study and national basis and, more importantly, note how the multiplicity of conservative parameter choices result in highly inflated fish losses due to impingement and entrainment. Dr. Ivar Strand (Professor Emeritus, Fisheries Economics, University of Maryland – Appendix C), further notes how EPA's economic analyses are flawed and inconsistent with EPA's own guidelines for performing economic benefits assessments. Dr. Strand makes several substantive recommendations that would improve the economics benefits analysis.

EPA Response

EPA disagrees with the assertion that EPA's I&E analysis is flawed. For responses to comments of Dr. Elgin Perry and Dr. Lawrence Barnthouse, please see EPA's responses to comment #316bEFR.029.105 regarding the age of impingement, Comment #316bEFR.306.092 regarding the detection of ecological impacts, Comment #316bEFR.074.101 regarding EPA's calculation of production foregone, Comment #316bEFR.074.042 regarding multiple conservatisms, Comment #316bEFR.005.009 regarding fish population modeling, and Comment #316bEFR.025.015 regarding compensation.

EPA disagrees that its analysis is inconsistent with the principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN# 6-1931). For EPA's responses to comments on specific analyses please see the following comments.

For EPA's response to comments on the commercial fishery method, please see the response to comment # 316bEFR.323.016. For EPA responses to comments on the recreational fishery methods, please see comments # 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values for the final rule, including meta-analysis and the benefit transfer method. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003).

Comment ID 316bEFR.074.005

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02
Performance standards

While we agree that high fish protection can be attained for some species and life stages with many of the technologies reviewed by EPA, we do believe that EPA has generally over-estimated or over-stated the long-term fish protection that can be attained in the performance standard ranges that are proposed for reducing impingement mortality and entrainment. The database of information from which EPA derives the proposed “standards” is a research database and not a database resulting from long-term compliance assessment. Field research was generally conducted under short-term optimal operational and environmental conditions. The data, therefore, does not represent long-term performance following routine operation & maintenance and exposure of the technology to the extremes of environmental conditions. Furthermore, the data does not demonstrate that standards can be achieved for all species and life stages. Other site-specific issues, as subsequently noted, may also impair performance during certain time periods. We, therefore, recommend caution in adoption of “performance standard ranges” based on the research database. Unlike “end of pipe” technologies that are not subject to performance confounding environmental elements, “front of pipe” technologies are heavily influence by them. EPA may wish to alternatively consider performance “targets” as a fish protection objective.

EPA Response

EPA has selected performance standards to facilitate a more streamlined approach to the permitting process and to provide a more consistent mitigation target on a national level. However, facilities can comply with the requirements of today's rule in a variety of ways. EPA thus maintains a desired flexibility in the implementation of the rule, thus allowing a facility to select measures that are appropriate to the site conditions and facility configuration.

Additional documentation has been collected and reviewed by EPA to further augment support for the performance standards and added to the Technology Efficacy database. This database, originally designed to act as a centralized bibliography of data EPA has reviewed during the course of the development of the final Phase II rule, has been expanded to allow users to query and compare basic data on technology performance and applicability. EPA recognizes that some may disagree with basing the performance standards on the wide range of data available in the database. While many documents do show some level of success in reducing impingement mortality or entrainment, other studies have shown the deployed technology to be unsuccessful or at best inconclusive. EPA did not view the varying degrees of success with regard to a specific technology as problematic, but rather as evidence that some technologies work in some applications but not in others.

Comment ID 316bEFR.074.006

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

EPRI recommends that EPA consider accommodating for episodic events in the impingement and entrainment "targets" that may preclude a technology's ability to provide fish protection. Such episodic events include corn shuck loading in the central U.S., seasonal (and episodic) leaf and other debris loading, fish that are moribund or dead-on-arrival because of weather-related phenomena (e.g., winter fish kills or kills associated with sudden decreases in dissolved oxygen), and other site- and water body-specific episodic biological and physical phenomena. EPA may also wish to consider precluding the application of the standards to nuisance species whose ecosystem removal is a preferred aquatic resource management approach.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.074.007

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Research is increasingly demonstrating that aquatic community health and fish productivity is related to habitat quality and that aquatic habitat loss and alteration is one of the major factors responsible for fish population declines. More importantly, ecosystem research is finding that habitat loss and alteration may ultimately prove to be more deleterious to stock restoration efforts than over exploitation. Increasingly, resource management agencies are adopting management strategies designed to protect and restore critical aquatic habitat. EPRI strongly supports EPA's proposal to allow habitat restoration as an approach to mitigate for I&E losses. EPRI recently completed an interim report that provides an assessment of the state-of-science on restoration and habitat enhancement strategies for mitigating the impacts of I&E. This report is included in this comment package. The report concludes that restoration science is rapidly evolving, restoration projects are increasingly demonstrating success, and, most importantly, while projects can directly mitigate for I&E losses they also provide long-term ancillary environmental benefits. Unlike with CWIS fish protection hardware where population benefits are highly uncertain, fish population and other environmental benefits will result from effectively designed environmental enhancement and restoration projects.

EPA Response

EPA believes restoration science continues to progress, though uncertainties still remain. EPA believes the requirements in the final rule will help to reduce restoration measure uncertainty.

For a discussion of ancillary benefits from restoration measures, see EPA's response to comment 316bEFR.032.011.

EPA does not believe the uncertainty of the existence of population level effects from restoration measures will necessarily be significantly lower than that from the use of cooling water intake structure fish protection hardware. In some cases, EPA believes it can be higher because of the uncertainties associated with the design, implementation, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.074.008

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 8.03

Proposed standards for Great Lakes

While estuaries, tidal rivers and coastal oceans are “unique” in the numbers of fish and invertebrates that are impinged and entrained and support key habitat for the maintenance of recreational and commercial fish, such a “unique” system does not exist for the Great Lakes. The Great Lakes uniqueness derives from international and national public policy and public concern over the drastic ecological changes that have occurred in the basin since colonization of North America. These changes mostly result from the deliberate and accidental introduction of non-native fish and invertebrates and mid-20th century commercial harvesting that was not sustainable. Our preliminary analysis indicates that the Great Lakes, unlike estuaries ant tidal rivers, are not productive systems, are generally depauperate of species, and those highly desirable species that they do support, their early life stages are not particularly vulnerable to power plant entrainment. The Great Lakes, in fact, are more like reservoirs than estuaries and tidal rivers. Prescriptive entrainment [mortality] reduction standards for the Great Lakes, therefore, do not appear necessary or justified by EPA’s own waterbody sensitivity criteria. Alternatively, it is highly unlikely that population-level benefits will accrue from entrainment protection in relation to other more pervasive stresses and impacts that are occurring in the Great Lakes system. We hope to further investigate this issue and provide more supportive technical documentation as part of our comments to the EPA NODA expected this fall.

EPA Response

Please refer to the response to comment 316bEFR.025.013.

Comment ID 316bEFR.074.009

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

EPA's determination that CWIS entrainment survival is 0% (based on its analysis of EPRI's 2000 Entrainment Survival Report) is scientifically untenable. Even EPA's re-calculations of entrainment survival in several of the study examples presented in Chapter A7 of the Case Study Methodology demonstrate that entrainment survival, while lower, still does occur. Entrainment survival monitoring methods have significantly advanced since the early 1970s and results collected since the late 1970s are valid. If EPA moves forward in their final rules with an impingement mortality reduction standard, EPRI recommends that entrainment mortality reduction should be similarly identified (not simply entrainment reduction).

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards.

Comment ID 316bEFR.074.010

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

Reservoirs are highly managed artificial systems and prescriptive impingement mortality reduction standards are very difficult to scientifically support – in fact, analyses that we have recently funded and reported on herein (see Appendix E) indicate that cooling water reservoirs often support fish populations that are as healthy as, or more healthy than, non-cooling reservoirs. If there are any systems that EPA should consider evaluating or regulating on a site-specific basis, reservoirs are such systems. Scientific data indicates the reservoir impingement mortality reduction may only be appropriate when it is in the interest of fisheries management.

EPA Response

Please refer to the response to comment 316bEFR.041.551 for a discussion of the biology of reservoirs.

Comment ID 316bEFR.074.011

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 19.0

Dry Cooling

EPRI supports EPA's conclusion that dry cooling is not a CWIS technology. It is also a technology that is not well suited for retrofit on existing power generating units. The lowest attainable steam condensing temperature at a plant using dry cooling must always exceed the ambient dry bulb temperature, even in new construction where direct systems using air-cooled condensers would be the technology of choice. In retrofit situations, where indirect systems with an intermediate, circulating water loop operating between the existing steam condenser and an air-cooled heat exchanger could be used, the attainable condensing temperature will be even higher. This inevitably results in additional thermal penalties to the cycle, further increased heat rate, emissions and operating costs.

EPA Response

The Agency agrees with the conclusion of the comment, as pertains to statements about the use of indirect dry cooling and its relative infeasibility for application in retrofit situations. The Agency still considers dry cooling to be an inappropriate technology for the basis of the final rule. See response to comment id 316bEFR.022.002.

Comment ID 316bEFR.074.012

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

EPRI has completed a study of estimates and information available on the costs and impacts associated with the retrofit of recirculated wet cooling systems in place of once through cooling at existing stations (Appendix D). In light of our comments regarding the determination of AEI at existing stations, it seems prudent that any decision to require such capital expense and operating penalties would come only after careful site-specific evaluation of AEI and other alternative mitigation options and potential benefits. The study also found that EPA's estimates for these costs were comparable to the "easier" retrofit situations from studies and data collected. It is our conclusion that the cost to put in towers in many stations would be significantly higher due to site-specific issues.

EPA Response

The Agency determined that retrofitting cooling towers was not an acceptable basis for the final regulatory requirements, in part, based on the costs and uncertainties of the technology. Should the commenter's assertions indeed prove true (i.e., that EPA's estimates of cooling tower costs are underestimated), then this would only serve to reinforce and further support the Agency's decision not to utilize cooling towers as a basis for the final rule.

Comment ID 316bEFR.074.013

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 12.02

RFC: Monitoring frequencies

EPRI recommends that EPA re-consider the need for prescriptive baseline monitoring and instead provide flexibility in the design and timing of such studies in accordance with the mitigation option pursued and the information needed to assess fish protection performance. EPRI has identified a number of factors that either preclude the need for baseline monitoring, make baseline monitoring extremely difficult or provide information of limited utility. These factors or issues include: (1) for some fish protection technologies (e.g., fine mesh traveling screens with fish return systems, aquatic fabric barriers) that are pursued, survival can be directly monitored or density differences in intake and discharge simultaneously monitored thereby precluding the need for a pre-baseline study; (2) shoreline monitoring for baseline characterization must take into consideration the fact that it may not capture the type and density of organisms due to the absence of a CWIS and the hydraulic environment it creates; and (3) extensive natural variability in estuarine and coastal areas because of fluctuating abiotic (weather) and biotic factors may make it more difficult (spatially and temporally) to develop the requisite precision in fish community characteristics (presence and relative abundance) for baseline characterization.

EPA Response

EPA believes that it has taken measures to streamline the baseline monitoring requirements, including allowing the use of historical data and/or data from other facilities if it is demonstrated to be reflective of the current conditions at the facility's intake structure (see § 125.95(b)(1)(ii); § 125.95(b)(2)(i); and § 125.95(b)(3)(iii)). Also see EPA's response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.074.014

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Finally, included in our comment package is the recently completed EPRI report - Evaluating the Effects of Power Plant Operations on Aquatic Communities: An Ecological Risk Assessment Framework for Clean Water Act § 316(b) Determinations. This report specifically describes how EPA's own Ecological Risk Assessment (ERA) approach can be used as a framework for performing site-specific 316(b) assessments. EPRI formally requests peer review of this report by the EPA Cooling Water Task Force – we also request that the Task Force forward the report to the EPA staff or team responsible for developing EPA's ERA approach for their peer-review as well.

EPA Response

EPA has considered the contents of the submittal in crafting the final rule, but does not believe it is appropriate to participate in a peer-review.

EPA does, however, note that the rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.074.015

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 17.06

Option: Site-specific determination of BTA

The one area, however, where the site-specific assessment process had limitations is that no standard framework for performing the assessments had ever been developed and applied. To address this limitation, EPRI has evaluated EPA's own Ecological Risk Assessment (ERA) process (EPA 1998) and has determined that the process offers an excellent conceptual framework for performing 316(b) assessments and determining BTA as required. Furthermore, EPRI has specifically developed or adapted the framework for performing 316(b) assessments. The results of EPRI's analysis are contained in the report – Evaluating the Effects of Power Plant Operations on Aquatic Communities: An Ecological Risk Assessment Framework for Clean Water Act § 316(b) Determinations (EPRI 2002a). Three copies of this report are appended to this comment letter. The following material is directly from the introductory chapter of this report:

Why Use ERA in 316B Assessments?

USEPA defines ecological risk assessment as "….a process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors" (USEPA 1992). Since entrainment and impingement results in the exposure of aquatic organisms to physical and chemical stresses, it seems that a logical approach to assessing the risk of adverse environmental impact of cooling water withdrawals would be through the use of an ecological risk assessment framework, such as that provided by USEPA. Further, USEPA acknowledges using ERA concepts when developing the interpretation of AEI in the New Facilities Rule for §316(b) (Comment 316bNFR.040.004, USEPA 2002). Finally, since the USEPA ERA Guidelines "…set forth current scientific thinking and approaches for conducting and evaluating ecological risk assessments" (USEPA 1998), the approach described in the Guidelines should be a sound starting point for adapting ERA to the assessment of adverse environmental impact under §316(b).

In fact, the USEPA's ERA guidelines have much in common with technical approaches recently used for site-specific assessments of the potential for AEI under §316(b) (PGE 1998; PSEG 1999; Barnthouse et al. 2002). Common features include a tiered approach, differentiation between ecological effects and the adversity of those effects, inclusion of both prospective <FN 2> and retrospective assessments, and use of multiple lines of evidence (weight-of-evidence). In addition to the decision-making advantages listed above, the USEPA's ERA approach is fully scalable allowing assessment of the potential for AEI at all levels of complexity, ranging from the relatively straightforward qualitative evaluation (e.g., check sheets) to the most complex and controversial cases involving state-of-the-art quantitative modeling; all under the same assessment framework. In addition, incorporation of an initial screening within the problem formulation phase will ensure that CWISs with little potential for AEI can by-pass much of the assessment process and be rapidly and easily permitted. On the other hand, CWISs with a higher potential for AEI would be thoroughly evaluated using a logical and technically sound assessment process. For all of these reasons, we believe that use of an approach based on USEPA (1998) would bring consistency across §316(b) assessments (as well as across assessments of risk from a variety of other man-induced stressors) with a flexible, efficient, technically sound and widely accepted approach.

In addition to the use of ERA to assess AEI, USEPA's two-step environmental decision-making process (i.e., risk assessment/risk management) is identical to the two-step process traditionally used for site-specific determinations under §316(b) (AEI assessment/BTA determination). Consequently, it also appears logical to address the entire §316(b) under USEPA's risk assessment/risk management approach. Such an approach would be useful regardless of whether the determination follows the traditional two-step process or focuses solely on selecting among management alternatives to reduce aquatic organism loss. Following this approach, the assessment of potential ecological risk becomes one of several factors that must be considered in making a BTA (i.e., risk management) decision. Other factors receiving consideration in determining which is the most appropriate intake alternative for minimizing any adverse environmental impacts include economics, technology, collateral environmental consequences, and social aspects.

Detailed information on application of ERA to 316(b) determinations in contained in the report included herein. EPRI formally requests peer review of this report by the EPA Cooling Water Task Force – we also request that the Task Force forward the report to the EPA staff or team responsible for developing EPA's ERA approach for their peer-review as well.

In addition to completing the previous report, EPRI has also recently completed an additional report that provides guidance on the selection of a 316(b)-assessment method (EPRI 2002).   In 1999, EPRI prepared a catalog of the various methods and models for estimating fish losses and impacts on aquatic populations and communities due CWIS impingement and entrainment (EPRI 1999). That report, however, did not provide guidance on the selection of an appropriate assessment approach. Our new report provides such guidance. This report concludes that there are a wide variety of technically sound methods available to address potential cooling water withdrawal effects at various levels of complexity and sophistication. The most appropriate methods will vary from site to site; there is no one set of methods applicable to all plants and source waterbody types. Risk assessors (using the ERA framework) can plan their analysis to incorporate a logical progression of methods, beginning with relatively simple methods, and only proceeding onto more complex and costly methods when necessary to adequately address risk. In general, the most sophisticated methods should be limited to the few situations where determination of CWIS impacts on populations has been complex. Specific report recommendations are that the assessment should: (1) include all relevant information as part of multiple lines of evidence and base conclusions on the weight of evidence; (2) be carefully designed to explicitly address assessment endpoints and assessment measures most appropriate for the specific source waterbody and potentially affected populations and communities; (3) be conducted in a phased manner to ensure that available resources are targeted at the most important issues; (4) include both prospective and retrospective methods to the extent practical and appropriate to the context of the assessment; and (5) explicitly address uncertainty in estimating effects, preferably through quantitative means. The report discusses each of these specific recommendations in detail. Three copies of this report (EPRI 2002b) are included in this comment package. This report compliments our 1999 catalog of methods (EPRI 1999a), our adaptation of the EPA ERA framework for 316(b) assessments (EPRI 2002a), our technical update and review of fish protection technologies (EPRI 1999b), and our procedural guidelines for selecting BTA alternatives (EPRI 2000).

Footnotes

2 This report uses the term "prospective" as used in the ERA guidelines to describe methods that estimate expected effects. In other ecological risk assessment and impact assessment literature, the term "predictive" has often been used in an equivalent sense.

EPA Response

Please refer to the response to comment 316bEFR.074.014.

Comment ID 316bEFR.074.016

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Need for Definition of AEI

EPRI has previously commented on the need to define the term "Adverse Environmental Impact" (AEI) and our support and encouragement for developing such a definition continues. Without such as definition, that which is being minimized is unclear or that which is being minimized for lack of definition (i.e., fish mortality due to impingement and entrainment) is a policy determination – one that is not consistent with other human endeavors (e.g., construction, transportation, agriculture, forestry and other resource development) that, while resulting in loss of aquatic and terrestrial life, are environmentally sustainable and socially acceptable. EPRI's scientific efforts have focused on developing tools and information to manage and support the sustainability of populations and communities. Individual members of any given population do not persist through time and cannot be sustained. Therefore, except for endangered and threatened species, where losses of individuals have been predetermined to have the potential for population level impact, the individual or individual losses are not appropriate endpoints for an AEI definition.

Our supported definition has recognized that it must encompass both scientific and social elements. Toward this end, EPRI has worked with the Utility Water Act Group (UWAG) and our members to develop a potential definition; i.e., -- adverse environmental impact is a reduction in one or more representative indicator species (RIS) that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.074.017

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01
RFC: Definition of "adverse environmental impact"

In August of 2000, in association with the Annual Meeting of the American Fisheries Society, EPRI sponsored the symposium Defining and Assessing Adverse Environmental Impact Under Clean Water Act §316(b). At that time, 20 papers were orally presented – of that total, 17 papers have now been finalized according to professional peer-review comments. These papers include:

-Maryland power plant cooling-water intake regulations and their application in evaluation of adverse environmental impact. McLean, R., W. A. Richkus, S. P. Schreiner, and D. Fluke. Pages 1-11.

-Scientific and societal considerations in selecting assessment endpoints for environmental decision making. Strange, E. M., J. Lipton, D. Beltman, and B. D. Synder. Pages 12-20.

-Adverse environmental impact: 30-year search for a definition. Mayhew, D. A., P. H. Muessig, and L. D. Jensen. Pages 21-29.

-Uncertainty and conservatism in assessing environmental impact under §316(b): lessons from the Hudson River Case. Young, J. R., and W. P. Dey. Pages 30-40.

-A holistic look at minimizing adverse environmental impact under Section 316(b) of the Clean Water Act. Veil, J. A., M. G. Puder, D. J. Littleton, and N. Johnson. Pages 41-57.

-Modeling possible cooling-water intake system impacts on Ohio River Fish Populations. Perry, E., G. Seegert, J. Vondruska, T. Lohner, and R. Lewis. Pages 58-80.

-A process for evaluating adverse environmental impact by cooling-water system entrainment at a California power plant. Ehrler, C. P., J. R. Steinbeck, E. A. Laman, J. B. Hedgepeth, J. R. Skalski, and D. L. Mayer. Pages 81-105.

-Comparing Clean Water Act Section 316(b) policy options. Kadvany, J. Pages 106-138.

-Using attainment of the designated aquatic life use to determine adverse environmental impact. Seegert, G. Pages 139-146.

-Defining "adverse environmental impact" and making §316(b) decisions: a fisheries management approach. Bailey, D. E., and K. A. N. Bulleit. Pages 147-168.

-Indicators of AEI applied to the Delaware Estuary. Barnthouse, L. W., D. G. Heimbuch, V. C. Anthony, R. W. Hilborn, and R. A. Myers. Pages 169-189.

-Adverse environmental impact: a consultant's perspective. Wells, A. W., and T. L. Englert. Pages 190-203.

-Proposed methods and endpoints for defining and assessing adverse environmental impact (AEI) on fish communities/populations in Tennessee River reservoirs. Hickman, G. D., and M. L. Brown. Pages 204-218.

-Minimizing adverse environmental impact: how murky the waters? Super, R. W., and D. K. Gordon. Pages 219-237.

-Measurement error affects risk estimates for recruitment to the Hudson River stock of striped bass. Dunning, D. J., Q. E. Ross, S. B. Munch, and L. R. Ginzburg. Pages 238-253.

-Use of equivalent loss models under Section 316(b) of the Clean Water Act. Dey, W. Pages 254-270.

-A blueprint for the problem formulation phase of EPA-type ecological risk assessments for 316(b) determinations. Van Winkle, W., W. P. Dey, S. M. Jinks, M. S. Bevelhimer, and C. C. Coutant. Pages 271-298.

All of the above papers are included in this filing. Except for the paper by Super and Gordon of the Riverkeeper Organization who offer an alternative interpretation of the requirements of 316(b), all the papers note the scientific and societal considerations for defining adversity, and most explicitly offer an aquatic population or community-based definition, or they recommend the development of one.

EPA Response

EPA acknowledges receipt and has reviewed the papers mentioned. Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.074.018

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Relative to our recommendation for the need for a definition of AEI, we would also like to note that the EPA ERA framework allows for, or can accommodate, alternate definitions of increasing complexity. Using the ERA framework, the level of assessment complexity would be driven by the potential for adversity, allowing for an efficient use of available assessment and mitigation resources. Section 5 of the EPRI report discusses adversity indicators in more detail; however, basic types of risk description of increasing complexity include:

-Qualitative analysis of representative species (RS)(or "species of concern") susceptibility and vulnerability to entrainment and impingement;

-Quantitative comparison of the estimates of losses to indicators of the capacity of RS populations to sustain such losses;

-Interpretation of the significance of changes in population abundance projected using population models; and

-Evaluation of the status or health of RS populations and fish and macroinvertebrate communities in the waterbody. This may include an evaluation of multi-year trends in abundance, diversity, and species composition, and the strength of evidence for causal links between any observed declines and CWIS operation, where such data are available.

Examples of the indicators that would typically be used in §316(b) assessments to characterize the risks to assessment endpoints using the various measures of effect are shown in Table 5-1 of the EPRI ERA report.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. For these reasons, EPA has also elected not to adopt the ecological risk assessment framework for section 316(b) determinations in the NPDES permitting program.

Comment ID 316bEFR.074.019

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.01

Overview of I & E effects on organisms

New Water Withdrawal Impact Information

EPRI is currently funding the Oak Ridge National Laboratory to investigate the relationship between water withdrawal (cooling, irrigation, public supply, hydropower) and the health of fish populations and communities in the water body from which it is withdrawn. As of the preparation of these comments, the report had not completed the standard professional peer review that we require for reports from our program. However, since there is key information relative to the impacts of CWIS and the EPA 316(b) rule-making effort, we feel that it is important that the data and findings from the analyses become part of the public record. Key chapters from the final DRAFT report are included in Appendix E. The complete finalized report will be submitted to EPA as soon as it is available.

The essential question investigated in this effort is whether the numbers of fish that are intercepted and diverted by an artificial water intake, and the magnitude of damages that are incurred by fish populations in the water body, are proportionate to the volume of water withdrawn (or alternatively, whether other environmental or biological factors predominate). The study thus tested the hypothesis of a dose-response model relating volume of water withdrawn (as the “dose”) to the status of fish populations (the “response”). A corollary question is whether there is some lower threshold of water intake volume in relation to water body volume below which the numbers of fish involved are inconsequential for survival of fish populations (consistent with a threshold dose-response model). We analyzed many types of withdrawals from water storage reservoirs as well as CWIS in order to have a wider range of withdrawal volumes for identifying a possible dose-response pattern (note: the aquatic environment does not discern between withdrawal use patterns).

The ORNL project team approached the analyses in six parts: (1) provision of background information on CWIS and discussions of a dose-response model approach, a hierarchical framework to view potential biological impacts, and the definition of adverse environmental impacts; (2) characterization of the withdrawal of surface waters throughout the United States from perspectives of geographic distribution and use type; (3) original data analyses to determine if there is a relationship between the amount of water withdrawn from reservoir systems (via normal reservoir discharge and/or CWIS withdrawal) and various measures of a fish population or community health; (4) analysis of the potential impacts of low-volume water withdrawal; (5) summarization of previous studies that provide insight into the relationship between intake volume and population-level effects; and (6) summarization of the importance of other factors that contribute to the risk of environmental impact of CWIS, such as location of intake, temporal effects, species characteristics, water body type, and cumulative effects of other sources of mortality.

The reviews and analyses did not find a compelling dose-response relationship between volume of water withdrawn and status of fish populations, although especially high volumes of reservoir discharges have affected certain susceptible fish species (volumes that exceed those of CWIS). For most withdrawal volumes there was no correlation with fish populations. The research concluded the following:

-The analysis performed with data for Texas, Tennessee Valley Authority, and reservoirs included in the National Reservoir Research Program were not able to identify conclusive evidence for a relationship between population- or community-level effects and rate of water withdrawal, either as a direct measure (i.e., mean annual discharge) or as a function of water body volume (i.e., residence time). A few significant relationships were found (see Tables 3-4 and 3-6 in Appendix E), but even some of those (e.g., mean annual discharge versus total fish biomass in the Texas reservoirs) were counter to the expectation of a negative effect on fish populations as discharge (or withdrawal) increased. Withdrawal rates investigated range from 1 to 5,200 MGD. There was a possible relationship for Texas hydropower reservoirs when water body volume was considered. Systems with residence times less than 25-50 days (i.e., withdrawal rates of 2-4%) suggest some response. However, cooling reservoirs in Texas with low residence times (< 8 days) often supported abundant fish populations.

-Reservoirs used for cooling are likely to have more productive fish populations than reservoirs not used for cooling, regardless of the volume of water withdrawal. This finding is based on analyses of reservoirs used for cooling in Texas and on comparative studies of cooling reservoirs in Illinois conducted by EPRI in the mid-1980s. In a direct comparison of fish community health in Illinois, the cooling reservoir was shown to maintain a highly productive fish community in spite of (or perhaps because of) power plant cooling. There was ample abundance of fish food organisms for maintaining a highly productive sports fishery. Entrainment and impingement, while not measured but certainly occurring, was of minor importance for the dynamics of fish populations when compared to other reservoirs.

-A 1996 U.S. Nuclear Regulatory Commission study (to support relicensing of U.S. nuclear power plants) demonstrates the subjective opinions of resource agencies that entrainment and impingement are problems at large nuclear power stations. The hard, quantitative evidence for such concerns is lacking in most cases. No general relationship between volume of water withdrawn and effects on fish populations could be shown (i.e., no general dose-response relationship). The NRC report concludes that site-specific analyses are essential because it was site-specific circumstances (often unique) that caused the episodic occurrence of high levels of fish losses.

-There does not seem to be a dose-response pattern between volume of water withdrawn and effects on fish populations. Where long time series of data on the factors affecting fish productivity along with data on fish population dynamics are available, volumetric flow relationships have not ranked high as determining factors.

-There is a hierarchy of effects of water withdrawal that must be understood when adversity is to be judged: relationships between plant size and water withdrawal --> numbers (or biomass) of organisms entrained or impinged --> number (biomass) killed --> proportion of organisms in the waterbody affected --> population effects at the species level --> community effects at the multi-species level.

-Overall Case Study Analysis Conclusion (See Appendix E-2): Case studies provide strong empirical evidence that large water withdrawals do not imply large effects on fish populations. The Hudson River power plants have withdrawn over 6,400 MGD for over 25 years (4,200 of that in a sensitive segment for entrainable fish); yet extensive monitoring has shown little impact. When change has occurred to some populations it is in conflict with power-plant-related mechanisms and likely has other causes. The Nuclear Regulatory Commission found little empirical evidence for actual damage from entrainment and impingement in its review of five nuclear plants with withdrawal rates ranging between 486 and 2,785 MGD. Despite this information, it found that natural resource agencies subjectively considered entrainment and impingement to be a problem. It therefore recommended including case-by-case analyses in its nuclear plant relicensing actions. Studies by TVA of Wheeler Reservoir (Browns Ferry Nuclear Plant) showed no significant changes in fish populations beyond the normal increases and decreases in a small percentage of species. Dutch studies found that whereas cooling-water flow rate and numbers entrained or impinged varied proportionately in most plants, the effect on fish populations was the reverse—populations were in better shape with power plant cooling because of the combined effects of thermal (stimulatory) and intake effects. Intake type and water body type dominated over cooling-water volumes in determining numbers of organisms entrained and impinged. The Dutch researchers stressed viewing the cooling system effects in totality and on a case-by-case basis. A detailed study of the fisheries of a reservoir used for cooling in Illinois (691 MGD) and reference reservoirs showed that the combined effect of heating and water circulation in the cooling lake did not yield fish populations greatly different from those in reservoirs not used for cooling. The available studies in the literature provide a poor scientific basis in empirical data for regulating power plant intake systems on the basis of the volume of cooling-water use.

Site-specific analyses, undertaken with knowledge of the potential effects of water withdrawal, remain essential for predicting or monitoring fish population effects of water intakes. Site-specific details of the environment and specific fish populations appear to predominate over a simple dose-response model in determining whether populations are affected by specific water withdrawal rates. Details on all the analyses performed are presented in Appendix E. EPRI anticipates completing the peer-review and revising the report before the end of the 2002.

EPA Response

Please see EPA's responses to Comment 316bEFR.072.049 and Comment 316bEFR041.037 concerning the study cited by the commenter.

Comment ID 316bEFR.074.020

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 11.0
Role of Restoration

Restoration/Enhancement as a I&E Mitigation Approach

Research is increasingly demonstrating that aquatic community health and fish productivity is related to habitat quality and that aquatic habitat loss and alteration is one of the major factors responsible for fish population declines. As Langton et al. (1996) note, habitat loss and alteration may ultimately prove to be more deleterious to stock restoration efforts than over exploitation. Increasingly, resource management agencies are adopting management strategies designed to protect and restore critical aquatic habitat (Langton et al. 1996; Minns 1997; Fluharty 2000; Saunders et al. 2002). EPRI strongly supports EPA's proposal to allow restoration as an approach to mitigate for I&E losses.

EPRI has initiated research on the state-of-science and feasibility of using restoration or environmental enhancement as an approach for mitigating CWIS impacts. Research is being performed for EPRI by Argonne National Laboratory. We have now completed our interim report Enhancement Strategies for Mitigating Potential Operational Impacts of Cooling Water Intake Structures (EPRI Report 1005337, July 2002) and copies are included in this filing. This interim report describes environmental enhancement or restoration approaches that may be applicable for mitigating impingement and entrainment impacts associated with CWISs. These approaches are described with respect to their underlying objectives, implementation and operational requirements, costs, current use by government and the private sector, and advantages and limitations for potentially mitigating CWIS operational impacts.

Environmental enhancement and trading strategies were evaluated against a variety of technical, ecological, regulatory, and operational parameters, including technological status, ability to target CWIS impacts, and the current level-of-use and state-of-the-science. A variety of sources were used to collect information for evaluation in this report, including scientific journals; technical publications; conference and workshop proceedings; government, non-governmental organizations (NGO), and private sector publications and websites; and personal communications with technical and regulatory experts. The project team did not comparatively evaluate the various enhancement and trading approaches, but rather addressed each on its own merits.

Enhancement approaches fell into two general categories: 1) those that directly address fish numbers; and 2) those that address habitat. Stocking addresses fish numbers, and may mitigate CWIS impacts by replacing fish directly affected by impingement or entrainment. Habitat enhancement approaches may mitigate impacts by providing more or better quality habitat to support fish reproduction, growth and survival. These approaches include restoration of fish passage, creation or restoration of wetlands and submerged aquatic vegetation beds, and creation of artificial habitats such as reefs. These enhancement approaches are widely used by a variety of government agencies and NGOs to successfully manage, restore, and/or protect fisheries resources in marine and freshwater environments. Trading approaches could include: 1) fish-for-fish trading that allows a cooling water user that provides greater CWIS impact reductions than required by its permit to trade those excess reductions to a second cooling water user; and 2) pollutants-for-fish trading that allows a cooling water user to have relaxed CWIS impact limits in its permit in exchange for reducing the load of key pollutants. Each enhancement and trading approach has its own set of design, implementation, operation, and cost requirements and constraints, as well as unique regulatory implications. These factors are discussed in detail in the EPRI report.

EPA Response

As described in sections 125.94 and 125.95 of the final rule, facilities may apply to the Director to use restoration measures to comply with the performance requirements of the final rule.

Under the final rule, state permitting agencies may develop trading programs. For additional discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.074.021

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Cost of Retrofitting Cooling Towers

The recently completed EPRI report Cooling System Retrofit Cost Analysis (July 2002) is included in its entirety in Appendix D. This study provides estimates and analyses of the costs of retrofitting electric power generating plants, designed for and operating on once-through cooling systems, with recirculated cooling systems using mechanical draft cooling towers. A brief discussion of the environmental impacts of recirculated cooling in comparison to those of once-through cooling is also included.

The approach to the analysis of the retrofit costs involved:

1. The gathering of data from utility sources of cost estimates made for retrofits at individual plants

2. A review and analysis of cost estimating methodologies by the Environmental Protection agency, Stone & Webster Engineering Company, the Washington Group and the National Energy Technology Laboratory, and

3. A comparison of the results of the several estimates with the individual plant data.

The conclusions of the analysis were:

1. Retrofit costs are highly variable from plant to plant. The results of this study support EPA's assertion that the costs to retrofit recirculated cooling will vary dramatically from site to site. As described in Chapter 3, the retrofit costs at each of the plants for which we have detailed data were dominated by site-specific adjustments rather than by simple scale factors based on size or flow rate.

2. This variability cannot be well accounted for by correlating factors such as $/kW or $/gpm of circulating water flow normally found to be satisfactory for new plant cost correlations

3. Differences in individual plant costs cannot be accounted for by differences in plant type (fossil vs. nuclear) or by cooling water source type (fresh, brackish, saline)

4. The variability is the result of site-specific factors associated with difficulties particularly related to the fact that retrofits present special constraints to on-site construction projects

5. Plant retrofits can be roughly assigned a "degree of difficulty classification" as "easy', "average" or "difficult" retrofits.

i. The costs for the easiest of the projects (lower bound of the individual plant data) are roughly consistent with the costs estimated for cooling system construction at new facilities and fall in the range of $125/gpm.

ii. The average difficulty projects costs cluster around $200/gpm +/- 20%

iii. The more difficult projects range from $250 to $300/gpm with a few ranging as high as $700 to $900/gpm

6. Significant costs, in addition to the initial capital costs, result from cooling system retrofits including

i. Additional requirements for operating power in the range of 1 to 1.5% of plant capacity

ii. Additional maintenance costs, primarily associated with water treatment requirements in the range of 1 to 3% of system capital costs annually.

iii. Additional fuel costs resulting from efficiency reductions imposed on the plant by the inherent limitations of recirculated cooling systems in the range of 1% on an annual average basis.

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.074.022

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.08
Non-aquatic impacts

Recirculated cooling, while reducing water withdrawals for natural waterbodies relative to once-through cooling, has environmental impacts associated with evaporation losses, discharge of blowdown, discharge and disposal of waste water and solid waste, emissions of drift, visible plumes, additional air emissions from increased fuel consumption and noise, that are not present with once-through systems.

EPA Response

The Agency determined that retrofitting cooling towers was not an acceptable basis for the final regulatory requirements, in part, based on the uncertainties of the technology.

Comment ID 316bEFR.074.023

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 12.0

Impingement and Entrainment Assessments

EPA's proposed rule notes protection for "all species and their life stages". Protecting and assessing the protection of individuals of "all species and their life stages" is impossible. To attain such a goal, one would need to monitor forever and spend infinite time in a laboratory identifying species. While we believe that this is not the intent of EPA's proposal, we recommend clarification to avoid future confusion. In keeping with EPRI's recommendation that the process should be driven by a level of adversity that a population may be experiencing, a subset of species of concern, or representative species (RS), or representative indicator species (RIS) should be selected for evaluating a technology's performance. This subset of organisms should be representative of species (and their key life stages) that are of recreational and commercial importance or have been otherwise identified by the permitting authority as species of concern. In many locations, particularly where impingement and entrainment is predominantly driven one species, protection of "total" number of organisms may be the preferred approach.

EPA Response

For an explanation of EPA's monitoring requirements, please refer to the preamble to today's final rule and EPA's response to comment 316bEFR.307.027. For a discussion of how compliance is to be determined, please see EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.074.024

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.08

Non-aquatic impacts

EPRI also recommends that EPA provide provisions for exclusion of nuisance species from protection requirements. Nuisance species <FN 3> being determined on a site-specific basis in accordance with fishery management goals

Footnotes

3 “Nuisance” species differ from exotic or non-native species because the latter, though non-native, may be desirable in the system such as salmon in the Great Lakes. Sometimes nuisance species can also be native such as the northern pikeminnow in the Columbia River basin where bounties exist for deliberate reduction in their population size to reduce predation on out-migrating juvenile salmon.

EPA Response

Please see response to comment 316bEFR.015.005.

Comment ID 316bEFR.074.025

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 8.04

Proposed standards for tidal rivers and estuaries

EPA stratifies the rule according to water body type noting that (page 17140):

“Because different waterbody types have different potential for adverse environmental impact, the requirements proposed to minimize adverse environmental impact would vary by waterbody type. For example, estuaries and tidal rivers have a higher potential for adverse environmental impact because they contain essential habitat and nursery areas for the vast majority of commercial and recreational important species of shell and finfish, including many species that are subject to intensive fishing pressures. Therefore, these areas require as higher level of control that includes both impingement and entrainment controls. Organisms entrained may include small species of fish and immature life stages (eggs and larvae) of many species that lack sufficient mobility to move away from the area of the intake structure. The reproductive strategies of many estuarine species include pelagic or planktonic larvae, which are very susceptible to entrainment.”

(Page 17141):

“Therefore, EPA is proposing to vary technology-based performance requirements by waterbody type, requiring more effective controls in waterbodies with higher overall productivity or greater sensitivity to impingement and entrainment.”

“EPA believes that the Great Lakes are a unique system that should be protected to a greater extent than other lakes and reservoirs. The Agency is therefore proposing to specify entrainment controls as well as impingement controls for the Great Lakes.”

We concur with EPA that fish and shellfish in estuaries and tidal rivers have a higher level of CWIS impingement and entrainment. This is because, as noted by EPA, organisms in these waterbodies have evolved a life history strategy that involves the production of large numbers of eggs and larvae to insure survival (Winemiller and Rose 1992, 1993). Dramatic as the impingement and entrainment numbers are for estuarine and tidal river plants, the numbers must be viewed against the extremely high numbers of eggs produced. While impingement and entrainment numbers are high, it does not imply that adverse impact or sensitivity is similarly high.

We similarly concur with EPA that estuaries and tidal rivers support habitat for commercially and recreationally important fish. However, not all habitat is equal in quality, therefore, potential adverse impact is a site-specific issue. EPRI recently completed a project that evaluates the state-of-science relative to assessing the quality of spawning and nursery habitat and, therefore, the potential for adverse environmental impact from impingement and entrainment processes (EPRI 2002c). This report principally concludes that federal and state resource agencies have the requisite knowledge on the quality of spawning and nursery habitat to support site-specific impact assessments. Furthermore, the report notes that in its absence, methods are available for documenting habitat quality and inferring the potential for AEI.

While we understand EPA’s logic (and concur with many parts of it) relative to entrainment control in estuaries and tidal rivers, we do not understand how that logic leads to similarly identifying the Great Lakes as waterbodies requiring similar protection. Yes, the Great Lakes are unique relative to hydrology, morphology, community evolution, and public and private concern; however, they are not unique in terms of productivity and vulnerability as compared to estuaries and tidal rivers. Yes, there is tremendous public and private concern and yes, the Great Lakes have drastically changed over the past century. This change overwhelmingly is the result of accidental and deliberate introduction of exotic species (Ragotzkie 1983; Fabrizio et al. 2000; Kitchell et al. 2000). We believe the "uniqueness" of the system results more from the public and scientific community concern over what some have coined as an "invasional meltdown" (Ricciardi 2001) rather than to sensitivity to entrainment as EPA postulates for estuaries and tidal rivers.

In relation to estuaries, tidal rivers, and reservoirs, the Great Lakes are not particularly productive and support a limited number of species. Scott and Crossman (1973) note that the Great Lakes are depauperate in species largely as a result of the "recent" retreat of Pleistocene ice. Furthermore, they note that the Atlantic Region of Canada, which encompasses all of the Great Lakes, the St. Lawrence River and all other waters in the Lakes and River drainage basin have a total freshwater fish fauna of only 142 species. This in comparison to the State of Ohio which has approximately 170 species.

Comprehensive comparison studies of primary productivity across various terrestrial and aquatic systems are generally limited. Dodds (2001) analyses which incorporated analyses of Oglesby (1977), however, notes that lakes and streams (including the Great Lakes) are an order of magnitude lower in primary productivity compared to estuaries, coral reefs, and freshwater wetlands. The open ocean (excluding coastal areas) was the only general ecosystem that had lower primary production than lakes and streams. Downing et al. (1990) assembled estimates of the biological production of entire lake fish communities covering a wide range of geographic areas and trophic status around the world. He then plotted fish production against primary production and found a strong linear relationship. The four lowest points in his relationship came from fisheries yield data from Lakes Superior, Huron, Michigan and Ontario. He did note that these low values may result from the collection of productivity data during the 1970s when the fishery was over-exploited (but naturally supported fisheries have not recovered since) or impacted by invasive species.

Downing et al. (1990) and Downing and Plante (1993) further reported that the productivity of entire fish communities was well correlated with the primary productivity of the ecosystem in which they live. Specifically, they noted that fish population production is strongly correlated with algal production and total phosphorous concentration, both an indicator of trophic status. Recent analyses by Ludsin et al. (2001) for Lake Erie using fish population data from 1969-1996 found similar results. In their completely natural or unimpaired state, the Great Lakes are oligotrophic and the upper Great Lakes (Superior and Huron) remain so today. The lower Great Lakes, particularly Erie and Ontario, because of anthropogenic impacts, are eutrophic; however, due to phosphorous abatement programs and the invasion of zebra mussels, both are rapidly returning to oligotrophic conditions (Ludsin et al. 2001).

Areas of the Great Lakes that do support higher levels of production can be found at the mouths of tributaries to the Lakes. In fact, there has been a recent call for delineating such locations as estuaries (Herdendorf 1990; Dyer 1990; Odum 1990; Schubel and Pritchard 1990). EPA discussed this issue during development of Phase I 316(b) regulation. EPRI subsequently commented that EPA miss-understood the content of the discussion in that the high productivity did not apply to the Great Lakes in general, only to areas where there is a mixing of water masses, such as at the mouths of tributaries. High productivity in these areas is not unusual. Willis and Magnuson (2000) found similar high species composition among four site types (lake, lake-mouth, stream-mouth, and stream). Comparison of species richness, rarefaction species diversity, and species density all supported the same pattern: stream-mouth sites contained the highest number of species, followed by stream sites, lake-mouth sites, and lake sites, even though lake and lake-mouth sites yielded more individuals and were larger in area and volume.

The Great Lakes fish community that existed during the 1970s when most of the 316(b) demonstrations (and extremely high impingement episodes) occurred (Michaud 2000), no longer exists. As previously noted, the system has been buffeted by inadvertent invasions of marine species followed by large-scale experimental introduction of several species of Pacific and Atlantic salmon plus several nonnative species of trout. Alewife invaded the upper Great Lakes during the 1960s and rapidly or explosively proliferated and their annual natural winter die-off created intolerable nuisance conditions along the shores. It also created severe clogging problems for CWIS. The presence of alewife in the Lakes also led to the high impingement numbers recorded in the historical literature (Michaud 2000). Salmon, in fact, were originally introduced into the lakes to control the alewife population (Ragotzkie 1983). The introduction of salmon was a huge success, both as control for the alewife population and as a multi-million dollar sport fishery. The fish community is now drastically different and continues to change because of the zebra mussel invasion (Frabrizio et al. 2000; Kitchell et al. 2000). In fact, the full extent of the zebra mussel infestation is yet to be realized; increased water clarity is dramatic -- this increased clarity is due to reduction in zooplankton and phytoplankton by the filtering action of the mussels. This reduction will likely lead to further reduction in overall productivity of the Lakes, at least in respect to fish communities. The Great Lakes are tremendous visible features on our landscape and considerable national and international attention and energy has been focused on resolution of its problems -- this focus and energy, however, should not necessarily be miss-interpreted that the Lakes are highly productive requiring an increased level of fish protection equivalent to that proposed for estuaries and tidal rivers.

Collectivity, these results suggest that the Great Lakes do not have the same level of uniqueness that EPA discusses for estuaries and tidal rivers and, therefore, are not as likely to experience AEI (or no more likely to experience AEI than low-volume river intakes and intakes on reservoirs). EPRI, however, will further investigate this issue and submit final comments on the issue as part of our response to the expected EPA NODA.

EPA Response

With respect to the standards for tidal rivers and estuaries, please refer to the response to comment 316bEFR.025.014.

With respect to the standards for the Great Lakes, please refer to the response to comment 316bEFR.025.013.

Comment ID 316bEFR.074.026

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02
Performance standards

Can the Proposed Performance Standards be Achieved?

EPRI and our expert consultant, Alden Research Laboratory (Alden), have reviewed EPA's analysis of fish protection technologies – data principally provided by EPRI/Alden in our 1999 technology update report (EPRI 1999b). In general, EPA has accurately characterized impingement technology reduction performance. However, while impingement mortality can generally be reduced by 80-95%, there will be some site specific conditions at many plants that may preclude attaining this performance standard range. Also as important, the ability of the technologies to provide average protection within the performance range (i.e., compliance) over some performance measurement period (e.g., months, one-year, two-years, permit period) is not well documented – most performance studies have been conducted over short-periods of time – that is, technology performance has never been evaluated against a performance standard. Relative to EPA's proposed entrainment reduction standard of between 60-90%, we believe that EPA may be over-stating expected performance – the current data base on entrainment reduction is to limited to comfortably conclude that the proposed performance range can be attained. Finally, relative to both performance standards, EPA does not consider or discuss how natural phenomena (i.e., physical and biological debris loading) outside the control of a CWIS operator, can completely preclude or impede a technology's selection and performance.

EPA Response

Please see response to comments 316bEFR.307.064 and 316bEFR.063.005.

Comment ID 316bEFR.074.027

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

A key point relative to the performance of fish protection technologies that EPA must consider when establishing performance standards is that the database of performance findings is inherently biased in the high performance direction. This is because the database results from site-specific assessments and BTA alternative considerations that have been followed since the mid-1970s. Essentially, engineering assessments of a limited number of pre-determined feasible technologies (i.e., generally following the procedural guidelines documented in the EPRI 2000a report) resulted in the selection of a technology with reasonably high fish protection performance expectations. Subsequent research or compliance monitoring later confirmed the high performance that was anticipated. These are the results noted in the literature and the EPRI (1999a) report (i.e., the system and process precluded selection of poor performing technologies) Because of this bias, it may be inappropriate to conclude that high performances recorded can be standardized for the industry.

EPA Response

EPA reviewed many technologies in developing the performance standards for today's rule but, as discussed by the commenter, focused primarily on those technologies that could reasonable be deployed at a wide range of facilities. The data presented in Chapter 3 of the Technology Development Document, and discussed elsewhere in today's rule, show that the performance standards are technologically and economically feasible for the majority of Phase II existing facilities. EPA does not believe it is warranted to discuss poor-performing or ineffective technologies within the scope of today's rule and somehow "average" their performance in with other, more successful technologies when developing performance standards.

EPA also recognizes that exceptional performance of a technology may not be able to be duplicated at every other facility. Today's rule adopts ranges for both the impingement mortality and entrainment reduction in recognition of the inherent variability of aquatic environments and facility configurations.

Comment ID 316bEFR.074.028

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

The following are additional comments on analyses – in general, we do note that EPA has not provided adequate scientific support in the rule record for the impingement and entrainment reduction standards. However, it appears that the standard(s) are achievable for at least some selected species and lifestages. For improving impingement survival, EPA focuses on modified Ristroph screens and associated fish handling features. For entrainment, EPA reviews in detail three technologies: (1) wedge wire screens; (2) aquatic filter barriers; and (3) fine mesh screens. The ability of these technologies to meet the performance standard is discussed below. Also discussed in this section are EPRI/Alden's comments on the EPA Technical Development Document.

EPA Response

See response to comment 316bEFR.074.026.

Comment ID 316bEFR.074.029

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

Accounting for Natural Phenomena

EPA's proposed rule is relatively silent on issues associated with natural phenomena that may preclude a technology's selection or a technology's performance and ultimately how a technology's "compliance" is evaluated. Unlike with "end-of-pipe" technologies that are not subject to the vagaries of nature and whose performance can be somewhat effectively controlled, CWIS fish protection technologies are "front-of-pipe" and fully subject to the forces and vagaries of nature. The forces and events may preclude selecting a technology or impeded the performance of a specific technology during some period of the year or during some type of event. For example, during the mid-west corn harvesting period, river transport of heavy loads of corn shucks frequently can cause fine (and coarse) mesh screen collapse. Similarly, biological (e.g., large woody debris and leaves) and physical (e.g., sediment) debris in stormwater runoff can preclude the performance (and substantially damage) of a technology. Estuaries and coastal locations around the U.S. frequently experience periods of ctenophore, jellyfish, and SAV (e.g., hydrilla, kelp, eelgrass) loading. Natural die-off of forage species in rivers, lakes (including Great Lakes) and reservoirs is also common during winter periods (Loar et al. 1978) or periods of low-dissolved oxygen. The hydraulic forces of a CWIS will cause these "dead-on-arrival" (DOAs) or "moribund-on-arrival" (MOAs) fish to collect and clog intakes and preclude the fish protection performance of a technology. These MOAs and DOAs should not be counted against a technology's performance, nor should a technology be expected to perform at some pre-determined or expected level when such loading occurs.

EPA Response

EPA has decided to give the Director the authority to determine methods of evaluating compliance. Thus, the Director will specify species and life stages of concern. The Director may choose to require evaluation of all species or of certain indicator species; or the Director may elect to verify compliance using biomass as a metric. EPA believes that as each situation will be somewhat unique, it should be left to the Director to determine whether biomass or actual numbers are a more appropriate unit. The Director may also authorize a facility to demonstrate compliance using a Technology Installation and Operation Plan.

EPA has determined that a uniform averaging period would not be appropriate; rather, the Director will be best suited to make all such determinations by evaluating these and other factors for each facility on a case-by-case basis. The Director will be able to make determinations regarding averaging periods based upon site-specific factors, such as biological assemblage at the site, annual and diel fluctuations in concentration and populations present, and the selected compliance alternative.

Comment ID 316bEFR.074.030

Subject Matter Code 7.03.01
Sample facilities/technologies

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Impingement Mortality Reduction - Modified Ristroph Screens

Ristroph screens have been shown to improve fish survival and have been installed at some power plants. Improvements have been made to the Ristroph screen design through extensive laboratory and field experimentation that have resulted in greatly increased fish survival rates. The most recent biological evaluation of this design was conducted at the Salem Generating Station on Delaware Bay in New Jersey. A series of impingement survival studies has been conducted in recent years to provide estimates of impingement survival rates. White perch impingement survival rate estimates ranged from 98 percent in December to 93 percent in April. Estimates for weakfish ranged from 88 percent in September to 18 percent in July. For bay anchovy, survival estimates ranged from 72 percent in November to 20 percent in July. Atlantic croaker survival estimates ranged from 98 percent in November to 58 percent in April. The estimated survival for spot was 93 percent in November (November was the only month in which a significant number of spot were collected). Alosa species combined produced survival estimates that ranged from 82 percent in April to 78 percent in November.

The Salem screens represent the current state-of-the-art in reducing impingement mortality. It is clear that survival is species-specific and can vary within species on a seasonal basis. It can also be expected that site-specific factors will influence survival potential. All of the other modified traveling screens that have been evaluated for impingement mortality have not incorporated the improved design features that exist at Salem. Therefore, the database needed to predict actual reductions on a site-by-site basis does not currently exist. However, the high survival rates observed at Salem, even for fragile species such as bay anchovy and Alosa spp., indicate the potential for improving survival at other sites. Since the baseline for the proposed rule is a shoreline intake with no fish protection provisions, the baseline mortality can be assumed to be 100 percent. As such, the 80-95 percent reduction in impingement mortality appears to be achievable for at least some species.

EPA Response

EPA appreciates the additional information submitted by the commenter and notes that additional information for the Salem facility has been included in a revised Chapter 3 of the Technology Development Document. EPA agrees with the commenter that fish handling and return systems like those deployed at Salem and other facilities demonstrate a wide applicability to many facilities in different circumstances. Although not universally deployable, fish handling and return systems are some of the most successful and studied impingement control technologies.

Comment ID 316bEFR.074.031

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02
Performance standards

Entrainment Reduction

A reduction in entrainment, potentially in the 60 – 90 percent range proposed by EPA, may be achieved for some species by all three of the technologies that EPA presents in support of their proposed performance standard. The operative words are "potentially", "may", and "some species" because the database for measuring performance is still extremely limited. It is not clear that simply reducing entrainment will provide a biological benefit unless the technology also does not result in substantial mortality of organisms. In anticipation that EPA may change the standard to address entrainment mortality, the following discussion addresses both entrainment and mortality.

EPA Response

Today's rule preserves the standard of a 60-90 percent reduction in entrainment, not entrainment mortality. EPA agrees that data regarding entrainment reduction technologies are more limited than for other technologies, but believes that performance is justified. See also response to comment 316bEFR.067.003.

Comment ID 316bEFR.074.032

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.03

Available I&E technologies

Wedge Wire Screens

Wedge wire screens can incorporate slot sizes as small as 0.5 mm. Therefore, they are capable of reducing entrainment of most eggs and larvae. While large-scale applications of wedge wire screens have not been evaluated biologically, these installations and other laboratory and field studies indicate that this technology not only is practicable to install and maintain in a variety of waterbody types, but also has a high potential for protecting entrainable organisms without substantial injury. Open questions that need to be addressed include:

-What is the optimal screen slot size and slot velocity needed to achieve maximum exclusion without impingement?

-What is the optimal cross-flow or approach velocity needed to achieve maximum exclusion without impingement?

-Can biofouling be controlled in marine and brackish water environments?

The first question is currently being address in laboratory studies sponsored by EPRI and EPA. These results, coupled with future field studies, should fill in many data gaps. The second question will need to be addressed by conducting studies in marine and brackish water environments. Developing the full potential for wedge wire screens should lead to its eventual acceptance as a technology for reducing entrainment of many species/life stages in a variety of waterbody types. Where suitable physical, hydraulic and environmental conditions exist, it is likely that this technology can offer a high level of fish protection; however, whether protection will average in the 60-90 percent range proposed by EPA will need to be determined following long-term monitoring.

EPA Response

EPA agrees with the commenter that wedgewire screens show great potential in reducing impingement and entrainment of eggs and larvae that otherwise might be susceptible to these impacts. Further study by EPRI or other organizations is welcome.

Comment ID 316bEFR.074.033

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.03.01

Sample facilities/technologies

Aquatic Filter Barrier

While the AFB has only been evaluated in detail at one river location (Lovett Station on the Hudson River), results of multi-year evaluations at this full-scale installation indicate that this technology has the potential for minimizing entrainment of early organism life stages and eliminating impingement. When the boom integrity was maintained at Lovett, it was highly effective in preventing organism passage. The airburst system for removing sediment and algae appears to be reasonably effective. Some improvements are needed to further automate the system. One manufacturer (Gunderboom, Inc.) is in the process of deploying booms at other sites across the U.S. and further refinement of this technology can be expected in the near future. Open questions that need to be addressed include:

-Does organism interaction with the AFB result in entrainment, injury, or mortality?

-Can a reliable anchoring system be developed that prevents failures and gaps from occurring?

-Will the boom be maintainable in other water body types?

As with wedge wire screens, these questions will be answered by current and future evaluations of the AFB in the laboratory (ongoing EPRI studies) and at other sites. Assuming that these engineering issues can be resolved, the AFB offers the potential to greatly reduce entrainment at CWIS possibly within the range (60 - 90 percent) proposed by EPA as a standard.

EPA Response

EPA agrees that the aquatic filter barrier is a promising technology that has demonstrated significant reductions in both entrainment and impingement when integrity of the system is maintained. EPA encourages the use of new and innovative technologies to address adverse impacts associated with cooling water intake structures and welcomes continued study and evaluation of these technologies.

Comment ID 316bEFR.074.034

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.03

Available I&E technologies

Fine Mesh Screens

The available laboratory and field data indicate that fine mesh traveling screens have the potential not only to meet the entrainment reduction performance standard but to achieve survival levels with early fish and invertebrate life stages that may reach levels of 60 percent or higher.

This potential is best illustrated with the available laboratory data that has been collected under controlled conditions. In field studies, little attempt has yet been made to determine the factors that most influence survival and to identify whether changes in design or operation (particularly screen travel speed) can improve survival. Clearly, some species/life stages such as bay anchovy larvae are fragile and may not survive to the 60 percent level following collection with fine mesh screens. However, for many species, the potential to obtain high survival rates under conditions existing at CWIS is evident. With further development and evaluation of fine mesh screens, it would appear that survival rates of 60 percent or higher may be achievable for many species.

EPA Response

EPA appreciates the data and notes the success of fine mesh screens in meeting the performance standards with regard to entrainment reductions. For further discussion of fine mesh screens, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.074.035

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

Technology Evaluation Summary

The available literature generally supports the concept that modified Ristroph screens (coarse mesh), physical barriers and some behavioral technologies may have the potential to reduce impingement mortality for some species (but not all) by 80 – 95 percent and that wedge wire screens, the AFB and fine mesh screens may have the potential to reduce entrainment by 60 – 90 percent from the baseline. As physical barriers to passage, all of these technologies should be effective in meeting the entrainment reduction standard provided that they can be designed at a given site to screen the earliest life stages. While none of the technologies has been developed or studied to the degree necessary to draw conclusions regarding wide-spread applicability at CWISs, they have all been studied under sufficiently stringent conditions with a wide variety of species to support their inclusion as technologies that generally support EPA's proposed performance standards. If EPA changes the entrainment performance standard to address entrainment mortality, it would appear that these technologies have the potential to protect many species/life stages, possibly to the 60 – 90 percent level.

EPA Response

Comment supports the rule. No response necessary.

Comment ID 316bEFR.074.036

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.02

Performance standards

In summary, while we believe high fish protection performance can be attained with impingement and entrainment mortality reduction technologies, (1) the ability of a technology to average out within the performance standard range proposed by EPA is not well documented and (2) performance measurement must account for natural factors, outside the control of CWIS operators, that will reduce performance.

EPA Response

Please see responses to comments 316bEFR.307.064, 316bEFR.311.002 and 316bEFR.063.005 and the preamble to the final rule.

Comment ID 316bEFR.074.037

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 23.02

TDD related comments

Review of Technical Development Document (TDD)

EPRI/Alden has also reviewed Chapter 3 and attachments of EPA's Technical Development Document for the proposed rule. The purpose of this review was to determine whether EPA's performance standard (80-95 percent reduction in impingement mortality and 60-90 percent reduction in entrainment) is further supported by the information presented.

The data, as presented by EPA, generally does support their proposal to use a uniform national technology standard. However, many generalizations and statements are supported by the selective use of available data and generally overstate the potential for individual power plant operators to meet a uniform standard on a site-specific basis, as we have also noted above. With few exceptions, EPA's effectiveness estimates combine data across species, life stages, environmental, and operational conditions. While not incorrect, this unscientific approach masks any site-, species-, and life stage-specific variability in the data.

In the case of modified (Ristroph) traveling screens, EPA used only a small number of the total available installations for which survival data exists. It is unclear what criteria were used by USEPA to determine which data to include in their analysis. Eliminated from consideration were data collected from Roseton, Danskammer, Oyster Creek, Oswego, Bowline, Belle River, Dunkirk and Mystic. EPA acknowledged limitations in the scope of their data collection efforts and their reliance on such sources as EPRI's Fish Protection at Cooling Water Intakes, Status Report (1999) and ASCE's Design of Water Intake Structures for Fish Protection (1982). EPA notes that "EPRI's analysis was primarily a literature collection and review effort and was not intended to be an exhaustive compilation and analysis of all data," and yet EPA chose to look at only a fraction of the data contained therein.

EPA focuses on fine-mesh screens, wedge wire screens, and ABS, since they hold potential to fulfill the entrainment reduction performance standard proposed. Other technologies are either downplayed or ignored entirely, e.g., high velocity screens (such as Eicher screens or Modular Inclined Screens [MIS]), strobe light, air bubble curtains, or hybrid systems that utilize combinations of behavioral technologies. EPA states in Section 3.4 that "the Agency has focused on technologies that have shown significant promise at the laboratory, pilot-scale, and/or full-scale levels in consistently minimizing impingement and/or entrainment." Without explicitly endorsing one technology over another, EPA has implied that certain technologies would be unable to achieve performance standards for any species under any condition. In Alden's opinion, several of the omitted technologies could be used alone or in combination for the protection of certain species and life stages. In the case of the MIS, laboratory and pilot-scale studies indicate that high latent survival rates can be achieve with a wide range of species.

In conclusion, the information presented in the TDD loosely supports the proposed performance standard. However, the selective use of data is considered unscientific. A review of all available data indicates the ability of any given technology will vary by environmental factors (such as water body type, debris loading, etc.) and the species and lifestages to be protected.

EPA Response

EPA believes these technologies are available and practicable for the category of existing facilities as a whole. EPA recognizes, however, that this will not be the case for some individual facilities. EPA has codified a site-specific compliance alternative to account for these situations. In addition, EPA has authorized compliance to be demonstrated pursuant to a Technology Installation and Operation Plan in order to account for the fact that biological variability and other factors may interfere with the consistent achievement of the national performance standards even when the model technologies are installed and properly operated.

Comment ID 316bEFR.074.038

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 21.01

Submittal of required information

Baseline Characterization and Compliance Monitoring

EPRI has reviewed EPA's proposed baseline characterization and technology performance monitoring requirements. Conceptually, both are relatively straightforward; however, they may not be practical or always necessary as proposed because of site-specific issues as well as demonstrated historical performance of the technology. Because of the following issues, EPA may wish to provide permitters and permittees maximum flexibility in determining the necessity, type and scope of baseline and performance monitoring. Key issues for consideration include:

-Variability: extreme variability on numerous spatial and temporal (annual, decadal, centuries) scales is well known and documented in fisheries science, particularly in estuarine areas (Sissenwine 1984). It may be impossible to capture this variability in short-term field monitoring.

-Performance Can Be Directly Measured without Baseline: for some technologies, performance can be directly measured without the need for a baseline characterization. For example, impingement survival can be directly measured in a fish return system following improvements (Ristroph screens, collection buckets, spray and return troughs) to traveling screens. Similarly, if an aquatic fabric barrier system is implemented, fish densities outside and inside (or in the discharge channel) the fabric barrier can be directly measured to assess performance. No doubt, with careful experimental design and analysis for other technologies, sampling designs that will permit directly assessing fish protection performance of a technology can be identified.

-Other Factors: the ability to use the shoreline baseline configuration to assess credit for historical fish protection work is a commendable ideal. There will be, however, factors that may preclude collection of realistic baseline data if the CWIS had been located on a shoreline. For example, the Seabrook Power Station is located onshore in an estuarine marsh environment while the CWIS is offshore with a velocity cap that withdraws water from a deep location in the ocean. The habitat in these two locations is very different and supports very different species assemblages. Only minimal sampling has been conducted near the shoreline to define the populations of fish and invertebrates that exist there. In the absence of such data, it will not be possible to estimate the level of I&E that might have occurred if the intake had been located near shore in the marsh area. To acquire such data would require lengthy field sampling over a prolonged period (years). More importantly, the CWIS creates hydraulic forces and processes that can attract fish to an intake structure. The absence of the hydraulic forces (and the physical structures that support the CWIS which will also attract fish) may preclude the collection of information on fish presence had the structure been present on the shoreline.

EPA further suggests that the baseline "could be estimated by evaluating existing data from a facility nearby without impingement and/or entrainment control technology (if relevant) or by evaluating the abundance of organisms in the source waterbody in the vicinity of the intake structure that may be susceptible to impingement and/or entrainment." This approach is not considered scientifically defensible. Many biological, engineering, and hydrologic/hydraulic factors (zone of influence) determine whether an organism will interact with a CWIS and whether or not the organism will survive that interaction. Assessing the mere presence or absence of organisms at a nearby facility or in the same waterbody does not give an accurate picture of the potential for I&E at a non-existing baseline CWIS. The composition and abundance of I&E organisms can be very different for two CWIS situated close to one another. For example, observations of shad impingement at the Marshall Steam Station showed high variability in the numbers impinged between adjacent screens despite similarities in flow and velocity (Loar et al. 1978). EPA's approach, while commendable in its ideal, fails to capture the site-specific nature of I&E at CWIS.

For these reasons, we recommend maximum flexibility in the necessity and design of baseline characterization. Most importantly, we recommend elimination of the prescriptive baseline characterization requirement, unless it is in the interest of the permittee to demonstrate existing performance and can be done so in a scientifically defensible manner.

EPA Response

Please see response to comment 316bEFR.034.013 for a discussion on calculation baseline.

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

Comment ID 316bEFR.074.039

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Entrainment Survival Review

EPRI has reviewed, from a scientific and risk management point of view, EPA's decision to base the proposed §316(b) performance standard on entrainment, rather than entrainment survival. Detailed comments resulting from review of sections VI.A.7 and VI.A.8.b of the proposed rule and the support document on entrainment survival, Ch A7, are provided in Appendix F. Comments of Dr. Charles Coutant of Oak Ridge National Laboratory on the general issue of entrainment survival are also provided below. The major findings and recommendations resulting from EPRI's review include:

-The proposed rule's exclusion of entrainment survival from the BTA performance standard is scientifically flawed;

-The proposed rule's exclusion of entrainment survival from the BTA performance standard can be ecologically unprotective and would not provide comparability in quantifying resource impacts among facilities and waterbodies;

-To provide a solid scientific and resource management foundation for BTA determination, the performance standard should be based on realistic estimates of entrainment losses (i.e., entrainment mortality) and be linked to protection of higher biological levels of organization.

-EPA's evaluation does not reflect consideration of the evolution of entrainment survival study methods—methods have matured and later methods do allow for valid estimates of entrainment survival with appropriate levels of precision.

-EPA's assumption of 100% entrainment mortality is not supported by the overwhelming evidence of substantial entrainment survival of many species that has been found in studies conducted to date, and is not justified by the concerns USEPA presented in Ch A7.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.074.040

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Independent of the proposed EPA rule, Dr. Charles Coutant of Oak Ridge National Laboratory provided the following general entrainment survival comments to EPRI in an email dated February 21, 2002:

I have been fortunate in my career to have been listened to quite a bit. But one thing that I harped on 30 years ago was nearly completely ignored: mortality during entrainment is NOT 100 percent (when biocides are not purposely being applied for biofilm control) and we can take steps to provide predictability (Coutant, C. C. 1971. Effects on organisms of entrainment in cooling water: steps toward predictability. Nuclear Safety 12(6): 600-607). A large share of the mortality for most entrained organisms, when it occurs, is due to elevated temperature not the mechanical stresses of going through condenser tubes and pumps (Kedl, R. J., and C. C. Coutant. 1976. Survival of juvenile fishes receiving thermal and mechanical stresses in a simulated power-plant condenser. Pages 394-400 in G. W. Esch and R. W. McFarlane, editors. Thermal Ecology II. ERDA Symposium Series CONF-750425. National Technical Information Center, Oak Ridge, Tennessee). Small fish are very resiliant to bending and twisting. The predominant thermal effect (sans biocides) follows a straightforward dose-response model that can be established in the laboratory and tested in the field. Thus, combinations of actual temperature of exposure (not delta T) and duration of exposure in the condensers, piping, and outfall plume can be used very easily to establish whether or not entrained organisms will suffer mortality, or conversely, cooling systems can be designed to minimize entrainment mortality (Coutant, C. C. 1973. Heat and Temperature. Pages 151-171 (plus appendix tables and references) in Water Quality Criteria 1972, A Report of the Committee on Water Quality, Environmental Studies Board, National Academy of Sciences/National Academy of Engineering, Washington, DC). The dose-response model works for direct mortality and indirect effects such as succeptibility to predation (Coutant, C. C. 1973. Effect of thermal shock on vulnerability of juvenile salmonids to predation. J. Fish. Res. Board Can. 30:965-973). Cooling towers, with their extended durations at high temperatures, severe physical stresses, and frequent use of biocides generally do kill 100 percent of the entrained organisms (sufficiently so that we can justifiably assume 100 percent). Most of this knowledge was well accepted and encyclopedia quality by the early 1980s. It became part of international approaches to power plant cooling (Majewski, W., and D. C. Miller, editors. 1979. Predicting the effects of power plant once-through cooling on aquatic systems. Technical papers in hydrology, UNESCO, Paris; International Atomic energy Agency. 1980. Environmental effects of cooling systems. Technical Report Series No. 202, Vienna).

Field studies to confirm these relationships are notoriously difficult to conduct, largely because the rigors of sampling are worse for the entrained organisms than those of the exposure. Many field studies showed higher mortality at the intake than in the discharge, indicating severe sampling problems. Ecological Analysts developed a much more benign sampling device to remedy some of the problems. When the entrainment studies were done carefully, they clearly substantiated the dose-response to temperature and the generally low component of mortality due to physical/mechanical stresses. The recent EPRI report documents many of these studies.

In conclusion, EPA's final note on entrainment survival that states "…it is clear that the number of relevant variables that collectively determine any entrainment survival rate is so large that the studies conducted to date should be viewed as a provocative set of anecdotes that demonstrate the need for further study, but do not provide a sufficient basis for making predictions” is not supported by the state-of-science and the scientific community.

EPA Response

EPA thanks the commenter for this submission; however, there is nothing in it that contradicts EPA's conclusion the entrainment survival is highly variable and unpredictable, and studies to estimate entrainment survival are difficult to conduct.

Comment ID 316bEFR.074.041

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Review of Methodology Used by EPA to Evaluate Impacts of Entrainment and Impingement Losses on Commercial and Recreational Harvests

Dr. Lawrence Barnthouse, at the request of EPRI, performed a detailed evaluation of the methodology used by EPA to estimate impingement and entrainment losses at CWIS. Dr. Barnthouse's detailed comments are included in Appendix A. The following is a summary of his comments.

He found that, although generally consistent with methods used in other similar assessments, the methodology as documented contains two significant errors. Without reproducing EPA's calculations, he could not confirm whether the calculations are wrong or the documentation is wrong. Even when correctly applied, EPA's methodology is highly sensitive to estimates of natural mortality rates in early life stages of fish, and in particular to assumptions made concerning the temporal distribution of entrainment and impingement mortality within life stages. Because it ignores biological compensation, EPA's methodology should overstate the benefits of alternative intake technologies. Despite EPA's arguments to the contrary, recent advances in understanding of biological compensation appear to provide a basis for developing quantification methods suitable for benefits analysis.

When he examined life history parameter values used in selected case studies, he found that different case studies often used different parameter values for the same species, leading to greatly differing estimates of the impacts of any given level of entrainment or impingement mortality. Some of the values used imply implausibly high or low population growth rates, and for the Delaware Estuary case study EPA's estimates of annual harvest and production foregone due to entrainment and impingement of spot and Atlantic croaker are more than an order of magnitude greater than the commercial harvests of these species over the same period. These results indicate the presence of a major bias in EPA's calculations, although without a detailed evaluation of the calculations it is not possible to determine the source of the bias.

The documentation provided by EPA, both for the methodology itself and for the individual case studies, is unclear and incomplete. Despite the incompleteness of the documentation, it is evident even from his brief examination of the case studies that EPA did not take appropriate care in developing parameter estimates for the models that were used, and did not perform "reality checks" to ensure that results of the calculations were realistic and reliable.

Although Dr. Barnthouse did not perform an exhaustive evaluation of all species or a statistical sampling of species evaluated by EPA, it appears that most of the assumptions chosen by EPA lead to overestimation of the impacts, not to a balance of overestimates and underestimates as claimed by EPA. A more detailed evaluation of the case studies would be needed to determine the magnitude of the overestimation, but at least in the case of the Delaware Estuary case study the harvest reduction and production foregone estimates appear to be greatly inflated.

EPA Response

Regarding the sensitivity of EPA's I&E estimates to natural mortality rates, please see the discussion in Chapter A6 of EPA's Regional Analysis Document (DCN #6-0003)

Please see EPA's response to Comment 316bEFR.025.015 for a discussion of compensation in the context of EPA's analysis.

While it is true that EPA sometimes used different life history parameter values for the same species located in different regions, this was done at the recommendation of local fisheries experts to reflect regional differences and thereby improve region-specific estimates.

In terms of life history data, EPA disagrees with the commenter's assertion that "EPA did not take appropriate care in developing parameter estimates for the models that were used." In fact, EPA consulted with local fisheries experts and conducted as thorough a review of the biological literature as possible to obtain the best available life history data. When possible, EPA used life history data recommended by a local technical advisory committee and provided in a current facility study (e.g., EPA used the same life history data used by Salem and by Brayton Point in their recent permit renewal applications).

In regards to EPA's estimates in the Delaware case study presented at proposal of foregone harvest of spot and croaker resulting from I&E at Salem, this analysis was not included in EPA's analysis for the final rule. However, EPA notes that for its final analysis, EPA reviewed the life history data it used to model these species, and revised any values that appeared unreasonable.

Finally, EPA notes that the document referred to by the commenter is not included in EPA's final analysis. For its final analysis, EPA made a good faith effort to document its methods and results as thoroughly as possible, and conducted detailed QA/QC according to a QA/QC plan developed for the study (see DCN #6-1002).

Comment ID 316bEFR.074.042

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

In addition to Dr. Barnthouse's review and comments, EPRI also obtained the services of Dr. Elgin Perry, Statistical Consultant, to evaluate the potential for overestimating losses and benefits because of the multiplicity of conservative choices. Dr. Perry's detailed comments are included in Appendix C. Dr. Perry noted in summary that from his analyses, the EPA methods as presented in the case studies result in an overly protective evaluation of I&E losses. In particular, Dr. Perry notes that EPA has repeatedly made a number of conservative decisions that push estimated benefits off the scale of realism. Examples include:

1. Setting entrainment and impingement survival to zero.

2. Not using models that employ compensatory mechanisms when estimating equivalent adults.

3. Estimating production by life-stage categories using constant mortality and growth within life stage.

4. Summing direct and indirect losses.

5. Estimated use-based benefits on the basis of replacement costs rather than on the basis of increase in value in the resource.

6. Estimating non-use benefits and a multiplier of use-based benefits when quantification of these benefits is very uncertain.

The net result of these conservative assumptions is that I&E losses and the economic benefits from their reduction are unrealistic. Dr. Perry's comments are consistent with those of Dr. Barnthouse and those of Dr. Ivar Strand as subsequently discussed.

EPA Response

EPA disagrees with this characterization of its analysis. Please see response to Comment 316bEFR.074.201, which refutes the assertion that EPA used "multiple conservatisms" in its analysis.

Comment ID 316bEFR.074.043

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.04

National Benefits

Review of EPA Economic Benefit Analyses Used for Case Study Assessments

Dr. Ivar Strand, Professor Emeritus (Fisheries Economics), University of Maryland, at the request of EPRI, performed a detailed evaluation of the methodology used by EPA to calculate the economic benefits to be derived from reducing CWIS impingement and entrainment losses. Dr. Strand's detailed comments are included in Appendix C. In summary, however, he notes that the analysis could be improved greatly by the elimination of:

-The use of Habitat Replacement Costs (HRC) and forage fish hatchery costs as measures of benefits. As their names indicate, these are simply costs and, only in very unusual circumstances not present here, can they be thought of as benefits. Using costs as benefits obscures the economic content of many of the decisions that EPA must make. In the aggregate benefit category for the preferred option 3 (Table C4-7), the habitat replacement costs represent 100% (or $180 million) of the Ocean and Great Lakes benefits, or about 25% of all national benefits. Forage fish replacement costs represent over 76% of the "benefits" for the Big Bend facility (D6-1), the facility upon which all Gulf of Mexico estuary facilities are based. Although the out-of-scope facilities in the non-Gulf estuary category generally do not rely on replacement costs, one of the in-scope facilities (the Brayton Point facility) has habitat replacement costs representing over 95% of the "benefits". The effect of using costs as benefits is substantial in the computation of benefits;

-The use of unsubstantiated ratios and multipliers when estimating benefits from commercial fishing. For each $1 annual increase in commercial harvest, EPA estimates annual benefits to commercial fisheries producers and consumers will increase between $1.8 and $3.15. In the Salem, Delaware case study, the proposed regulations are projected to increase spot and croaker landings by 5.1 million pounds at a constant price of $0.70/lb and $0.85/lb respectively, even though spot harvests in New Jersey and Delaware are nearly non-existent and croaker harvest is around 2 millions pounds. Benefits from spot and croaker represent about 60% of the benefit estimate at the Salem facility. The Salem facility is used to estimate benefits from all facilities on non-Gulf estuaries. The total value of the non-Gulf estuaries is over 60% of the national aggregate benefits for the preferred option 3 (Table C4-7);

-The inappropriate estimate of nonuse values as 50% of the use value. The Federal government's own best practice (Economic Analysis of Federal Regulations Under Executive Order 12866, OMB, June 11,1996;) does not recognize a 50% rule as measures of nonuse benefits. It states "For many of these goods, particularly goods providing 'nonuse' values, contingent-valuation methods may provide the only analytical approaches currently available for estimating values (OMB, p. 33).";

-Errors and questionable judgment in developing benefit estimates for the case studies. For example, one case study (the Ohio River) presents a benefit estimate implying each additional pound of recreational fish caught on the Ohio River is worth $148 (p. C7-1). This is important because benefits for all facilities on all freshwater rivers in the nation are based on this case study.

-In the aggregation of benefits, EPA selects from the alternative suite of benefit estimates that it has derived (e.g. HRC, RUM, benefit transfers) for each case study. The methods with the highest benefits are usually selected.

All of these comments are relevant even if the EPA chooses to use an economic efficiency criterion (i.e., costs being greater than benefits as the decision criterion to reject a technology). If EPA chooses to use inefficient technologies based on the current criterion of "significantly greater costs than benefits", then it is even more important that correct concepts and methods are applied in the benefit estimation.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

In the cost benefit analyses for the final Section 316(b) Phase II rule, EPA estimated a random utility model (RUM) for each region. The benefits transfer methods that produced the results in question for Ohio are no longer used. For more detail on EPA's recreational benefits methods please see the regional study document (DCN #6-0003), Chapter A11: Estimating Benefits with a Random Utility Model (RUM). Please also see EPA's response to comments on recreational fishing: #316bEFR.075.504 and #316bEFR.041.452.

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

For EPA's response to comments on the methods used to extrapolate results to the regional level, please see the response to comment 316bEFR.041.041. Please also see Chapter C1 of the EBA on the regional approach used in the analysis for the final rule.

Comment ID 316bEFR.074.044

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 7.01.03

Option 3--Site-specific determination

In 1977, following several years of intensive government and industry research on CWIS impacts and approaches to mitigate them, EPA proposed regulations for implementing Section 316(b)(EPA 1977). Those rules, reflecting the scientific consensus of the time, embraced the site-specific approach for assessing AEI and determining Best Technology Available (BTA) for minimizing AEI where it existed. Although the rules were subsequently remanded due to procedural issues, the rules were informally adopted by state and federal permitting authorities and subsequently followed to present.

In the 25 years that have since elapsed, research and 316(b) compliance activity has further confirmed the validity of the site-specific AEI assessment and BTA determination approach. For the benefit of the regulatory and policy dialog that has developed since the 1995 316(b) Consent Decree, EPRI has consolidated and summarized much of the technical information 1977 through present. Key EPRI reports <FN 1> or EPRI sponsored initiatives documenting the site-specific nature of AEI assessment and BTA determination include:

-Summary of EPRI Cooling Systems Effects Research 1975-1993. EPRI Report TR-104302

-Evaluation of Fish Behavioral Barriers. Prepared for EPRI by Alden Research Laboratory. Palo Alto, CA. TR-109483.

-Proceedings: 1998 EPRI Clean Water Act Section 316(b) Technical Workshop. TR-112613. April 1999.

-Fish Protection at Cooling Water Intakes: Status Report. TR-114013. December 1999.

-Catalog of Assessment Methods for Evaluating the Effects of Power Plant Operations on Aquatic Communities. TR-112013. June 1999.

-Procedural Guideline for Evaluating Alternative Fish Protection Technologies to meet § 316(b) Requirements of the Clean Water Act. EPRI Report 1000551, December 2000.

-Evaluation of Biocriteria as a Concept, Approach and Tool for Assessing Impacts of Entrainment and Impingement under § 316(b) of the Clean Water Act. TR-114007. June 2000.

-Assessment of Spawning and Nursery Habitat: Review and Evaluation of Methods Potentially Applicable to Regulation of Cooling Water Intake Structures. February 2002. Report # 1000732

-Behavioral Technologies for Fish Guidance. August 2001. EPRI Report #1006198

-Power Plants & Aquatic Resources: Issues and Assessment. Journal of Environmental Science & Policy, Volume 3, Supplement, September 2000. EPRI Order #1000767.

-Review of Entrainment Survival Studies: 1970-2000. EPRI Report #1000757, December 2000.

-Technical Evaluation of the Utility of Intake Approach Velocity as an Indicator of Potential Adverse Environmental Impact under CWA § 316(b). EPRI Report #1000731. December 2001.

All the above, including independent research results, have documented that the assessment of AEI and determination of BTA is a site-specific process.

Footnotes

1 All the reports listed have been previously provided to the water docket as part of EPRI comments on the Phase I 316(b) rule and in response to the EPA Phase I NODA.

EPA Response

EPA appreciates the commenter's submittals. EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID	**316bEFR.074.101**
Author Name	Doug Dixon
Organization	EPRI (Electric Power Research Inst)

Subject Matter Code 10.01.02
Methods to Evaluate I&E

Appendix A

Review of Methodology Used by EPA to Evaluate Impacts of Entrainment and Impingement Losses on Commercial and Recreational Harvests

Lawrence W. Barnthouse, Ph. D.
LWB Environmental Services, Inc.
Oak Ridge, Tennessee

Prepared for the Electric Power Research Institute under Agreement No. EP-P8210/C4139

August 1, 2002

Summary

I reviewed the methodology used by EPA in its Case Study Analyses for Section 316(b) of the proposed rule for existing facilities. My objective was to evaluate whether the methods used are consistent with the best state-of-the-practice in entrainment/impingement impact assessment, and whether the parameter estimation methods used yield reasonable and unbiased results. My review report includes 1) a summary of EPA's methodology, 2) a general evaluation of the methodology, including equations and assumptions, 3) an evaluation of EPA's rationale for assuming absence of biological compensation, 4) an evaluation of parameter estimates for selected species, and 6) identification of omissions and errors in documentation.

I found that, although generally consistent with methods used in other similar assessments, the methodology as documented contains two significant errors. Without reproducing EPA's calculations I could not confirm whether the calculations are wrong or the documentation is wrong. Even when correctly applied, EPA's methodology is highly sensitive to estimates of natural mortality rates in early life stages of fish, and in particular to assumptions made concerning the temporal distribution of entrainment and impingement mortality within life stages. Because it ignores biological compensation, EPA's methodology should overstate the benefits of alternative intake technologies. Despite EPA's arguments to the contrary, recent advances in understanding of biological compensation appear to provide a basis for developing quantification methods suitable for benefits analysis.

When I examined life history parameter values used in selected case studies, I found that different case studies often used different parameter values for the same species, leading to greatly differing estimates of the impacts of any given level of entrainment or impingement mortality. Some of the values used imply implausibly high or low population growth rates, and for the Delaware Estuary case study EPA's estimates of annual harvest and production foregone due to entrainment and impingement of spot and Atlantic croaker are more than an order of magnitude greater than the commercial harvests of these species over the same period. These results indicate the presence of a

major bias in EPA's calculations, although without a detailed evaluation of the calculations it is not possible to determine the source of the bias.

The documentation provided by EPA, both for the methodology itself and for the individual case studies, is unclear and incomplete. Despite the incompleteness of the documentation, it is evident even from my brief examination of the case studies that EPA did not take appropriate care in developing parameter estimates for the models that were used, and did not perform "reality checks" to ensure that results of the calculations were realistic and reliable.

Although I did not perform an exhaustive evaluation of all species or a statistical sampling of species evaluated by EPA, it appears that most of the assumptions chosen by EPA lead to overestimation of the impacts, not to a balance of overestimates and underestimates as claimed by EPA. A more detailed evaluation of the case studies would be needed to determine the magnitude of the overestimation, but at least in the case of the Delaware Estuary case study the harvest reduction and production foregone estimates appear to be greatly inflated.

Introduction

At the request of EPRI (Electric Power Research Institute), I reviewed the methodology used by EPA in its Case Study Analyses (CSA) for Section 316(b) of the proposed rule for existing facilities. The primary focus of the review is on the methodology itself, not the applications of the methodology in the individual case studies. However, because the validity of the case study results is highly dependent on the methods used to develop parameters for the models, the review includes a "first-level" review of the application of the models to the cases included in the CSA. The objective is to evaluate whether the methods used are consistent with the best state-of-the-practice in entrainment/impingement impact assessment, and whether the parameter estimation methods used yield reasonable and unbiased results.

The review includes the following components:

-Summary of EPA's methodology,
-General evaluation of methodology, including equations and assumptions,
-Evaluation of EPA's rationale for assuming absence of biological compensation,
-Evaluation of parameter estimates for selected species, and
·-dentification of omissions and errors in documentation.

Summary of EPA's Methodology

EPA's methodology for evaluating entrainment and impingement consists of four major components:

1. Estimation of entrainment and impingement losses by life stage
2. Extrapolation of stage-specific losses to losses of age-1 equivalent fish
3. Extrapolation of age-equivalents of exploited fish species to pounds of fish lost to commercial and recreational fisheries
4. Extrapolation of age-1-equivalents of forage fish to losses in production of commercial and recreational fish

This review focuses on steps 2 through 4, extrapolation of age and stage-specific losses to estimates of reductions in recreational and commercial harvests. EPA's methods for making these extrapolations are documented in Chapter A5 of the CSA. One potentially significant aspect of EPA's methodology involves the assumption that no compensatory processes (e.g., density-dependent growth or survival) are operating in the modeled populations. EPA's justification for this assumption, which is documented in Chapter A6 of the CSA, is also included in this review.

Extrapolation of losses to age-1 equivalents

Extrapolation of stage-specific losses to age-1 equivalent fish requires estimates of the probability of survival from the age of entrainment or impingement to age 1 (1-year-old fish). Mortality of early life stages is typically very high, so that only a small fraction of entrained or impinged organisms would survive to age 1, even if there were no entrainment or impingement. Survival rates vary greatly among species and life stages, because of the great diversity of life histories among fish species. A single female striped bass can spawn several million eggs per year over a reproductive life span of ten years or greater, whereas a female salmon may spawn only a few thousand eggs and spawns only once before dying. In both cases, only two of these spawned eggs must, on average, survive to reproductive maturity. The survival probability of each salmon egg must, therefore, be many times higher than the survival probability of each striped bass egg.

Early life stage survival rates are available for relatively few species, and even within species estimated survival rates are highly variable and somewhat unreliable. Where stage-specific rates were unavailable, EPA used the following equation, from Goodyear (1978), to estimate survival:

[see hard copy for equation]
(Equation 1)

where:
Seq = the probability of survival from egg to the expected age of spawning females
fa = expected lifetime total egg production

Given estimates of stage-specific survival rates, EPA calculates survival from the stage of entrainment or impingement to age 1 using the following equation:

[see hard copy for equation]
(Equation 2)

where:
Sj,1=cumulative survival from stage j until age 1
Sj = survival fraction from stage j to stage j+1
[see hard copy for equation] = adjusted Sj
jmax = the stage immediately prior to age 1

The survival adjustment factor, which is documented in Appendix VII, Attachment F-4 to the most recent permit application for Salem Generating Station (PSEG 1999), assumes that fish within a given stage or age class are equally vulnerable to entrainment or impingement throughout that stage or age. The intent of the adjustment is to account for the fact that fish entrained or impinged near the end of any stage would have had a higher probability of surviving and contributing to later stages or ages than would fish entrained or impinged early in that stage or age. Age-1 equivalents are calculated by multiplying the losses at each stage j by the appropriate value of $S_{j,1}$ and then summing over all life stages entrained or impinged.

Extrapolation of age-equivalents of exploited fish species to pounds of fish lost to commercial and recreational fisheries

EPA's equation for calculating foregone harvest due to entrainment and impingement is provided on page A5-4 of the CSA:

[see hard copy for equation]
(Equation 3)

where:
Y_k = foregone yield due to I&E losses in year k
L_{jk} = losses of individual fish of stage j in year k
S_{ja} = cumulative survival fraction from stage j to age a
W_a = average weight of fish at age a
F_a = instantaneous annual fishing mortality rate for fish of age a
Z_a = instantaneous annual total mortality rate for fish of age a

The foregone harvest for fish entrained in any given year is estimated by first calculating the expected future harvest from each stage or age group lost, and then summing over all stages and ages lost during that year.

Estimation of foregone production of forage fish

The method for calculating foregone production of forage fish is documented in section A5-3.3 of the case study report. According to EPA, Rago's (1984) model for calculating foregone at a specific stage, age or size class i (P_i) was used:

[see hard copy for equation]
(Equation 4)

where:

P_i = expected production for an individual during stage i
G_i = instantaneous growth rate for individuals of stage i
N_i = number of individuals of stage i lost to I&E (expressed as equivalent losses at subsequent ages)
W_i = average weight for individuals of stage i
Z_i = instantaneous total mortality rate for individuals of stage i

The term N_i in equation (4) must be interpreted differently depending on whether a cohort of fish was entrained or impinged at stage i or at some earlier stage. For fish lost at age i, N_i would be equal to the total loss at stage i. For fish lost at an earlier stage j, N_i would be equal to the losses at stage i discounted by the fraction of fish expected to survive from stage j to stage i:

[see hard copy for equation]
(Equation 5)

The CSA does not explicitly state that this adjustment was made. However, according to EPA's responses to UWAG questions (EPA 2002, response 5) the adjustment was made as described in Rago's (1984) paper.

Production foregone for fish lost at any stage j is obtained by calculating the production foregone at each future stage or age using equation 8 and then summing over all stages:

[see hard copy for equation]
(Equation 6)

where
Pj = production foregone for all fish lost at stage j
Tmax = oldest age group considered.

The total production foregone from all fish lost during any given year, PT, is obtained by calculating Pj for all stages or ages entrained or impinged during that year:

[see hard copy for equation]
(Equation 7)

where:

PT = total production foregone for all stages
tmin = youngest age group considered.

According to Chapter A5 of the CSA, EPA applied the production foregone approach to forage species, and then used the resulting estimates of PT to translate reduced forage fish production into reduced predator production.

Reduction in harvest related to foregone production of forage fish

EPA used a trophic transfer model to quantify the effect of foregone forage fish production on the biomass production and harvest of exploited RIS. The approach involves using trophic transfer coefficients to convert prey (forage fish) biomass into predator (harvested fish) biomass:

[see hard copy for equation]
(Equation 8)

where:

Pp = biomass production of predator
k = trophic transfer efficiency (typically about 0.1)
Pf = biomass production of forage species

EPA subdivided the overall trophic transfer pathway linking forage fish production and predator production into a "high efficiency" and a "low efficiency" pathway. For the high efficiency pathway, EPA assumed that 20% of forage fish production is consumed directly by predators, at efficiency k1. The remaining 80% of forage fish production was assumed to reach predators indirectly, through intermediate trophic levels. This intermediate step involves an additional transfer efficiency coefficient, k2. The reduction in biomass production of harvested species due to foregone production of forage fish was calculated by EPA as the sum of production losses for the high efficiency and the low efficiency pathways:

[see hard copy for equation]
(Equation 9)

EPA assumed a value of 0.09 for the transfer coefficient k1 and a value of 0.1 for coefficient k2. Thus, the net effect of the dual pathway model is that the biomass of predators available for harvest is assumed to be reduced by an amount equal to 2.5% (weighted fraction of the two transfer coefficients) of forage fish production foregone. EPA provided no rationale for the 20%-80% split or for the values of the coefficients k1 and k2.

Evaluation of methodology

At least in concept, EPA's approach is similar to approaches used in site-specific assessments such as the 1999 permit application for the Salem Generating Station (PSEG 1999). As discussed below, the approach ignores biological compensation and, therefore, provides upper bound estimates on the number of age-1-equivalents, pounds of harvest, and production foregone caused by entrainment and impingement.

At least in two cases, however, EPA may have erroneously interpreted the original source literature, thereby introducing potentially significant errors into the calculations.

EPA's equation for calculating foregone yield due to entrainment and impingement (Equation 3 above) cannot be correct. According to Equation (3), the yield lost at any given age is equal to the number of entrained or impinged fish that would have survived to that age (L multiplied by S) times the average weight of a fish at that age (W) times the fraction of the total mortality rate at that age that is attributable to fishing (F/Z). However, the yield to a fishery depends on the fraction of the population dying at any given age, not just the on ratio of fishing mortality to total mortality. The fraction of fish dying at any age i is given by:

[see hard copy for equation]
Equation (10)

where:

Ma = instantaneous natural mortality rate at age a

The fraction of an age group caught by a fishery cannot be any higher than this fraction, and can be as large as this fraction only if there is no natural mortality (i.e., Ma = 0 so that Fa = Za). If total mortality is very low, then Aa will be very low, the yield to the fishery will be very low, and nearly all fish will survive to the next age class. This is true regardless of the proportion of Za that is attributable to fishing. On the other hand, given the exact same ratio of Fa to Za, if total mortality Za is very high then Aa will be very high. The yield to the fishery from age group a will be very high, but very few fish will survive to the next age class.

Baranov's Catch Equation, as documented in Ricker (1975), correctly accounts for both the ratio of fishing to total mortality and for the fraction fish dying at any age i:

[see hard copy for equation]
(Equation 11)

where:

Na = Initial number of age a fish
Ua = (FaAa)/Za = exploitation rate of fish at age a
= fraction of fish of age a that die at age a

Given this relationship, then the loss in future yield for fish entrained or impinged during year k at life stage j should be:

[see hard copy for equation]
(Equation 12)

The total loss in future yield for all fish entrained or impinged during year k should be

[see hard copy for equation]
(Equation 13)

The literature cited by EPA (Ricker 1975) describes the correct form of the yield model. In its response to UWAG questions (EPA 2002), EPA stated that Equation (3) as printed in the case study report was used, in that form, to estimate foregone fishery yield due to entrainment and impingement. If this is true, then EPA's foregone yield estimates are incorrect and are biased high.

The correct version of the model (i.e., equation 13 above) was used in the Salem Generating Station's latest permit renewal (PSEG 1999, Appendix VII, Attachment 4). Even when correctly applied, the model does not include compensation and therefore is conservative, producing upper bound estimates on the actual reduction in future yield due to entrainment and impingement.

EPA's application of Rago's (1984) production foregone model also contains a significant error. According to Rago (1984) the term Wi refers to the average weight of individuals at the beginning of stage i. However, according to EPA's responses to UWAG questions (EPA 2002, response 3), EPA assumed Wi to be the average weight of all age i individuals. This difference in interpretation is potentially highly significant, because early life stages of fish grow very rapidly. The weight of fish at the end of each stage can be many times higher then the weight at the beginning of that stage. Use of an average weight calculated from weights measured at both the beginning and the end of a life stage would introduce a substantial upward bias into the production foregone estimates. EPA's citation to page 82 of Rago (1984) as support for its approach is incorrect. The correct citation is to page 84, which provides Rago's equation for calculating the average biomass of a cohort of fish over any time interval:

[see hard copy for equation]
Equation (14)

where:
= average biomass
= initial biomass at time 0
= average weight at time 0, i.e., the average weight at the beginning of the interval over which production is being calculated.

Since, in Rago's model, production over a life stage is equal to average biomass multiplied by growth rate, Equation (4) is obtained simply by multiplying both sides of equation (14) by the growth rate, G:

[see hard copy for equation]
Equation (15)

Aside from these errors, several other significant uncertainties and potential sources of bias are inherent in EPA's methodology.

Equation (1), which is used to calculate early life stage survival rates when empirical data are unavailable, assumes 1) that the population being modeled is stable over time, and 2) that survival is constant over the period between the spawning and adulthood. The stability assumption is reasonable as a first approximation because, measured over long time spans, the average sizes of most populations are relatively constant. The assumption of constancy over all stages is clearly an oversimplification, because mortality of all life stages and ages of fish is size-dependent. Survival rates of early life stages are very low; survival rates increase with increasing size and age. It is not clear from Chapter 5 how EPA apportioned Seq among different life stages, when more than one life stages was entrained or impinged.

Moreover, it is not clear how EPA used Equation (1) to calculate survival rates. The variable fa in Equation (1), the expected lifetime total egg production of a female recruit, is not a directly measurable quantity. This variable represents the number of eggs expected to be produced over the life time of a fish that has just reached reproductive age, accounting for both the number of eggs produced by the fish at each subsequent age and the probability that the fish will survive to reach that age:

[see hard copy for equation]
(Equation 16)

where:
Si = fraction of fish surviving from the age at first reproduction to age i
Mi = number of eggs spawned by a female fish at age i
S1 =1

Estimates of age-specific fecundity and survival are unavailable for many species, and even within a species different populations can have substantially different life histories. Age-specific survival rates for all of the modeled species are listed in the individual case study appendices, however, fecundity estimates are not provided. The input data spreadsheets provided in Docket Nos. 4-2035 through 4-2055 contain fecundity data for some, but not all species.

The adjusted survival fraction in Equation 2, S*j, is also a potentially significant source of error. This adjustment is included to account for the fact that typical entrained or impinged organisms will have already spent a certain amount of time in the life stage where they were entrained or impinged, and so will have already have survived some natural mortality. The probability that such fish would have survived to age 1 had they not been entrained or impinged is higher than it would have been had they been entrained or impinged on the first day of that life stage. Because of the adjustment, S*j is always larger than Sj.

The adjustment formula assumes that fish are equally susceptible throughout the entire duration of the life stage, i.e., the daily probability of entrainment or impingement is constant. If fish become progressively less susceptible during the stage (e.g., because of growth or emigration), then the adjustment will produce estimates that are biased high, especially if the stage is long in duration. Juvenile fish, for example, are often susceptible to entrainment immediately after transformation from the larval stage (~20 mm in length for many species). However, juvenile fish grow very rapidly and in many species reach a length of 100 mm or greater by age 1. Beyond a length of ~ 40 mm, they may be too large to be entrained. In this circumstance, the actual average age of entrained juveniles would be much younger than assumed in EPA's model, so that extrapolation of the losses to age-1 equivalents would be inflated.

The importance of the above two sources of uncertainty, early life stage survival rates and the survival rate adjustment factor, is illustrated in Figure 1. As in some of the case studies modeled by EPA, the "juvenile" period, i.e., the period from transformation to the juvenile life stage and the end of the first year of life, is divided into two substages, termed "juvenile 1" (J1) and "juvenile 2" (J2). Figure 1 plots the number of age-1 equivalents lost per 10,000 entrained J1 fish. Figure 1 assumes a survival rate of 40% for J2 fish, similar to values for striped bass and weakfish used in the Delaware Estuary case study. A range of values is used for J1 fish, from about 4% to 12%. These values are consistent with the range of values assumed for various fish species in EPA's case studies.

Survival rates for early juvenile fish are especially difficult to measure because juveniles are too large and mobile to be efficiently sampled by ichthyoplankton nets. Few empirical estimates of early juvenile mortality are available, even for well-studied species. All survival rate estimates for this stage are highly uncertain, and the actual uncertainty in survival rates for many species is probably greater than the range used in this example. For a range of 5-10% J1 survival, application of EPA's methodology produces a range of 381-727 equivalent one-year-olds per 10,000 entrained J1 fish. If, however, juveniles were susceptible to entrainment only at the beginning of the J1 stage, then the same 10,000 losses would equate to only 200-400 age-1 equivalents.

These uncertainties translate directly into uncertainties concerning the magnitude of reduced harvests caused by entrainment and impingement. Because EPA's model is linear, a factor of two uncertainty in the number of age-1-equivalents per lost fish translates into the same factor of two uncertainty in pounds lost and economic value.

The production foregone model used by EPA involves many of the same uncertainties. Rago (1984) performed an extensive sensitivity analysis of this model. He found that model outputs were especially sensitive to 1) survival rate and estimates for post yolk-sac larvae and age 0 (juvenile) fish and 2) mean weight estimates for age 0 fish. He also discussed the influence of density-dependent population regulation (compensation) on production foregone estimates. He noted that the model assumes that compensation does not occur, and therefore should provide upper bound estimates of production foregone. The production foregone model, like the other models used by EPA, is linear so that a factor-of-2 uncertainty in estimates of production foregone per entrained or impinged forage fish translates directly into the same uncertainty in estimates of pounds of harvestable fish lost.

In at least on respect, however, Rago's (1984) model is inconsistent with the approach used by EPA to calculate age-1 equivalent losses and future yield for harvested species: the production foregone model does not include the survival rate adjustment discussed above. In calculating the production foregone at future stages or ages (i.e., stages or ages subsequent to the stage or age at which the loss occurred), the model assumes that the loss occurred at the beginning of the stage. Using the survival rate adjustment (which would have made the production foregone model logically consistent with the age-1-equivalent loss model), would have increased the production foregone estimates.

EPA's approach to estimating secondary and tertiary harvest reductions due to prey production foregone is conservative both in assuming that no compensation occurs and that all of the entrained and impinged prey would ultimately have been consumed (directly or indirectly) by harvested predators. When forage fish are entrained and impinged, predators – in this case the surviving members of the harvested predator populations – can potentially consume alternative prey. Moreover, some of the entrained and impinged forage fish are those that would have been consumed by the entrained and impinged predators, had they survived. However, EPA's "secondary and tertiary" yield loss calculations assume that production foregone translates directly (discounting for transfer efficiencies) into reduced yield of harvested predatory fish, i.e., into reduced numbers or size of the harvested predators. Implicitly, EPA assumes that no consumption of alternative prey occurs and that the forage fish losses consist solely of fish that would have been consumed (directly or indirectly) by the surviving members of harvested species. These assumption, although consistent with EPA's conservative assessment approach, are clearly biologically unrealistic.

Critique of EPA's rationale for assuming no biological compensation

Chapter A6 of the case study report discusses the use of "population models" in assessing long-term consequences of mortality due to entrainment and impingement. In this context, "population models" means the use of classical spawner-recruit models such as the Ricker and Beverton-Holt models to quantify the influence of density-dependent population regulation (compensation) on the abundance of fish populations, and to calculate estimates of long-term effects that include the influence of density-dependence. Specific topics covered in Chapter A6 include:

-The general concept of population regulation and the principal models used by fisheries scientists to quantify compensation,

-The way in which these models can be used to calculate quantities of interest to fisheries managers (e.g., maximum sustainable yield),

-Modifications of the models made to apply them to CWIS impacts,

-Various uncertainties that limit the ability of stock-recruitment models to predict responses of fish populations both to harvesting and to entrainment/impingement losses, and

-EPA's rationale for not quantifying impacts on populations and, instead, using models that assume no compensation.

EPA asserts that stock-recruitment models do not account for impacts on multiple species, do not include impacts of multiple intake structures, do not account for other sources of human-related mortality (e.g., toxic chemicals), do not incorporate inter-species interactions, and do not consider interactions between density-dependent and density-independent processes. Because of the high degree of uncertainty associated with stock-recruitment models, and because many of the fish species that are vulnerable to entrainment and impingement may already be depleted by overfishing, a "precautionary" approach to impact assessment is, according to EPA, appropriate. The precautionary approach, according to EPA, entails (1) use of entrainment and impingement losses as direct measures of potential impacts, analogous to the use of toxicity testing to predict the potential impact of pollutant discharges, and (2) use of density-independent models to project estimates of entrainment and impingement losses to estimates of reduced harvest and production foregone.

The primary concern with EPA's argument is that it inappropriately confuses the phenomenon of biological compensation with the mathematical models that have been used by fisheries biologists to quantify compensation. In addition, EPA oversimplifies the use of compensation in fisheries management.

The operation of density-dependent processes in fish populations has been demonstrated in numerous empirical studies, including statistical analyses of long-term databases and direct manipulative experiments performed in small ponds and lakes (Myers 2001, Rose et al. 2001). Moreover, the existence of compensation is explicitly recognized in fisheries management regulations implemented by the National Marine Fisheries Service, which state that exploitation that reduces the size of populations by greater than 50% below the unexploited stock size are consistent with the long-term sustainability of populations (NMFS 1998a).

In focusing on a few types of simple models, EPA greatly oversimplifies the biological basis for compensation and ignores the fact that compensation is explicitly acknowledged by fisheries management regulations. The Ricker, Beverton-Holt, and other stock-recruitment models are used in fisheries management only when large quantities of high-quality data are available. In other cases, the approach most commonly used for establishing fishing rates that protect the reproductive capacities of fish populations is the "spawning stock biomass per recruit" (SSBPR) approach (Goodyear 1993). The SSBPR approach implicitly considers compensation by quantifying the influence of fishing mortality on the reduction in number of eggs produced per female recruit over her lifetime. To maintain a stable population, the survival rate of each spawned egg must increase in order to offset the reduction in lifetime egg production caused by harvesting. As noted by Goodyear (1993), the SSBPR model was first proposed in 1977 (Goodyear 1977) as a method for indirectly quantifying compensation in power plant impact assessments.

Technical committees of the Atlantic States Marine Fisheries Service have, in fact, developed stock-recruitment models for two fish species that are often entrained and impinged at East Coast power plants: striped bass and weakfish (NMFS 1998b, 2000). These models are used as an input to the management process for these species, although they are not used to calculate numerical harvest limits. Although spawner-recruit models are not widely used in fisheries management, compensation is at least implicitly included.

Many of the uncertainties inherent in EPA's biological assessment method (e.g., estimation of stage-specific natural mortality rates) can at least in principle lead either to overestimates or to underestimates of the potential harvest lost due to entrainment and impingement. However, ignoring compensation leads to an overestimate of harvest reduction and, therefore, an overestimate of the benefits to be gained by implementing additional technologies to reduce entrainment and impingement. The magnitude of the bias introduced by assuming a linear relationship between losses and harvest reduction would be expected to be relatively small for fish stocks that are severely depleted and have a very low compensatory reserve, but relatively large for fish stocks such as striped bass that are currently being exploited at sustainable levels. EPA has made no attempt to quantify the degree of bias, or to evaluate the influence of such bias on the benefits assigned to alternative intake technologies.

It clearly is true that the precision of spawner-recruit models is often too low for use in managing specific fish stocks (Goodyear 1993). However, this degree of precision may not be necessary for a national-scale benefits analysis such as the one performed by EPA. For example, the method developed by Myers et al. (1999) for estimating the compensatory reserve of fish populations based on meta-analysis of hundreds of published stock-recruitment data sets could be used to develop models that are suitable for benefits assessment. Rose et al. (2001) showed that this method produces estimates of compensatory reserve that are consistent with expectations derived from fish life history theory. Although the benefits predictions derived from a model that included compensation would be uncertain, they would, at least, not contain a consistent bias toward overestimation of benefits.

Evaluation of parameter estimates for selected species

Whether or not the uncertainties discussed above compromise the validity of EPA's benefits analysis depends on the validity of the model parameters used by EPA in the various case studies. A detailed evaluation of all parameters used in all case studies would be impossible within the time available for commenting on the proposed rule, however, much can be learned from a limited evaluation of a few model applications, focusing on parameters such as early life stage mortality rates that are known to have especially important influences on model predictions. I selected three specific issues were selected for detailed evaluation:

-The influence of juvenile-stage survival assumptions on estimates of age-1 equivalent losses and yield reductions for Atlantic croaker and spot,

-Inconsistencies between mortality rates used for the same species evaluated in different case studies,

-Checks for unrealistically high or low parameter values and model projections.

These particular issues are representative of the types and potential magnitudes of uncertainties affecting all of the case studies, and of the types of “reality checks” that are needed to ensure that seemingly plausible and well-documented parameter sets do not lead to implausible or impossible model results.

Influence of juvenile-stage survival assumptions on estimates of age-1 equivalent losses and yield reductions for Atlantic croaker and spot

The life history parameters listed in Appendix B2 of the CSA are, for most species, the same values used in PSEG’s 1999 Permit Application (PSEG 1999, Appendix L, Tab 18). Yet, EPA’s estimates of age-1 equivalents lost at Salem are different from the estimates presented in PSEG’s Application, and, in some cases, EPA’s estimates are very much higher. The differences in part are due to EPA’s assumption of 100% entrainment mortality for all species and life stages (see EPRI’s specific comments on EPA’s assumption of 100% mortality), however, for some species the differences are much too large to be accounted for by entrainment mortality alone. For these species, differences in assumptions concerning the age of entrained juvenile fish may account for a substantial fraction of the difference. Examination of the Salem data input spreadsheet (Docket No.4-2051) shows that for Atlantic croaker, spot, and Atlantic menhaden, most of the entrained fish are juveniles rather than eggs or larvae. Early life stages (eggs, yolk-sac larvae, and post yolk-sac larvae) accounted, respectively, for only 7.5%, 0.6%, and 1.2% of total entrainment losses of these species. The juvenile life stages of all three have durations of 9-10 months, during which the fish grow rapidly out of the entrainable size ranges and emigrate from the Delaware Estuary. Because life history considerations and length distributions of juvenile fish collected in entrainment samples at Salem indicate that small, early juveniles account for most of the entrainment of this life stage, PSEG (1999) did not apply the life-stage survival adjustment factor (equation 2) to entrained juveniles. EPA, however, applied the adjustment to all life stages, including juveniles.

Figure 2 compares estimates of the number of age-1 equivalents per 100,000 entrained Atlantic croaker, spot, and Atlantic menhaden, under two alternative assumptions concerning entrainment susceptibility of juveniles: susceptibility only at the beginning of the stage, and equal susceptibility throughout the stage. The values calculated using the EPA assumption range from approximately twice as high (spot) to more than six times as high (Atlantic croaker) as values calculated using the PSEG assumption. These differences in assumed susceptibility translate directly into proportional differences in the estimated lost yields to fisheries and production foregone. Since Salem is used as a model to extrapolate losses calculated for all of the facilities (Salem, Hope Creek, Deepwater, Edge Moor, Delaware City Refinery, Deepwater, Chambers Cogen, General Chemical Corp., SPI Polyols, Sun Refining, Logan Generating Co., and Hay Road) examined in the Delaware Estuary case study, the differences in susceptibility assumptions translate into factor of 2-6 estimates of total yield losses and production foregone for the case study as a whole.

Inconsistent values for life history parameters used in different case studies

Mortality rates for early life stages of fish are notoriously difficult to measure and different estimates for the same species can differ by surprisingly large amounts. Table 1 shows a range of published mortality rates for bay anchovy post yolk-sac larvae. Bay anchovy larvae are abundant and relatively easy to collect, and ages of larvae (in days) can be accurately determined from analysis of otolith increments. Nonetheless, the range of published values for this species and life stage implies a range of stage-specific survival rates from essentially 0 to more than 12%. These large differences, some of which are clearly biologically implausible, are caused by factors such as size-specific gear avoidance and movements of larvae into and out of study areas. Much less information is available concerning early life stage mortality rates for other species and life stages. Under this circumstance, special care is needed to ensure that the values selected for use in impact modeling are biologically realistic and that consistent sets of parameters are used in different components of a study.

There is no indication in the case study documentation that EPA attempted to check the biological realism of literature-derived early life stage mortality rates. For some species, different case studies apparently used different mortality rates. Impacts on Atlantic menhaden and alewife were quantified for the Delaware Estuary, Brayton Point, and Seabrook/Pilgrim, case studies. Gizzard shad and several other species are common to both the Ohio River and Great Lakes (Monroe and J.R. Whiting) case studies. All three Atlantic coastal and both Great Lakes case studies evaluated impacts on alewife. Inspection of the stage-specific mortality rates provided in the life history appendices show that in some cases different values were used in different case studies, producing dramatically different estimates of the number of age-1 equivalents lost per entrained or impinged fish. The stage-specific survival rates used by EPA for the above species are summarized in Table 2. Not all of these values, however, were actually used in the benefits analysis. For example, although early life stage mortality rates for alewife are listed in Appendices G1 (Seabrook/Pilgrim), H1 (J.R. Whiting, and I1 (Monroe), no entrainment or impingement estimates for alewife eggs, larvae, or juveniles were used in those case studies.

Figure 3 shows, for menhaden, alewife, and gizzard shad, the influence of the assumed ELS mortality rates on the estimated numbers of age-1 equivalent fish entrained or impinged. Only mortality rates that were used in the benefits calculations are included in this figure. To facilitate graphical comparisons, the estimates are expressed as numbers of age-1-equivalents per 100 million eggs, per 10 million larvae, and per 100,000 juveniles. The differences are substantial. For Atlantic menhaden, any given number of entrained or impinged fish would translate into 4-20 times more age-1 equivalents using the Delaware Estuary mortality rates as using the Brayton Point mortality rates. On the other hand, for alewife, the Brayton Point mortality rates imply 5-20 times as many age-1 equivalent fish per entrained or impinged fish as do the Delaware Estuary values. For gizzard shad, the Ohio River values translate into twice as many age-one-equivalents per unit entrainment of eggs and larvae as the Great Lakes values, but only into one 20th as many age-1-equivalents per unit entrainment or impingement of juveniles.

These inconsistencies in life table parameter values translate directly into inconsistencies in estimates of yield losses and production foregone used in the different case studies.

Checks for unrealistically high or low parameter values and model projections

CSA Tables B3-16 and B3-17 provide, respectively, EPA's estimates of annual average harvest foregone and production foregone due to entrainment for the Delaware Estuary case study. Figure 4 compares EPA's harvest and production foregone values for Atlantic croaker and spot (all 12 facilities combined) to average annual Delaware and New Jersey landings of these two species from 1990 through 2000. The NMFS data are available on-line at http://www.st.nmfs.gov/st1/commercial/. Figure 4 shows that EPA's estimates of entrainment impacts on these species are 10-100 times the actual landings of these species in the two states bordering the Delaware Estuary. For both species, EPA's production foregone estimates are larger than recent (1990-2000) average landings for the entire Atlantic coast (~15 million pounds of Atlantic croaker and 7 million pounds of spot). Such a result is quite remarkable because the Delaware Estuary is at the northern end of the geographic range of both species, so that only a small fraction of fish spawned each year should be susceptible to entrainment or impingement at Delaware Estuary facilities. The gross disparity between EPA's estimates and the actual landings of these species could be related to a variety of assumptions, including inappropriate application of the survival adjustment factors, the method used to extrapolate from the model facility (Salem) to the other facilities, the assumption of 100% entrainment mortality of all life stages, and the assumption of no compensation. Whatever the combinations of factors, it seems clear that EPA's values probably overestimate the actual impact of these facilities, possibly by a factor of 10 or more. Inspection of the other values in Tables B3-16 and B3-17 suggests that impact estimates for other species entrained at Delaware Estuary facilities may also be unrealistically high. The estimated annual yield loss and production foregone for striped bass and weakfish, for example, are also greater than the 1990-2000 annual average commercial landings for these species in Delaware and New Jersey (~ 400,000 pounds of striped bass and 1.6 million pounds of weakfish).

The plausibility of EPA's model results can also be evaluated by examining the implications of the survival rate parameters with respect to the long-term growth rates of the populations. Considered over the long term, the average growth rates of most populations remain near zero. A decline of 50% within a single generation would be cause for great concern, yet, given the high uncertainty in estimates of early life stage mortality rates, it is easy to develop density-independent population models that predict growth rates far larger or smaller growth rates, e.g., an increase of 10x per generation or a decline of 99% per generation. Calculation of population growth rates per generation from life history data requires, in addition to the age-specific mortality rates documented in the life history appendices attached to the case studies, estimates of age-specific fecundity and % maturity. Fecundity and maturity estimates for alewife were available from PSEG (1999), and estimates for yellow perch were available from Docket 4-2046, the input spreadsheet for the Monroe case study. Values for Atlantic menhaden were not developed by either PSEG or EPA, but were available from a U.S. Fish and Wildlife Service report on Atlantic menhaden (Rogers and Van Den Ayvle, 1989). Age-specific fecundity values for these three species are provided in Table 3. These estimates, together with the stage and age-specific mortality rates used by EPA, were sufficient to estimate per-generation growth rates for each species, measured as the number of eggs produced by each spawned egg, given the probability of survival of each egg to reproductive maturity, the sex ratio (assumed to be 50% for all three species), and the expected lifetime egg production of each newly mature female. The necessary data for several other fish species are available in the 1999 permit application for Salem, however, as discussed below, the mortality rates used for Salem (and adopted in general by EPA) were adjusted to produce a net population growth rate of zero and so do not provide an independent test of EPA's modeling procedure.

The resulting population growth rate estimates are provided in Table 4. The values for Atlantic menhaden and yellow perch are generally within a range of 0.5 to 3.0. These are at least within the plausible range, and could be consistent with observed rates of change in real fish populations. For alewife, however, the Brayton Point values imply a growth rate of more than 6x per generation. This value could substantially overstate the actual impact of entrainment and impingement, depending on which mortality rates are responsible for the high growth rate and which life stages are most vulnerable to entrainment or impingement.

To overcome the problem of biologically unrealistic combinations of life history parameters, PSEG (1999) adjusted literature-derived early life stage mortality rates for all species to produce a net population growth rate of zero. The ratios of daily mortality rates for eggs, larvae, and early juvenile fish were fixed based on recommendations from independent experts, and then an "adjustment factor" was applied to each of the daily rates to reduce the net population growth rate to zero. PSEG's approach is not the only possible approach to reconciling conflicting literature-derived life history parameter estimates, however, it provides an illustrative example of how such adjustments can be performed.

Figure 5 shows results obtained by applying PSEG's procedure to the Atlantic menhaden, alewife, and yellow perch mortality rates used by EPA. The natural mortality rates for eggs, larvae, and juveniles of each species were adjusted by a common multiplier until a growth rate of zero was produced. Figure 5 compares, for each species, numbers of age-1 equivalent fish per unit entrainment or impingement calculated using EPA's values and using values calculated using the adjusted mortality rates. With the exception of Atlantic menhaden at Brayton Point, All of the adjustments reduce the number of age-1-equivalent fish lost per unit entrainment or impingement. In two cases, (alewife at Brayton Point and Atlantic menhaden at Seabrook/Pilgrim), the reductions are greater than 50% for at least one life stage.

Identification of Errors and Omissions in Documentation

As discussed above, the harvest foregone equation (Equation 7, p. A5-4) provided in the CSA report is clearly erroneous. EPA's interpretation of the weight term in Rago's (1984) production foregone model is also erroneous. Neither of these errors is evident in the text of the CSA itself, which is extremely vague and provides few details beyond lists of equations and terms. The nature of the errors was evident only from EPA's responses to UWAG's request for clarification of the methodology (EPA 2002, responses 1 and 3).

The CSA provides no rationale for the biomass transfer functions used to extrapolate foregone production to reduced yield of predators, however, the values themselves are consistent with values used in other similar studies. Similarly, no rationale is provided for the 80%-20% split assumed between direct and indirect trophic transfer pathways, and this choice of values appears to have been arbitrary. In response to a question on this rationale from UWAG (EPA 2002, response 6), EPA stated that the 20% fraction assumed to be directly consumed by predators was "…introduced for illustrative purposes only to present the rationale for using the low net transfer efficiency of 2.5%." In other words, the choice of transfer factors was arbitrary.

The scope of this review did not include a detailed evaluation of the individual case studies; however, spot checks of the case studies indicate that there are some significant omissions in documentation. In particular, all of the appendices contain tables (e.g., Table B3-17 of the Delaware Estuary case study) of production foregone estimates for harvested species. No explanation is provided concerning how or why these tables were developed. According to Chapter A5, the production foregone method was to be applied only to forage species. The sources of early life stage mortality rates for many species are also inadequately documented. Some of the values appear to be biologically unrealistic, however, the most unrealistic values often were not actually used in the benefits analysis.

Conclusions

The models described in Chapter A5 of the CSA are superficially similar to the models used in other assessments of impacts of entrainment and impingement on fish populations, however EPA made at least two significant errors in interpreting the original sources for the models used. In both cases the errors lead to overestimation of the reduction in harvest attributable to entrainment and impingement. Even when correctly applied, these models do not account for biological compensation. Because of this limitation, the CSA methodology should, even using correct formulations, overestimate actual impacts of entrainment and impingement on age-1 abundance, harvests, and production foregone. The calculated benefits associated with reducing entrainment and impingement impacts would, as a consequence, be overestimated.

Aside from the errors and the conservative assumptions, the models used by EPA are highly sensitive to assumptions concerning patterns of vulnerability with any particular life stage and to values chosen for key parameters, especially larval and juvenile mortality rates. Examination of a few examples in the case studies shows that EPA may well have made inappropriate assumptions in some cases, and that inadequate care was taken in the development of life history parameters for many species. Some of the errors would have reduced the projected values of age-1 equivalents, harvest foregone, and production foregone, however, in most of the cases examined the errors appear to have inflated those values.

EPA does not appear to have performed any reality checks on the models or the results. Examination of individual mortality rate parameters (Table 2) and estimation of implied population growth rates for selected species (Table 4) shows that many of the parameter sets are biologically unrealistic. Simple comparisons of the estimated harvest foregone to the known harvest of commercial species should be clues that there are probably errors in the analyses. The huge disparity between the estimated spot and croaker harvest and production foregone estimates developed for the Delaware Estuary case study and the actual New Jersey and Delaware landings of these species indicates that for these species the bias may be as large as a factor of 10 or greater, although without a detailed evaluation of the calculations it is not possible to determine the source of the bias.

EPA has been conservative in assuming 100% mortality of all entrained organisms (see EPRI's separate comments regards this assumption), no compensation, and constant susceptibility to entrainment throughout the juvenile life stage. Although I did not perform an exhaustive evaluation of all species or a statistical sampling of species evaluated by EPA, it appears that most of the assumptions chosen by EPA lead to overestimation of the impacts, not to a balance of overestimates and underestimates as claimed in Section A5-4 of the CSA.

[see hard copy for tables and figures]

EPA Response

Regarding the survival values used by EPA, please see response to Comment 316bEFR.305.003.

In response to comments on compensation, please see EPA's response to Comment 316bEFR.025.015.

Another technical issue noted by the commenter involves the method for adjusting survival rates of entrained juveniles. Several commenters indicated that entrainment of juveniles occurs predominantly to fish that are early in the juvenile stage, because older juvenile individuals are stronger swimmers and are therefore able to avoid entrainment. Commenters noted that it is therefore appropriate to use unmodified survival rate parameters (Sj), rather than using parameters that are modified (S*j) to account for an unknown precise within-stage ages. EPA acknowledges that the commenters have identified a valid improvement to the method, and EPA has discontinued application of S*j for assessing juvenile entrainment.

Regarding EPA's calculation of production foregone, please see response to Comment 316bEFR.305.003.

The commenter notes a problem in the Case Study Document submitted at proposal in EPA's reported equation for calculating foregone yield. The equation in question was misprinted in the document, but has been corrected in subsequent reports. Note that the associated calculations were performed with the proper equation, not the misprinted equation.

The commenter questions the structure and basis of the trophic transfer model. EPA has responded to this question as part of its response to Comment 316bEFR.306.202.

The commenter states that the reporting of citations of the sources of survival rates is inadequate. However, EPA notes that the sources of all life history parameter values used in its I&E analyses are provided in an appendix to each regional report in the Regional Analysis Document (DCN #6-0003).

The commenter questions EPA's identification of survival rates, in particular the use of the equation Seq = 2/fa to estimate survival rates. The commenter has misinterpreted EPA's use of Seq = 2/fa In fact, EPA used the equation only in very few instances, and only in cases where survival rates for particular life stages were unknown. In such cases, EPA used the method in conjunction with known survival rates in other life stages to deduce a survival rate for a single stage. In no cases did EPA use the method to infer survival rates throughout the entire lifespan of a fish. The commenter correctly notes that survival rates vary dramatically between life stages, and the parameter sets used by EPA reflect that.

The commenter asserts that EPA has not done any "reality checks" on the results. This is not true. In fact, EPA conducted rigorous QA/QC as well as "reality checks" on all results. EPA recognized that in some cases its estimates of foregone harvest were larger than actual empirical harvest rates even though all growth and mortality rates appeared reasonable. This issue is complicated by uncertainty about what to assume about the nature of particular fisheries. For example, EPA did not wish to assume that every stock was fully exploited, nor did it wish to make other stock-specific assumptions about how the fishery might respond if the stock changed as a result of reductions in I&E. EPA considered capping estimates of foregone harvest in some relation to current harvest rates, but eventually elected not to alter the basic results by capping loss estimates in this way, given no compelling reason to do so. EPA considers these cases to be more uncertain than its other estimates. However, such cases were few and did not significantly affect EPA's results or lead to any distinct bias in the overall national benefits analysis.

The commenter has concerns about EPA's assumption of 100% mortality of all entrained organisms.

EPA has responded to this issue in its response to Comment 316bEFR.306.506 and in Chapter A7 of the Regional Analysis Document (DNC #6-0003).

Comment ID 316bEFR.074.201

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.01.02
Methods to Evaluate I&E

APPENDIX B to EPRI Comments

Comment on Multiplicity of Conservative Choices

Elgin Perry
Statistics Consultant
2000 Kings Landing Rd.
Huntingtown, Md. 20639
phone: 410.535.2949
email: eperry@chesapeake.net
7/29/02

At the request of EPRI (Electric Power Research Institute), I performed a technical review of the EPA Case Study Assessment (CSA) methodology (DCN 4-003), a supporting document to the EPA Proposed Phase II Section 316(b) Rule for Existing Facilities (67 Fed. Reg. 17,121-225; April 9, 2002). The following are the results of my review.

EPA has the daunting task "to protect human health and to safeguard the natural environment air, water, and land upon which life depends." The consequences to society of not succeeding to accomplish this task are sufficiently grave that it seems prudent to proceed with a conservative strategy, a strategy that is more likely to err in the direction of being over-protective rather than under-protective. In the last decade experience has illustrated the consequences of relying heavily on models and not being sufficiently conservative. Examples of highly managed fisheries that suffered disastrous consequences include the 1992 collapse of the North Atlantic cod fishery, 1993 collapse of the pacific herring fishery in Prince William Sound and the 2000 collapse of the King Salmon fishery in Yukon River Alaska. In some cases the fisheries models gave warning that collapse was near, but regulating agencies were reluctant to reduce fishing pressure out of short sighted concern for the economic welfare of those in the fishery.

In the CSA, EPA indicates that it intends to take a “precautionary approach” to estimating the CWIS impacts, in light of the “at risk” status of may fish stocks CSA, A6-6. This review does not challenge EPA’s decision to take a conservative position on protection of the environment, but instead it addresses the statistical effects of a multiplicity of conservative decisions. In particular, I consider the likelihood that numerous conservative decisions in a sequential process will result in a final position that is overly conservative. An overly conservative decision will be more costly than is needed to protect a resource.

In this discussion I consider a conservative decision to be one that is protective of the environment in an extreme condition that has a low probability of occurring. A example would be a water policy that insures adequate water supply even in a drought that is expected to occur once in 100 years. An overly conservative decision might be one that is protective of a once in 100 thousand-year event. The geological record indicates that in a period of 100 thousand years, planetary conditions will be sufficiently changed that the conditions under which we formulated this decision would no longer apply. Thus, most would agree that planning on that time scale is folly.

I begin with a simple example that illustrates how conservative steps in a sequential process can result in an overly conservative position. Assume a five-step process. At each step, there is an estimate with some degree of uncertainty. The estimate of each subsequent step is based on the estimate of the previous step. Because of this structure, uncertainty propagates through the process. At issue here is whether it is better to manage this uncertainty by being conservative at each step or by estimating the propagation of error to the final step and being conservative at the final step only. To illustrate the difference between the two, consider a specific case. Let the first step have a mean of 6 and a variance of 1.0. At each subsequent step the process is increased by a random variable with mean = 1.0 and variance = 1.0. Thus at the final step, the process has a mean of 10 and the error has propagated up to a total variance of 5.0.

In this five-step process it is desired to manage risk to protect against a 1 in 100 event. This is consistent with the use of a 99% upper bound. If one were to compute a 99% upper bound at each step and use that as the mean for entering the next step, the upper bound attained in the last step is 21.6. The probability of obtaining a value as extreme as 21.6 in a distribution with a mean of 10 and a variance of 5 is about 1 in 100 million. Clearly, taking even a moderately conservative position at each step in a multi-step process can result in an extremely conservative position. A 99% upper percentile of the step 5 distribution (mean=10, variance=5) is 15.2. This illustrates that taking a conservative position at each step of a multi-step process can result in a final position that protects against events with risk 5 in 100 million when the intention is to manage for risk of 1 in 100.

In what follows, I look specifically at the steps for evaluating impingement and entrainment (I&E) losses as presented in EPA case studies and examine the conservative nature of some steps in the EPA assessment. While the degree of conservatism may seem reasonable at each step (and sometimes not), bear in mind that in a few steps, it will accumulate to a position that is extreme. In most cases, it is impossible to put a probability level on the degree of conservatism used by EPA and thus it is not possible to judge the total degree of conservatism.

The evaluation of I&E as presented by EPA in its summary of case studies is a multiple step process. At a gross level, the steps can be thought of as:

1. Impingement and Entrainment Estimation. Numbers of fish impinged or entrained a estimated based on statistical sampling designs and methods.

2. Equivalent Adult Modeling. Estimating the number of additional age 1 fish that would have entered the population if there had been no losses to I&E.

3. Direct Foregone Production: Forecast of pounds of fish lost to commercial and recreational fishery as a result of I&E of species exploited by commercial and recreational stakeholders.

4. Indirect Foregone Production: Forecast of pounds of fish lost to commercial and recreational fishery as a result of I&E of forage species.

5. Economic evaluation: The translation of production losses into economic value based on Cost of

replacement and perceived non-use benefits.

However, within each of these steps, there is more than one opportunity to be conservative. For example, in the production-forgone model there are four independent variables and each of these is supported by a separate model. For each independent variable, one might first choose a conservative model and then choose a conservative estimate from that model. As a result, there are at least eight opportunities to be conservative in this single calculation as I illustrate:

$$Pji = \frac{Gi\ Nij\ Wi\ (\exp(Gi-Zi) - 1)}{Gi - Zi}$$

The independent variables are:

Gi= instantaneous growth rate for individuals during stage i
Nj= number of individuals loss at stage j expressed as equivalent age stage i fish.
Wi= average weight for individuals of stage i.
Zi = instantaneous total mortality rate for individuals of stage i.

For each of these we might choose between models (a) and (b):

Gi :(a) constant growth rate model
(b) decreasing growth rate model (e.g., von Bertalanffy model)

Nij: (a) equivalent adults model without compensation
(b) equivalent adults model with compensation.

Wi : (a) unweighted average of biomass
(b) weighted average of biomass

Zi : (a) constant mortality rate model (e.g., negative exponential model)
(b) decreasing mortality rate model (e.g., Pareto Model)

Holding all else constant, one of the two models listed for each independent variable will predict higher production lost and is therefore environmentally conservative relative to the other. In addition, there will be uncertainty in the estimate that may be modeled by a statistical formulation. One may choose a value from the environmentally conservative side of the distribution of plausible values. This provides eight opportunities to be conservative. If the initial example of a five-step process is extended to an eight-step process, then the result of making a conservative choice at each of eight opportunities is to arrive at an extreme position that has probability of a little less than 1 in 200 billion. I am not saying that EPA has implemented production calculations with this extreme degree of conservatism, but this illustrates the potential of getting off the scale of realism in a single calculation.

In presenting the case studies, EPA has repeatedly made a number of conservative decisions that push estimated benefits off the scale of realism. Examples include:

1. Setting entrainment and impingement survival to zero.

2. Not using models that employ compensatory mechanisms when estimating equivalent adults.

3. Estimating production by life-stage categories using constant mortality and growth within life stage.

4. Summing direct and indirect losses.

5. Estimated use-based benefits on the basis of replacement costs rather than on the basis of increase in value in the resource.

6. Estimating non-use benefits and a multiplier of use-based benefits when quantification of these benefits is very uncertain.

EPA supports these decisions as follows:

I&E survival: The EPA position on entrainment and impingement survival is: "Although EPA agrees with the conclusion of the EPRI report that an assumption of zero entrainment survival rate for all facilities may be unwarranted for certain species and certain conditions, EPA believes that it remains to be determined whether non zero survival rates are common for cooling water intake structures in general." CSA, p. A7-14 makes it clear that this is one of numerous conservative choices presented in the case studies.

Compensation: EPA again chooses a conservative approach in its treatment of compensation. The agency acknowledges that the concept of density dependence is fundamental to the study of biological populations and to the application of population modeling in fisheries management. EPA, however, chooses to implement several density-independent models to conservatively estimate potential consequences for fishery harvests and ecosystem production. EPA justifies this choice saying "Given that many fish stocks are at risk, EPA has adopted a 'precautionary approach' in evaluating CWIS impacts because of the many uncertainties associated with modeling compensation and stock-recruitment relationships." CSA, p. A6-6. The Agency further states: "EPA believes that the many uncertainties associated with modeling stock-recruitment relationships and potential compensation justify this approach, in keeping with the precautionary approach to environmental decision-making." CSA, p. A6-7.

Estimating production: While EPA acknowledges the conservative nature of the I&E survival and the compensation choices, the conservative nature of the production-forgone calculations are less obvious. The EPA suggests a life-stage model with constant population rates within stage as a tool for evaluating production foregone. Using data from a power station study (Loos and Perry, 1989) where larvae were measured to the nearest mm, I compared the computation of production based on life-stage categories and production based on 1-mm categories. The use of constant rates over broad life-stages results in an estimate of production that is 3 or 4 times greater than the estimate obtained using 1-mm categories. This difference is largely resolved by a within life-stage adjustment (S* of equation 4 , Chapter 5), but is it not clear that EPA recommends this adjustment for production foregone (equation 8, chapter 5). Barnthouse also discusses biases due to this life-stage model (see separate EPRI comments in Appendix A).

Summing direct and indirect losses: In general, it would seem that direct and indirect losses should be combined by a maximum function rather than a sum. The logic supporting use of a maximum rather than a sum is as follows. Suppose an aquatic system had 1000 potential recruits and was balanced such that it had forage to support these 1000 recruits. If a CWIS removed 100 of the 1000 potential recruits and at the same time removed forage that could have supported these 100 recruits, then the cumulative effect remains at 100 which is the maximum of the direct and indirect losses. Summing direct and indirect losses is a conservative choice.

HRC benefits: EPA endorses a Habitat-based Replacement Cost (HRC) for evaluating I&E losses. Many economists believe that evaluation of benefits on the basis of replacement costs rather than on the basis of increase in value in the resource results in a over-estimate of benefits (See comments prepared for EPRI by Dr. Ivar Strand, Appendix C). This is another conservative position in the I&E evaluation process.

Non-use Benefits: Citing Freeman (1977), EPA applies a rule of thumb for national-level passive use benefits of water quality improvements of 50-percent of the estimated recreational fishing benefits. EPA further cites Fisher and Raucher (1984) who "conclude that since nonuse values were likely to be positive, applying the 50 percent "rule of thumb" was preferred over omitting nonuse values from a benefits analysis entirely". EPA goes on to discuss a list of uncertainties related to the 50% number and concludes that it intends to revisit this topic, but will apply the 50% number in the interim. In view of this uncertainty, it is impossible to know if 50% is a liberal or conservative estimate of non-use benefits. However, on the one hand setting non-use benefits to 50% of angling benefits on the assertion that is "must be positive" and on the other hand setting entrainment survival to zero when it has been demonstrated to be positive is inconsistent logic applied in a conservative direction.

Conclusions

In the preceding, I have demonstrated the risk of obtaining an end result that is overly conservative when a reasonable level of conservatism is applied repeatedly in a multi-step process. I have shown that the EPA case studies demonstrate a multi-step approach to evaluating I&E losses and that EPA has made a number of conservative choices in that process. From this I conclude that following the EPA methods as presented in the case studies will result in an overly protective evaluation of I&E losses. Given this general tendency toward environmentally conservative evaluation of I&E losses it is disturbing the find that EPA repeatedly alludes to existing estimates as underestimates with comments such as the following:

"EPA notes that most of these studies were completed by the facilities in the mid-1970's using methods that are now outmoded. A number of the methods used probably resulted in an underestimate of losses." CSA, p. A8-1.

Our experience has shown otherwise. In cases where initial studies showed large I&E losses and additional studies with improved methods were conducted, the improved methods resulted in lower estimates of I&E losses (Bailey et al. 2000). This trend is a natural result of the conservative approach to protecting the environment. Initial studies were performed using methods with a high degree of uncertainty. Because of the uncertainty, conservative choices are made and the resulting estimates are environmentally conservative. If the conservative estimates are not of concern, then no further studies are done. If the conservative estimates seem large, additional studies with improved methods are conducted to reduce uncertainty. The improved precision allows one to estimate a conservative position that is not as extreme as that obtained from the less precise study. Thus in general, improved methods result in lower estimates of I&E losses.

EPA Response

EPA regrets its unfortunate use of the term "precautionary approach," as discussed in EPA's response to Comment 316bEFR.005.026.

EPA disagrees that there are multiple conservative assumptions in its final benefits analysis. First, the analyses referred to in points 5 (replacement costs) and 6 (50% rule) of Dr. Perry's comment are no longer included in EPA's analysis. For a discussion of replacement costs, please see response to Comment 316bEFR.005.035. For a discussion of the 50% rule, please see response to Comment 316nEFR.005.034.

Regarding entrainment survival (point 1), please see response to Comment 316bEFR.306.056. EPA notes that its analysis did consider impingement survival in cases where data on survival were presented in the facility documents that were used.

Regarding compensation (point 2), please see EPA's response to Comment 316bEFR.025.015.

Regarding constant growth and mortality rates (point 3), EPA made a good faith effort to use the best available life history data for its analyses, which seldom included information on variation in growth and mortality rates within life stages.

Regarding production foregone calculations, please see EPA's response to Comment 316bEFR.305.003.

Regarding the summing of direct and indirect losses (point 4), EPA notes that its analysis was not concerned with fishery recruits only; thus it was appropriate to consider the combined losses of both forage and fishery species.

Finally, EPA wishes to note that its analysis was unfortunately limited by the quality of facility-provided I&E data, which often had serious limitations for the purposes of EPA's 316b benefits analysis. Limitations included: (1) the geographic basis of data collections, which were not designed to support a national scale benefits analysis; (2) the set of facilities with available records is not a random or representative sample of all facilities; and (3) there are numerous inter-facility differences in sampling methods, e.g., the frequency of collection (many studies are from the 1970's and include only 1-2 yrs of data or only count losses on a seasonal basis for a subset of species); lack of information on collection efficiency or variance in I&E estimates; lack of taxonomic detail (e.g., many losses not identified to species level); many facilities did not report losses according to size/age classes of fish during first year of life; and many facilities only evaluated a subset of the species impinged and entrained.

All of these limitations resulted in many data uncertainties that were beyond EPA's control, as discussed in Chapter A6, Chapter A10, and the regional reports contained in the Regional Analysis Document (DCN #6-0003)and in response to Comment 316bEFR.041.843.

Comment ID 316bEFR.074.301

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.02
Benefit Estimation Methodology

The following is a critique of the methods, procedures and case study examples of the economic analysis associated with the benefits and costs of implementing performance standards shown in the EPA Proposed Rule for Phase II Existing facilities. This critique will not consider in detail all eight case studies. It raises questions regarding methods and techniques associated with the benefit estimation and raises questions regarding the application of methods and techniques in three of the case study examples. It does not attempt to assess the biological models associated with the benefit estimates nor with particular estimates associated with the Habitat Replacement Cost (HRC) method. <FN 1>

The Methods of Estimating Benefits from Reduced Entrainment and Impingement

There is a long history of using benefits and costs to assess proposed regulatory actions and a long list of literature associated with methods to assess them. Based on that history and literature, one could conclude that the economic profession as a whole would have substantial disagreement with several of the methods EPA used to assess both use and nonuse benefits of the proposed rule.

Chapter A9 of §316 (b) Existing Facilities Benefits Case Studies, Part A: Evaluation Methods contains EPA's judgments regarding methods to assess four different categories of benefits based on whether the goods arise from: marketed goods, non-market direct use goods, non-market indirect use goods, and non-market non-use goods. I will comment on EPA's choices of methods to be used and, later in this review, on their application of the methods in several of the case studies. Of the methods suggested in Chapter A9 and used by EPA in the case studies, the benefit transfer method, the RUM models and value of foregone production are legitimate concepts for estimating benefits of the proposed rule. Three other methods employed (HRC, forage fish replacement costs and the use of 50% of use value to measure nonuse value) are not.

In most case studies, EPA employs a "benefit transfer" <FN 2> method of analysis to obtain some of the use values used in their analysis. This method, properly applied, has a solid foundation in economic theory. But it is important to note that this approach must be used with much caution and good judgment because it can be grossly inaccurate in natural resource valuation. The goods being valued are based on natural resources, sought in their natural state and location, and that fact must be taken into account. The value of a natural resource-based good is inherently dependent on location (e.g., the value of a bag of sand in the Sahara desert is different from one in New York City). Taking a value produced in one study and applying to another circumstance might introduce substantial error. Applications should be done with care, and there are numerous instances in the case studies where greater care should have been exercised.

In other studies, EPA relies on values derived from Random Utility Models (RUM). Without the data and programs to evaluate the models, it is difficult to check particular benefits estimates. While the model is a perfectly reasonable approach, the devil is in the detail. The two case studies that I examined, the Ohio River and the Salem Nuclear Plant, produced results that cannot be defended in my opinion and require more effort on EPA's part if they are to be used.

Use Benefits from Marketed Goods

The primary marketed goods likely to be affected by the proposed rule are commercially harvested fish. The document transfers benefits based on literature that have little correlation with those EPA seeks to examine here. The proposed regulations state that the producer surplus (short run benefits to fishermen) should be estimated as lying between 40 and 70% of the increase in gross revenues to fishermen. These are presumably estimates of increased short run profits to fishermen. The procedure is based on West Coast studies by Rettig and McCarl (1985) and on Great Lake studies by Holt and Bishop (2002) and Cleland and Bishop(1984). There is no East Coast study cited, which is strange given that the only commercial fisheries that are important in the national aggregates are the non-Gulf estuaries and these estimates are based solely on the Delaware Bay. The Norton et al. (1983) study on the Atlantic coast striped bass estimated a surplus for striped bass of approximately 15% of ex-vessel value but was not used here despite being used later when examining the benefits to consumers. In general, the producer benefits depend greatly on the fishery and on the year considered. Wild fluctuations in fish abundance imply wild fluctuations in producer surplus. A reasonable estimate of the short run benefit might be 15-40 % of the new revenues. <FN 3> Because most fisheries are not limited in the number of fishermen or anglers that can enter, long run adjustments in fishing effort are likely to be important. When a change such as the proposed rule occurs, fishing increases and drives down the stock, reducing the gains to the point that only “normal returns” occur. If this happens, there are no long-run benefits to fishermen from the initial improvements. Most U.S. fisheries are managed as open access systems so that one would expect long run benefits to be eliminated.

In most instances, it would be better for the analyst to understand what is happening in the fisheries and, if necessary, survey the industry to determine the appropriate percentages. Given that EPA does not want to devote this effort to commercial benefit estimation, I suggest that

1) For very small changes in production in open access fisheries, an estimate of 15% of new revenues could represent a lower bound and the 40% of new revenues themselves would provide a realistic upper bound on the economic surplus lost from I&E.
2) For larger changes in open access fisheries that draw new entry and cause increased costs, use 15% of new revenues declining to zero over time for a lower bound and 40% new revenues declining to zero for an upper bound.
3) For large or small changes, when the fishery is managed as an individual transferable quota, take the present value of 15% of the new revenues for a lower bound and the present value of 40% of ex-vessel revenues as an upper bound.

EPA extends the benefits to market agents above the ex-vessel level (e.g., wholesalers, retailers, and the ultimate consumers) based on the producer surplus changes. Citing the Norton et al. (1983) work and personal communication with Bishop and Holt (2002) and Bishop (2002), EPA decides to use an expansion factor of 3.5 to estimate benefits to consumers and all other economic agents. Following the EPA procedures, the process implies that the national benefits will rise between $1.8 and $3.15 for every $1 of increased dockside revenue. This is completely arbitrary.

As an alternative to this procedure, one could estimate an ex-vessel demand curve properly (Just et al., 1983; Thurman and Easley, 1992) and obtain all of these values directly. The ex-vessel data exist and, based on my experience, can be used to identify ex-vessel demands because the supply curves shift dramatically with stock changes. This is neither a difficult nor an expensive procedure and it might provide justifiable short run benefit estimates. It does not distinguish gains to consumers (that are long run) and short run gains to wholesalers and retailers.

In all studies, another factor should also be noted: it takes time to build fish stocks. EPA apparently does not consider time adjustment for the lag between when the rules are implemented, the new structures installed, and the fish stocks rebound. If EPA accounted for the time delay and adjusted the benefits with a social rate of discount, then the annualized returns would be a smaller and a more appropriate estimate.

As it stands, the analysis of the benefits to commercial fisheries has absolutely no economic content. The nation is being asked to make a $15-30 billion investment in part based on commercial benefit estimates; it seems reasonable that the estimates have some economic content.

Direct Use Benefits from Non-Marketed Goods

The primary benefactors of the proposed regulations in many instances are likely to be recreational anglers. The document proposes that the preferred methods of economic analysis for sportfishing are the random utility model (RUM) and the benefits transfer approach. The benefits transfer approach utilizes previous studies to infer values applicable under different circumstances. Typically, a RUM model will yield a benefit measure for a change in historic catch rate. The improved sportfish populations from changes in intake technology are alleged to increase the catch rate, and the benefit measurement will be the value/catch rate times the improvement in catch rate times the number of fishing trips. In some cases, the improvement that may induce an increase in the number of total trips taken must also be considered.

These two approaches are clearly the most desirable of those methods available However, the details of the analysis are critical, and bad study results can arise from use of a good methods. Table A9-2 of the Economic and Benefits Analysis shows the previous research used to develop benefit estimates in the case studies. Given the tremendous advances in methodologies of estimating benefits since the early 1980’s and potential changes in tastes, the early studies referenced in the Table may be of little use.

Indirect Use Benefits from Non-Marketed Goods

EPA assumed that forage fish stocks will be enhanced by the proposed regulations and EPA uses two methods to value the increase:

1.) The replacement cost of improving the stock. This is not a legitimate method from an economic perspective.
2.) The foregone commercial and recreational production. This is conceptually correct but may be difficult to implement.

Let us deal with the general notion of replacement costs first. The “Replacement Cost” (including the Habitat Replacement Costs) approach to benefit estimation is the most critically flawed part of the CWIS proposed regulations because the costs of activities, not the satisfaction of individuals, are used as the basis of estimating benefits. It might be instructive to review how “defensive expenditures” or costs of actions can end up as benefits in any economic analysis. In doing so, hopefully the reason why they should not be used in this instance will become evident.

To begin with, the economic notion of benefits derives from an individual's welfare improvement- that is, individuals obtaining satisfaction from improvements in their surroundings. The use of replacement costs derives from a literature on "defensive expenditures" or "averting behavior". In that literature, individuals are observed to incur costs to avoid or avert an environmental harm. For example, if the effects of groundwater contamination can be avoided by filters and households chooses to incur the filtering costs and the households' welfare from pre-contaminated groundwater is the same as from filtered groundwater, then one can say that the value households' place on clean groundwater is at least as great as the averting costs that they incur. One can also say that the cost to society of the original contamination is no greater than these averting costs. (all costs are assumed to be variable) (Bartik, 1988; Abdalla, Roach and Epp, 1992). These are strong assumptions that must be true for these bounds to hold and the actions must be based on individuals' behavior. The only reason there is a relationship between costs and benefits here is that the individual is comparing the two and only choosing to incur the cost if they are no greater than the benefits.

Now let us consider the cost of replacing forage fish that is necessary to offset the value of the commercial and recreational harvest they provide. First, these costs are not costs incurred by individuals who are comparing their benefits with these costs but costs incurred through a political process. EPA seems to argue that the political process allocates so that benefits are as great as the costs and EPA then chooses a situation, such as San Francisco Bay, to justify its point and obtain costs. The first presumption, political choice reflects value, is hard to believe. Even if it were true, there are probably 10,000 communities and waterbodies (including the ones being considered) that have not incurred forage fish replacement costs. Why choose the communities that have incurred replacement costs instead of the ones that have not? If we were to consider only the replacement/mitigation costs, then we'd have to deduce that the local value for the CWIS is lower than replacement/mitigation costs because the vast majority of communities have chosen not to incur them. <FN 4> Accepting the proposition that a political process reflects benefits greater than costs and then choosing a representative replacement cost (including zeros), one would have to conclude that the value to communities was nearly 0! The forage fish improvements benefits <FN 5> are not necessarily zero but the process of using selected replacement costs to reflect values is not defensible.

To conclude, the alternative that EPA proposed, the use of the "dollar value of foregone commercial and recreational production" is far superior to using replacement costs. In most of the case studies, estimates of lost commercial and recreational value because of decreased forage fish abundance are already provided. These values should be used and the use of replacement costs should be eliminated.

Nonuse Benefits

The improved stock of fish and other organisms not caught by commercial or recreational fishermen may have some value by themselves even after the value used to produce goods and services have been estimated. These are called nonuse values. Some economists do not believe in the concept of nonuse values (e.g., Rosenthal and Nelson, 1992), others believe that nonuse values should not be estimated and not included with use values (e.g. Quiggin, 1998), and others include them as part of cost-benefit analysis and would have them estimated using contingent valuation (e.g., Arrow, et al., 1993; OMB, 1996). The proposed rules go further and suggest four processes: contingent valuation method (CVM), a value proportional to the use values (i.e., 50 % of the use value), a benefits transfer approach, and habitat replacement costs (HRC).

CVM analysis is a common although controversial method of obtaining nonuse values (Arrow et al. 1993). Most economists would consider it the only possible way of determining nonuse values. It is interesting to note that despite the enormous expenses incurred in valuing resources over the last 20 years (including the case studies under consideration), no one in the world has studied the non-use value of changes that occur around cooling water intakes. It seems reasonable that EPA should address this fundamental lack of knowledge. The only feasible way is through the use of a well-designed contingent valuation study. At the same time, they could also examine whether there are negative externalities associated with cooling towers and the plume associated with them. The study would need to be well designed to avoid many of the potential biases associated with its application (Arrow et al., 1993).

Because there is no directly relevant literature, how can one employ a reasonable benefits transfer approach? Because nothing exists related to CWIS technology, the case studies estimate nonuse values as 50% of the use value, citing the work of Fisher and Raucher (1984) as justification. However, the cited literature and all studies that I have reviewed have not addressed the circumstances surrounding the CWIS regulations. The reason that there are no relevant studies with comparable use and nonuse values for CWIS might be that no one ever thought that there were nonuse values here. It is clear that for any of the reasonable approaches to work, some primary research needs to be done on nonuse values associated with effects from CWIS.

The habitat replacement method (HRC) suggested and used by EPA is not a reasonable method, mostly because of the problem of using costs as benefits as discussed above. The rationale for using the costs of habitat replacement probably stems from the literature on marine and estuarine wetlands. Wetlands offer nursery grounds for commercial and recreationally caught species and provide other services such as erosion, wind and wave barriers. The values of services such as erosion control are nearly impossible to deduce from the use of the wetlands by local citizens. Many studies have estimated the wetland benefits by examining the cost of replacing the wetland services with other objects (see Anderson and Rockel, 1991 for a review). The replacement costs have been called "Economic Value of Wetlands" (see Kahn, 1998, p. 383). But they are not necessarily benefits because of the differences in the manner in which the original defensive expenditure argument and the wetland cost approach have been applied. The original defensive expenditure argument laid out all of the assumptions that were necessary for defensive expenditures to reflect benefits and assured that the application conformed to those assumptions. The Abdalla et al. (1992) application provided an excellent example of how to use it properly.

The wetlands argument for using replacement costs of services is not so convincing. In general, the wetlands services that are "valued" have not been lost, so that the knowledge of whether people would make expenditures to replace the services is unknown and the level of needed expenditure is unknown. The estimates of expenditures to offset wetlands loss are usually transferred from other situations. Given that values of natural (i.e., in situ) resources are inherently dependent on location, the cost (or benefits) transfer approach is fraught with potential for error. Also, there is no guarantee that affected individuals' welfare would be the same with the wetland and the alternative. Thirdly, the expenditure estimates (e.g., with erosion, land stabilization structures) are derived from government actions. As argued above, the link dependent on the benefits being at least as great as the costs is no longer established under collective action.

As a final comment, the wetlands alternative services that have been valued with cost estimates are almost exclusively use values, not nonuse value. EPA is attempting to use the defensive expenditure concept in a new context, <FN 6> one in which potential environmental impacts from a cooling-water intake are considered to generate nonuse values of an unseen aquatic habitat. The nonuse values are measured by the potential costs of eliminating the environmental impacts. The extension requires a great leap of faith. First, there is no guarantee that the impacts exist. <FN 7> Numerous other stressors of the environment exist and other organisms may have filled the niche of the forage fish. There is a reasonable chance that eliminating the cooling water flow will have little or no positive impact on the waters adjacent to the intake. Hence there is a degree of uncertainty not present in the original basis of the defensive expenditures approach. Second, in EPA's approach, the nonuse benefits of the reduced impacts are measured. This is a highly unusual application of the defensive expenditure approach that is normally employed to assess use values. Defensive expenditures reflect revealed preferences and are most useful when based on individual choice. Finally, there is no reason to believe that the mitigation/replacement costs that EPA chooses are the least cost way of mitigating/replacing. <FN 8>

Through a political process, the use of defensive expenditures has emerged and is being used to answer questions it was not designed to answer. It is instructive to view the long-term consequences of following the proposed rule and its application. By making costs appear as benefits, the benefits of a project will rise exactly as costs rise. Thus, the most difficult and costly habitat restoration project will have the greatest benefits, irrespective of whether the resource is unique, whether there are numerous individuals near the location or whether there are other factors that might affect benefits. The perverse consequence of using the HRC approach is to require the most restrictive CWIS technology for cases where restoration of the habitat is most difficult (because the costs are benefits). <FN 9> To me, this is clearly nonsensical. As a Nation, we want to use our limited resources in the most productive fashion possible, not to use them to achieve the most costly results possible.

Economic Criteria in Decision Making

If EPA chooses to use economically inefficient performance standards and associated technology based on the current criterion of "significantly greater costs than benefits," it is imposing a cost to the nation. The proposed rule suggests that this is based on a precautionary principle, accounting for uncertain environmental effects that the CWIS might have on the environment. But what are the potential unexpected costs? While by definition we do not know, it seems that some activities are more likely to have more uncertain effects than others. Our experience with the use of cooling water intakes in power production has spanned many decades and unforeseen consequences are doubtful at this time. Using the precautionary principle in this instance appears overly cautious.

It also appears that the EPA is considering the criteria of "wholly disproportionate" to weigh costs against benefits. This is uncommon economic procedure and raises the cost to the society from the "significantly greater" criteria. Again, one should ask what uncertain consequences arise from using cooling water for power plants. Making the rule more stringent is moving in the wrong direction.

Despite using the "significantly greater costs than benefits" criterion, EPA appears to recognize that net benefits (benefits minus costs) should be positive and, facing a number of choices across different benefit estimation methods and case studies, reveals a preference for being “environmentally cautious” by choosing benefits methods that are associated with large values. This is inappropriate. If EPA chooses to use inefficient technologies based on the current criteria of “substantially greater costs than benefits”, then it is even more important that correct and unbiased methods and applications are used in the benefit estimation.

Footnotes

1 In some instances, particular estimates are used to show the absurdity of using replacement costs as benefits. However, the particulars are irrelevant because replacement costs generally do not measure benefits associated with the resource.

2 “Benefit transfer” is a term referring to the practice of taking an economic value derived for one situation and transferring it to another situation.

3 Many fisheries work under contractual agreements whereby 40-60 % of new revenues are a direct payment to labor. Using 40-70 % of new revenues as profits denies almost any other cost of production.

4 EPA uses Breffle and Rowe (2002) to defend the proposition that replacement costs are less than willingness to pay. However, the research was based on restoration associated with PCB contamination in the Fox River, not cooling water intake regulations.

5 Schell et al. (1996) suggest that increase in forage fish on the Ohio River actually reduced recreational harvests.

6 EPA might be considering HRC as benefits in the sense of “avoided costs” as damage assessment analysis often does. The conditions for this interpretation are clearly not evident in the proposed rule.

7 Perry et al. (2002) show that CWIS impingement and entrainment at several Ohio River facilities do not have perceptible impacts on populations of most (16 of 22 species) fish species examined.

8 This does not mean that mitigation such as replacing commercial or forage fish should not be considered as an alternative technology in the options for the plant. It only means that replacement costs should not be used as benefits, except in appropriate cases. None of the case studies to which HRC was applied appear to be appropriate cases.

9 EPA notes “Where restoration costs are very high, or where public values might be much lower than costs, economic studies can be conducted to determine the value of habitat replacement.” However, the case studies reveal that EPA is willing to use HRC instead of a reasonable alternative method even when these conditions are met.

10 Based on the value of $3.56/fish to $8.56/fish and assuming an average rainbow smelt weighs 8 ounces.

11 An actual replacement figure would be higher because the transportation cost of moving the fish is not considered in the $0.34/lb.

12 It is not clear why rainbow smelt was chosen as a forage fish and a commercial and recreational species at the same time. Presumably, all of these species are forage for another species at some point in the life history but rainbow smelt appears to have been selected as a special case.

13 Unpublished data, National Marine Fisheries Service.

14 The same would be true if costs per age 1 equivalent (Tables G6-41 and G6-42) were considered.

15 Additionally, it would be useful to know the names of the non-RIS species so that someone could determine whether $0.96/lb was legitimate.

16 For New England, Norton et al. propose a completely ad hoc adjustment to the value of $2.23/fish derived from the travel cost model. Whereas the $2.23/fish might be low, the addition of $10/fish because some of them are sold is not defensible.

17 There also may be overestimates associated with the usage of benefits transfer.

18 Pending EPA answers to my submitted questions, I am unclear as to whether or not any of the sites in the mainstem of the Ohio River were actually included in the original measurement. The abundances for the Ohio River sites may all have been derived from electrofishing abundance surveysin smaller streams or in the nearshore of the Ohio River.

19 The proposed rule states:

“Assuming that fish abundance is uniform within each pool, changes in relative fish abundance under different policy scenarios can be calculated as follows:

[see hard copy for equation]
(p. C5-10 and p. C5-11).”

EPA Response

EPA agrees that the benefit transfer methods, the RUM models, and the value of foregone production are legitimate concepts for estimating the benefits of the 316(b) rule.

This comment refers to EPA’s proposed rule analysis. For the final rule analysis, EPA has made significant changes in its methods and applications. For the final Phase II 316b analysis, EPA uses regional rather than local case studies, and has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Therefore, the comments on benefit transfer presented here are no longer relevant. For EPA’s response to comments on the methods used to estimate recreational fishing benefits for the final Phase II rule, please see the responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

The comment recommends the use of species-specific discounting of future benefits. EPA has done so in its final rule analysis. This discounting takes into account both the lag in installation of the technology, and the lag in growth of fish to catchable size.

For EPA’s response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316EFR.005.029.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see the response to comment # 316bEFR.005.035.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

EPA does not agree that the only acceptable method of estimating non-use benefits would be to conduct an original stated preference study. Many resource economists support the idea that benefits transfer analyses, properly conducted, can be used as an alternative to a primary research survey in order to estimate non-use benefits. While it might be preferable to conduct such research in an ideal world, EPA did not deem it feasible as a matter of cost or timing to conduct such a primary study here. EPA also notes that failing to assess non-use values would only tend to make the qualitative assessment of ecological benefits all the more important.

The comment states that the fact that there have been no relevant studies with comparable use and non-use values for CWIS might indicate “no one ever thought there were nonuse values here.” EPA does not agree. The fact that a study has not been done for a particular issue does not indicate that the issue does not exist. There are many natural resources that people obviously value for which no non-use valuation studies have been done. There are numerous threatened and endangered species and significant habitats that are, by definition, significant. Yet they have not all been studied.

In addition, lack of quantification of CWIS losses with carefully designed and executed monitoring studies by the owners of these CWIS and scientifically and statistically sound annualizing procedures have prevented the public as well as economists from recognizing the full extent of the problem. Another major contributor to the lack of recognition of the issues surrounding CWIS is the fact that impingement and entrainment data, even when collected and appropriately annualized, are rarely evaluated on a watershed-specific basis or on a regional basis. Therefore, the extent of cumulative impact of I&E is typically unknown.

The comment states that a “wholly disproportionate” benefit cost standard is “uncommon economic procedure,” and suggests that EPA has selected valuation methods that produce large values. The Agency recognizes that quantification and monetization of ecological benefits involves unavoidable uncertainties and thus “precise monetization” was not attempted for the final Section 316(b) Phase II rule. For example, in addition to presenting monetized benefits EPA presents a qualitative assessment of ecological benefits. The Agency believes that it undertook reasonable, appropriate analyses and explained its approaches in the Regional Analysis Document for the Proposed Section 316 (b) Phase II Existing Facilities Rule. EPA points out that benefit considerations should not strictly determine policy decisions, and that other factors should also be weighed. For a discussion of benefit cost test in the context of the 316b rulemaking, please see EPA's response to Comment 316bEFR.005.020. For EPA’s response to comments on “wholly disproportionate” criteria please see comment #316bEFR.005.018.

EPA agrees that accurate valuation of benefits is critical when applying the benefit-cost test. However, no methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis.

The comment discusses EPA’s case study approach for the proposed rule. As mentioned above, EPA has changed its case study approach to a regional approach. In addition, EPA has changed some of the modeling procedures mentioned in this comment. EPA’s revised RUM models, conducted for the final Phase II 316b analysis, estimate separate values for boat and shore mode anglers. Values for boat anglers are applied to charter boat anglers in calculating total benefits. It is likely that charter boat anglers have higher per-day values than boat anglers, so using boat anglers’ values results in a lower bound estimation of value for charter anglers.

The comment states that the choice sets for RUM models should be larger. For the final Phase II 316b analysis, EPA estimated regional RUM models, thus allowing for the largest possible choice set for each angler. EPA’s specification of choice sets and distance calculations are significantly better than those in the available existing studies, including the Hicks et al. (1999) study that many commenters agree is a valid study to use for the 316b analysis (DCN #4-1603). While existing studies only allow substitution across counties, EPA's models include all possible fishing sites within each region, thus providing a much more realistic total choice set. Also, previous studies calculated straight-line travel distances between county centers. In contrast, EPA calculated a near approximation to actual road travel from the person's town to each specific fishing site, based on the lat/long coordinates of the site.

The comment states that historic catch rates should be used in RUM models. All of EPA's RUM models used in the final 316b Phase II analysis use historic catch rates for the five years including and preceding the year of the survey. For the final 316b Phase II analysis, EPA has estimated catch rates for no target anglers using average catch rates for all species caught by no target anglers at each site. Please see response to comment #316bEFR.306.320 for details.

The comment notes that one of the coefficients in EPA's original Delaware RUM model was negative. The RUM model estimated for the Mid-Atlantic region for the final 316b Phase II analysis has positive and significant coefficients on catch rates for all species and species groups.

The comment states that EPA's recreational fishing analysis for the North Atlantic could overstate values for winter vs. summer flounder. EPA does not agree. The North Atlantic regional case study uses a benefit function transfer based on the Hicks et al. (1999) study (DCN #4-1603). Hicks et al. (1999) estimates a single coefficient for the flounder/flatfish group. This group includes the following species in the flatfish/flounders group: summer flounder, sole, wither flounder, flounders, and southern flounder. See Hicks et al. (1999) p. 8. Fish size variations are significant within one species group and across all groups considered in Hicks' analysis. Thus, the analysis of Hicks et al. is applied to assess an average "flounder" caught in the North Atlantic region. There is no empirical evidence that this value either overstates or understates the value of winter flounder.

EPA has changed its Inland and Great Lakes approaches. For the Great Lakes region, EPA has conducted an original RUM study.

For the Inland region, EPA did a benefit transfer using values from numerous studies. EPA followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) in developing a benefits transfer approach for the Inland region. The steps were followed as recommended in the Guidelines when using BT: (1) describe the policy case; (2) identify existing, relevant studies; (3) review available studies for quality and applicability; (4) transfer the benefit estimates; and (5) address uncertainty. Further information on the methods EPA used to estimate recreational fishing benefits for the Inland region is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter H4: Recreational Fishing (DCN# 6-0003).

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Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.03

Case Study Specific Comments

Case Studies

Because the proposed rule depends in large part on how EPA applies the choices of benefit methods available, it is useful to review the case studies accompanying the rules. Three case studies involving the Delaware River (Salem, Hope Creek, Edge Moor, and Deepwater facilities), the New England coast (Pilgrim and Seabrook facilities), and the Ohio River (nine facilities from southwestern Pennsylvania to mid-Kentucky/Indiana) were chosen. In addition, there is some discussion of information associated with the Brayton Point study, a facility outside of these three case studies.

EPA Response

EPA's notes that its final analysis for the Phase II rule including many more facilities (a total of 46) than were evaluated for proposal. For information on EPA's extrapolation approach for the final rule, please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and response to Comment 316bEFR.041.041.

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Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

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Pilgrim and Seabrook

New England Ocean Facilities (Pilgrim and Seabrook)

The two New England Ocean facilities considered by EPA are nuclear power plants that are on the Gulf of Maine in similar ecologies but have different intake structures. The Pilgrim intake is located in an artificial embayment, whereas Seabrook's intake is located over a mile offshore in deep water. Seabrook is located in Massachusetts, near the New Hampshire border, while the Pilgrim plant is located on Plymouth Bay, 38 miles south of Boston. The information associated with Pilgrim in addition to information from the J.R. Whiting facilities on the Great Lakes, is used to extrapolate the benefits from reduced I&E to all of the nation's relevant facilities on the Ocean and Great Lakes.

According to the data presented by EPA, the entrainment of fish is several orders of magnitude higher than the impingement at both the Pilgrim and Seabrook facilities. The commercially or recreationally harvested fish species that also are impinged at Seabrook include winter flounder, red hake and Atlantic silversides. At Pilgrim, the harvested species that are impinged include Atlantic silversides, Atlantic herring, rainbow smelt, and Atlantic menhaden. Primary harvested species that are entrained at Seabrook include Atlantic mackerel, winter flounder and red hake while Atlantic mackerel and cunner are entrained at the Pilgrim plant. There also are estimated forage fish losses at both facilities, "including fourbeard rockling, lumpfish and rock gunnel at Seabrook and American sand lance, fourbeard rockling and lumpfish at Pilgrim" (EPA, Chapter G3, p. G3-51).

In the proposed rules, the impingement and entrainment losses are valued for the harvest improvements to commercial and recreational fisheries, the replacement cost of forage fish and/or the foregone commercial/recreational harvest from the forage fish. In addition, estimated benefits are computed for the non-use value of the losses to the forage fish. Finally, Habitat Replacement Costs are determined.

To get an idea of the absolute level of the "values per pound" that are assigned toeach lost pound by benefit category, consider the rainbow smelt. The ranges in benefits per pound for recreational catch of this species are $7.50 to $17.12/lb, <FN 10> for commercial harvest $0.20/lb, and "forage fish hatchery costs" $0.34/lb. <FN 11> It is difficult to isolate the "value" for rainbow smelt with HRC because more than one species is affected by the habitat.

Comparison of these rainbow smelt benefits is useful for several reasons:

1.) The misuse of replacement costs as values and the arbitrary nature of the benefit transfer in this study. The reason that one does not want to use replacement costs as values becomes clear in this case. If the people in New England valued the rainbow smelt as forage <FN 12> in the water at $0.34/lb, why would they permit fishermen to harvest them and receive only $0.20/lb?

2.) The gross overstatement of EPA's recreational values. A rainbow smelt, a species that few would even recognize and one that is targeted by few in the recreational sample, is valued at a substantially greater value than striped bass. For example, the 1996 percentage of targeted striped bass trips in the

New England was about 6% (4,923 targeted striped bass trips of 77,465 total trips) whereas for rainbow smelt it was 0.01% (14 of 77,465). <FN 13> Why does this matter in the estimation of benefits? At the Pilgrim plant, the annual entrainment value of rainbow smelt represents around 30% of the recreational and nonuse total (Table G4-10).

Because the recreational values generate about 50% of the economic value (exclusive of HRC costs), it is useful to examine how they were chosen. Three studies were examined, McConnell and Strand (1994), Tudor et al. (2002), and Hicks et al. (1999). The Tudor study was discarded legitimately as it was outside of the area and has other problems (see comments on the Delaware River study). Some combination of the McConnell/Strand and Hicks study was used to determine a high and low value, although the document is vague regarding how these numbers were generated. The EPA apparently believes that the McConnell/Strand values were based on a RUM model. As a co-author of this report, I can say with some authority that they were derived from a contingent valuation experiment. Moreover, they are based on an "expected" catch that does not have a simple correspondence with the historic catch rate. In short, the estimated values that EPA used from this study contains problems that make them suspect for the purpose that EPA wants to use them.

The best scientific information available for the assessment of recreational benefits in this area is the Hicks et al. study, the one that EPA claims "may serve as a lower bound for the values of fish". These are not lower bound but rather best estimates in the sense that they are the only ones cited than have any current validity. In fact, they may overestimate the gains at Pilgrim because the category "flatfish" used by Hicks et al. combines winter and summer flounder. Since summer flounder is the more targeted species (about two to one in New England), it probably has a higher value than winter flounder. When the combined value of flatfish is used, the value of the combination is probably higher than winter flounder would be if considered alone. Because the overall recreational losses at both Seabrook and Pilgrim are comprised of over 50% from winter flounder, the economic value of improvements to recreational harvest for this case study is overstated.

The commercial value estimates have little or no economic content. As mentioned in the general comments, the proposed regulations state that the producer surplus (benefits to fishermen) should be estimated as lying between 40 and 70% of the increase in gross revenues to fishermen. These are estimates of increased profits to fishermen. The procedure is based on West Coast studies by Rettig and McCarl (1985) and on Great Lake studies by Holt and Bishop (2002) and Cleland and Bishop(1984). There is no East Coast study cited and using the approach in New England is questionable. Many New England fisheries take 40-60 % of the (adjusted) revenues as a direct payment to labor. Thus, using 40-70 % denies almost any other cost of production. The Norton et al. (1983) study on the Atlantic coast striped bass estimated a surplus for striped bass of approximately 15% of ex-vessel value but was not used to justify EPA's approach to computing returns to consumers. In general, the producer surplus depends greatly on the fishery and on the year considered. Wild fluctuations in fish abundance imply wild fluctuations in producer surplus. In most instances, it would be better for the analyst to understand what is happening in the fisheries and, if necessary, survey the industry.

I understand in this instance why EPA is unwilling to expend the time and resources to calculate economic surplus correctly because of the small losses involved. However, a more sensible approach would have been simply to take 15 % of the new revenues as the short run level of benefits. Because most fisheries are not limited in the number of fishermen or anglers that can enter, long run adjustments can be important. When a change such as proposed one occurs, fishing increases and drives down the stock, reducing the gains to the point that only normal returns occur. In the long run, there are no commercial resource rents from the improvements created by the closed-cycle cooling system. Most U.S. fisheries are managed under open access so that one would expect resource rents to be eliminated in the long run. If there are abnormally high profits because of the new production, entry will eliminate them over time. Because these will be dissipated by new fishing effort, the long run profits will be zero. Thus, the 15 % should be decreased to zero over a period of years.

Given the New England situation, I would take the 15% of new revenues declining to zero over time to be a good estimate for a lower bound. For an upper bound, I would take the present value of 40% of the new revenues.

EPA goes on to base the benefits to market agents above the ex-vessel level (e.g., wholesalers, retailers, and the ultimate consumers) on the producer surplus changes. Citing the Norton et al. (1983) work and personal communication with Bishop and Holt (2002) and Bishop (2002), EPA decides to use an expansion factor of 3.5 to estimate consumers surplus. Following the EPA procedures, the process implies that the national benefits will rise between $1.8 and $3.15 for every $1 of increased dockside revenue. This is completely arbitrary.

Because winter flounder represents about 90% of the commercial value, an alternative to EPA's procedure would be to estimate an ex-vessel demand curve for winter flounder properly (Just et al., 1983; Thurman and Easley, 1992) and obtain values to consumers directly. The ex-vessel data exist to estimate demand and in my experience, will reveal ex-vessel demands because the supply curves shift dramatically with stock changes. This is neither a difficult nor an expensive procedure and it might provide defensible results.

Another factor also should be noted: it takes time to build fish stocks. I could not find how EPA considers the time adjustment for the lag between when the rules are installed, the new structures built, and the fish stocks rebound. If it did not consider this delay, the benefits should be adjusted with a social rate of discount.

In the Pilgrim and Seabrook facilities, the replacement costs of forage fish do not have a great effect on the final estimated benefits, even though they are provided. Because replacement costs are not a legitimate method to estimate benefits anyway, the time used to compute these figures could have been better spent thinking about and improving estimates in the other benefit categories.

Finally, the figures for the habitat replacement costs are developed for the Pilgrim facility because there was no information on which to base restoration costs at the Seabrook facility. The primary source of information for the Pilgrim facility was "the cost of what knowledgeable resource experts consider to be the minimum amount of restoration necessary to offset I&E losses at the Pilgrim facility"(p. G5-1). While I am not in a position to comment on the realism of the costs of restoration, a quick division of annualized "values" to create artificial reefs (G5-41) suggests a value of about $225/age 1 equivalents. Considering that these species are tautog, cunner, rock gunnel, radiated shanny, and sculpin (spp.), an excessive average "value" per fish is indicative of why one should not have used HRC for valuation in this case study.

One further comment on the estimate for the Pilgrim facility is warranted. Based on a project in

Narragansett and Mount Hope Bays, cost figures to restore eelgrass (SAV) at three 16 m2 sites were developed (Table G5-41). These costs were doubled, based on the fact that private, not public contractors would be used. These were then expanded to provide a figure for 100 m2 of “$1,234 (rounded to the nearest dollar)” and when considering 47 similar projects, costs were estimated to be about $57,000. This action would save about 570 age 1 equivalents (301 of which are cod) at a cost of about $100/age 1 equivalent saved.

The Pilgrim case study goes further by showing HRC on an incremental basis (Table G6-2). Ignoring the fact that they are not benefits, the figures raise other questions. They seem to indicate that incremental percentage reductions in environmental effects come at a constant cost of about $1 million per 10% reduction. This does not make sense in the context of Tables G5-35 and G5-36 that show huge differences in the average costs per acre of habitat restored. <FN 14> When designing activity to meet low performance standards, EPA should use the projects with least average cost first. With increasing performance standards, EPA should choose the next lowest cost projects and the average cost of an acre or age 1 equivalent should rise. Hence the incremental costs should rise. Perhaps there is more substance to what EPA has done but the proposed rule fails to reveal it.

For the Pilgrim facility, the habitat replacement cost is about 15 times larger than the mid-point between EPA’s low and high estimates of economic benefits based on other methods. EPA however considers habitat replacement costs as benefits and goes on to use them to expand to national benefits. As previously explained, HRC are not benefits and should be considered only as costs incurred by the power companies if habitat replacement is a desired alternative to meet performance standards.

EPA Response

For EPA's responses to comments on replacement costs and the HRC method, please refer the document entitled "The Habitat-based Replacement Cost" method (Docket #6-1003) and to EPA's response to Comment 136bEFR.005.035.

Regarding commercial fishing valuation methods, please refer to EPA's response to Comment 316bEFR.005.029.

Regarding recreational fishing benefits, EPA did not use a benefits transfer approach for its final analysis for the 316b Phase II rule. Rather, EPA developed a random utility model to estimate recreational fishing benefits for each region (see DCN # 6-0003).

Regarding discounting, please see Chapter A14 of the Regional Analysis Document (DCN #6-0003).

For further detail on benefits methods used in EPA's final analysis, please see Chapter A9 of Part A of the Phase II Regional Analysis Document (DCN # 6-0003).

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Delaware River

EPA has based its economic benefits for the Delaware estuary on the Salem Nuclear Station located on a man-made peninsula named Artificial Island at the end of the transition zone between the Delaware River and the Delaware Bay. The benefits are derived based on the impingement and entrainment at this facility and then extended to the other in-scope facilities in the Delaware River basin. In addition, the national benefits for facilities located on non-Gulf of Mexico estuaries are derived from the Salem and Big Bend (Tampa Bay, FL) estimates.

How representative Salem is of the other facilities is beyond my expertise to evaluate but that question is critical in determining the appropriateness of the benefit estimates. That is, everything for the Delaware Estuary is derived from the benefits associated with the species that are impinged and entrained in the Salem facility.

This case study was better than the Pilgrim/Seabrook case study in two primary ways: 1) EPA does not present habitat replacement costs as benefits and 2) EPA presents primary research (Tudor, 2002) using the RUM model for recreational anglers primarily from Delaware, New Jersey, Maryland and Pennsylvania. While the lack of effort on replacement costs is to be whole-heartedly supported, there are some potentially serious problems with the RUM model. Perhaps because of the problems, the document also uses benefit estimates based on previous studies.

The bulk of the estimated benefits are derived from losses in fish that are caught commercially (over 60% of the total I&E losses). EPA's commercial benefit estimates have no economic content. As mentioned in the general contents, benefits are generated by multiplying a species' dockside price by an arbitrary and excessive percentage of the increase in commercial production. The percentage lies between 40% and 70%. This is based on West Coast studies by Rettig and McCarl (1985) and Huppert (1985) and on Great Lake studies by Holt and Bishop (2002) and Cleland and Bishop (1984). Oddly enough, the Norton et al. (1983) study on the Atlantic coast had surplus at approximately 15% of ex-vessel value but was not used here although it was used later. In most instances, it would be better for the analyst to understand what is happening in the fisheries and, if necessary, survey the industry.

The case study of Salem Nuclear Plant illustrates the potential problems that can arise from following EPA's procedure. The use of unsubstantiated ratios and multipliers when estimating benefits from commercial fishing rests on unrealistic assumptions. The proposed regulations are projected to increase spot and croaker landings by 5.1 million pounds and a constant ex-vessel price of $0.70/lb and $0.85/lb, respectively, is used. Based on this, spot and croaker harvest increase generate about two-thirds of the commercial benefits from reduced entrainment. Along with "Non-RIS species" that are unnamed but valued at $0.96/lb, spot and croaker increases represent 83% of the reduced entrainment benefits (Table B4-9). EPA apparently did not recognize that spot harvests in New Jersey and Delaware are nearly non-existent and croaker harvest average around 2 millions pounds per year. <FN 15>

It is inconceivable to me that the New Jersey and Delaware prices for spot and croaker could remain constant at this level if increased production occurred in the Delaware estuary. In states with moderate production, such as Virginia, the average ex-vessel price of spot and croaker is between $0.35/lb and $0.40/lb. Also, the use of 40-70% of total revenues as an estimate of producers surplus is unreasonable. For this large of a change that draws new entry and causes increased costs, an estimate of 15% of new revenues declining to zero over time could provide a lower bound and 40% new revenues declining to zero for an upper bound.

EPA goes on to base the benefits to consumers (e.g., wholesalers, retailers, and the ultimate buyer) on the producer surplus losses. Citing Norton, Smith and Strand (1983) in addition to a personal communication with Bishop and Holt and Bishop (2002), EPA decides to use an expansion factor of 3.5 to expand the producer surplus to estimate consumer surplus. For every $1 of increased dockside revenue, the national benefits rise between $1.8 and $3.15. Conceptually, there is no necessary association between producer and consumer surplus and no basis upon which to establish this arbitrary expansion factor.

EPA should recognize that spot and croaker represent about two-thirds of the commercial benefits and estimate an ex-vessel demand curve for these species (Just et al., 1983; Thurman and Easley, 1992). Although the long-run benefits to consumers cannot be established directly, upper and lower bounds on the benefits could be determined. The ex-vessel data exist and, in my experience, can be used to reveal ex-vessel demands because the supply curves shift dramatically with stock changes.

The recreational benefits represent about 25% of the I&E losses at Salem (Figure B6-1). The recreational benefits are derived from a RUM model and from benefits transfers. In the final estimates of the RUM model, gain from increases in weakfish and striped bass abundances are prominent. In the benefit transfer estimates, bottom fish and non-RIS species are very important. Because of their importance, I will spend time addressing these four categories (striped bass, weakfish, bottom fish and non-RIS species).

The benefits transfer analysis is presented first and contains the same errors in interpretation as the Pilgrim/Seabrook case study. That is, in addition to the EPA's RUM estimates (Chapter B5), four studies were considered: Norton et al. (1983), Agnello (1989), McConnell and Strand (1994), and Hicks et al. (1999). EPA apparently believes that the McConnell/Strand values were based on a RUM model but they were derived from a contingent valuation experiment. Moreover, these benefits are based on the square root of an "expected" catch that does not correspond directly to the historic catch rate. In short, the McConnell and Strand estimates that EPA uses have problems that make them suspect for EPA's intended purpose. Norton et al. and Agnello (1989) also should not be considered for this analysis because they use an out-of-date (about 1981) and inaccurate database. The Marine Recreational Fisheries Statistics Survey of the National Marine Fisheries Service was in its infancy and the data are not as accurate as more recent information. It is also true that recreation demand analysis was in its infancy. <FN 16>

The best scientific information available for the transfer of recreational benefits in this area is the Hicks et al. study, the one that EPA claims "may serve as a lower bound for the values of fish". These are not lower bound but rather best estimates in the sense that they are the only ones cited than have any current validity. Because the striped bass and weakfish are both in the small game category, using this study to estimate benefits would probably eliminate problems that aggregation of the species group would cause. That is, striped bass is probably more highly prized than the average small game fish whereas weakfish are probably less prized. Using the Hicks et al. benefits for small gamefish would probably produce reliable estimates.

The recreational values assigned to additional blue crab harvest deserve a comment. The average recreational crabber will harvest, on average, many more crabs than a similar angler who is fishing. I know of no reliable estimates for the marginal benefit of a blue crab but I would say that the marginal benefit is smaller than for a small game fish.

Now consider values estimated from EPA's RUM model (Chapter B5, also referred to as Tudor, 2002). As stated before, it is a laudable effort and has some commendable aspects. However, there are several problems that cause, in my opinion, the aggregate values to be too large. Specifically,

1. The boat mode values were expanded to shore-based and party charter boat activities. It is likely that benefits per fish for the shore mode angler are substantially smaller than for a private boat angler. Because benefits per trip are expanded by the number of trips and there are nearly the same number of trips by shore-based anglers as by private boating angler (Table B5-9), the aggregate benefit is probably too high.

2. The definitions of the sample population and their choice set of sites in the RUM model are unusual (B5-1.2) and probably upwardly bias the benefits of greater recreational harvest. EPA chooses its sample on the basis of sites and includes only the sites in Delaware Bay and along the New Jersey and Delaware ocean shoreline. In 1998, 65% of the visitors to Delaware sites were from out of state whereas 45% of New Jersey trips were from out of state. By considering the restricted set of sites, the RUM model forces individuals to take trips to these sites and to have considered only these sites in their choice. This produces parameter estimates that are biased downward and estimates of benefits per fish that are biased upward. These visitors probably considered sites in the Chesapeake as alternatives to the Delaware Bay sites. The point is that the model's choice set should include at least the Chesapeake Bay sites if it is to be realistic and relied upon for benefit estimates.

3. The "historic" catch rates measured by EPA are in fact "future" catch rates. EPA uses a sample of anglers fishing in 1994. The historic catch rate that is used to predict which sites the anglers will choose is based on catch information from 1994 through 1996 ((see B5-1.3). EPA could get the abundance measures that Hicks et al. (1999) used in their analysis.

4. The use of weakfish and flounder abundance to represent the relevant abundance for anglers that are not targeting any species probably biases upward the benefit of changes in weakfish and flounder abundance. Because the abundance of bottom fish such as croaker and spot may be important to non-targeting anglers and may be correlated with weakfish and flounder abundance, excluding them may bias upward the coefficient on weakfish and abundance for non-targeting anglers. Any change in weakfish and flounder abundance is overvalued.

5. The problem just discussed would be partially offset if EPA used the value of bottom fish from their RUM model. However, only some results of the RUM model are used. Because the RUM estimates indicate a negative effect of the abundance of bottom fish on the choice of site, it implies that anglers would place negative value on increases in the abundance of bottom fish. Since croaker

and spot are bottom fish and their abundance increases by nearly 15 million fish under the proposed rule (or about 10 times the amount of striped bass and weakfish, Table B6-1), the benefits to anglers might be negative if all estimates were based on EPA's RUM model. The loss of benefits to anglers seeking bottom fish is not included in the value estimates, to the best of my knowledge. Including this effect in the shore mode might even cause the shore anglers to lose value from fishing in the Delaware Bay.

These problems cause the estimated benefits from EPA's RUM model to be unreliable and overstated. Unless the problems are corrected and a new, reasonable model estimated, it should be removed from the document and the results of Hicks et al. (1999) substituted.

It is nearly impossible to tell what benefit estimates go into the final benefit evaluation for Salem (Tables B6-3 and B6-4). However, for such a high estimate of benefits to be presented, the replacement costs of forage fish must have been included. As discussed previously, replacement costs are not a useful measure of benefits in the context of the EPA proposed 316(b) regulation.

EPA Response

This comment refers to case studies presented at proposal that were not included in EPA's final analysis for the Phase II rule. However, EPA notes that its extrapolations were adjusted for technologies in place as necessary. See response to Comment 316bEFR.041.041.

For a discussion of EPA's commercial fishing benefits analysis, please see response to Comment 316bEFR.005.029.

For a discussion of EPA's recreational fishing benefits analyses, please see response to Comment 316bEFR.075.504 and Comment 316bEFR.041.452.

Comment ID 316bEFR.074.305

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 10.03.02
Ohio Watershed

Ohio River

The Ohio River case study considers the effects of nine facilities (Sammis, Cardinal, Kammer, Philip Sporn, Kyger Creek, Beckjord, Miami Fort, Tanners Creek and Clifty Creek) on populations of fish in the Ohio River. Many of these plants use less than 5 % of the mean annual river flow and therefore are not subject to the performance standards to control entrainment. These facilities are required to reduce impingement mortality of all life stage of fish and shellfish by 80-95% from the baseline calculation.

Because there are no commercial fisheries of consequence that would be affected by the proposed regulation, the estimated benefits are shown for recreational harvest improvements, nonuse values, replacement cost of forage fish and the value of production generated from forage fish increases. In addition, the analysis is provided for the nine facilities separately, an entire segment of the Ohio River (29 facilities) and the entire Ohio River (48 facilities).

Over 60% of the total benefit estimate for the twenty-nine plants that is used in the national estimate are comprised of recreational benefits based on a RUM model developed by EPA. In-scope facility impingement and entrainment reduced annual recreational catch by 54,000 pounds in the segment of Ohio River and these lost pounds of fish are estimated to be worth about $8.1 million/year or $150/lb to anglers. To put the benefits in perspective, EPA used two approaches to develop values for the estimated fish lost from impingement and entrainment, a benefits transfer and RUM approach. The benefits transfer values range from $2-4 per fish <FN 17> (Table C4-3). The $150/lb for species such as black crappie, channel catfish, smallmouth bass and walleye is unrealistic and a closer examination of the RUM model on which it is based is appropriate.

As an overview to the recreational benefits, we should put the estimate of 54,000 pounds of fish in perspective. A thorough analysis of the same segment of the Ohio River by the State of Ohio in 1992 and 1993 (Schell et al. 1996) produced an estimate of over 2,500,000 fish caught. If we were to use a conservative estimate that these fish weighed one pound on average, then the harvest gains to anglers from the proposed rule to fishing in the Ohio River segment would be about 2% of total harvest. This is probably imperceptible to the fishing public. In fact, the results of Perry et al. (2002) indicate that if power plant impingement and entrainment mortality were completely eliminated there would be perceptible changes in fish populations for only 6 of the 22 Ohio River sites studied.

Let me explain what I believe is the fundamental mistake in EPA's gross overestimate of benefits. Many of the coefficients of the model are reasonable and indicate the usual response to time and travel cost that a RUM model of recreational demand will produce. The problems arise in the estimation of benefits because EPA uses an index of relative abundance developed by the Ohio EPA <FN 18> and does not apparently account for this when developing benefit estimates. Because the abundance is a relative measure, it is not the actual population- it must be scaled in order to convert it to population. EPA apparently adds the relative abundance to the increase in the absolute level of harvest from the proposed rule. This makes no sense without some conversion of the relative abundance to an absolute abundance AND a conversion of the harvest to an abundance measure. This is my interpretation of what EPA did. <FN 19> If the interpretation is correct, then EPA needs to estimate benefits properly.

Even if EPA were to scale their relative abundance measure and to convert the harvest into abundance, another issue must be confronted. The relative abundance measure is along a straight line and therefore EPA's measure of abundance is for one dimension of the river, the length. It must be expanded to consider the width and depth of the Ohio River. I do not know specifically what EPA did but it appears that they assumed that the new fish would be uniformly distributed down a line, rather than throughout the river. That is, the dimensions of river depth and river width are not considered. Based on the information given on page C1-5, Ohio River is on average about 400 m wide and 4.5 m deep. Because the square root of the relative index was used in the model, I would estimate that the assumed change in abundance from the proposed rule was or 42 times what is should be.

If the above argument is not the reason for the excessively large value per pound, then one must closely look at the model and its extrapolations to determine how these large values could be obtained. I will suggest some additional factors within the RUM model and the extrapolations that could cause an overstatement of benefits.

Specifically, the remaining problems that are apparent at this time are:

1. The water quality variables are used in an inefficient manner. That is, the way EPA employs water quality in their model affects the value of a site but not the value of changes in the abundance of fish at the site. One would prefer that new fish at a site with low water quality would be worth less than new fish at a site with high water quality. The way to achieve this result is to interact the site water quality with the fishery abundance. This was not done and should be considered.

2. There is substantial literature on the overstatement of the number of trips either recalled over an extended past period or predicted to be taken in a future period. In Bockstael et al. (1988) for example, people took only about 70% of beach trips that they predicted they would take from their interview date to the end of the season. There are similar results for recall of past usage. Although EPA notes this ((C5-5.4a), it would have been better to reduce the number of trips by a percentage based on the literature. Reliance on previous literature was followed on using 50% of the use values for the nonuse value, even though it is a far more questionable extrapolation than the one suggested above. Shell et al. (1996) estimate 209,385 as the total number of trips during 1992 for the same segment of the Ohio River. If each trip's benefit from reduced I&E was EPA's estimated $0.12/trip, then if would take about 66,666,666 trips by adult residents in your fishing boundary (Figure C5-1) to produce EPA's total benefit estimate of $8,059,275. If one used the total trips of Shell et al. and EPA's total benefit of $8,059,275, then the benefits per trip would have to be $38. This benefit would arise from a miniscule increase in catch per trip of 0.25 pounds.

3. The procedure used by EPA to obtain fish abundance indexes at sites not sampled by the State of Ohio may bias the economic value of fish upward, although there is not enough information to be certain. If the EPA computes a weighted average of nearby monitored sites, then the procedure may be reasonable. If the EPA diminishes each nearby site's abundance by a factor based on the inverse of distance but does not take a weighted average over the sites, then there would likely be a downward bias in the fish abundance measure for non-monitored sites. Since these sites are probably not visited

as often as monitored sites, the RUM coefficient on fish abundance and the value of improved abundance are biased upward. The description of the data generation is insufficient to tell what the EPA did.

4. The use of 74 individuals from Ohio to estimate behavioral response of all freshwater anglers using the interior waters of the U.S. is obviously precarious. However, it was not clear why only 65 of the 74 individuals were used to make the assessment of the economic value from the proposed regulations. This needs to be explained.

5. Of the 74 or less individuals (66 observations are recorded in the LIMDEP results) used in the analysis, how many individuals actually chose sites associated with the six Ohio River pools? My unofficial count is 5.

6. Given the small numbers of fish involved, it seems highly unlikely that anglers would increase their number of trips because the "value" per trip went up after the reduction in I&E. In addition, the coefficient of the inclusive value in the participation model is not statistically significant. This part of the model should be abandoned (Table C5-4).

7. The estimate of the benefit per trip is $0.12/trip with a standard deviation in the sample of $.0.37/trip. Have you used Monte Carlo techniques to estimate whether or not the benefit per trip estimate is statistically significant? Researchers of ten prefer the median as a measure of central tendency because it has a smaller variance than the mean. What is the median for your sample?

It is completely unclear as to how the total benefits of the reduced I&E reduction are computed "in a manner to avoid double counting" (p. C7-1). This should be clarified. My calculations imply that benefits from nonuse and forage fish generate $1.3 million to $2.4 million dollars annually from impingement reduction and $3.3 million to $4.1 million annually from entrainment losses. These are the differences between benefits shown in Tables C6-2 and C6-3 and the benefits in 7th paragraph of page C7-1.

Because the process by which the nonuse and forage fish benefits are generated is unclear, my comments can only be general in nature. The use of 50% of use value to compute nonuse value is unjustified. My guess is that the nonuse values are extrapolated from the RUM model estimates. Because the RUM model estimates are so unbelievably large, the nonuse values must be also. After correcting for the apparent mistakes in the RUM model, EPA could use 0 as the lower bound estimate of nonuse values and 50% of the use value as the upper bound. Alternatively, they could assess the preferences of residents near the Ohio River with a contingent valuation study of forage fish abundance in the Ohio River.

Some of the total benefits may be associated with replacement costs of forage fish. As previously noted, this approach is not a valid method in this case study.

It is also important to note that EPA's analysis is based on the presumption that improvements in forage fish increase the abundance of recreational fish and those improvements in abundance benefit anglers. Schell et al. (1996) suggest that the abundance of forage fish actually reduces the catch rate of anglers on the Ohio River in 1993;
"One reason for this decline in catch from 1992 to 1993 may also be due to an inverse relationship

between forage abundance and angler success."
(Schell et al. p. 23)

EPA might wish to consider this phenomenon when developing their benefit estimates.

EPA Response

This comment is made regarding EPA's recreational fishing analysis developed for the Ohio Case study presented at proposal. The commenter states that recreational fishing benefits estimated for the Ohio River (48 facilities) are grossly overstated. The commenter further states that the RUM model used in the analysis is appropriate and the coefficients of the model are reasonable and "indicate the usual response to time and travel cost that a RUM model will produce". The commenter, however, argues that the index of relative fish abundance was used incorrectly, which resulted in incorrect benefits estimation. The commenter also raises additional concerns regarding the Ohio case study analysis.

For the final Phase II 316b analysis, EPA no longer uses case studies of individual water bodies or facilities. Instead, EPA has estimated regional models. Therefore, many of the points made are no longer relevant to EPA's analysis.

EPA agrees that the RUM model estimated for the Ohio case study shows the usual response to time and travel cost and other site characteristics. EPA re-iterates that its RUM results are consistent with the results reported in peer-reviewed literature.

The Agency disagrees that the relative fish abundance measure is used incorrectly in the analysis. As shown in Equation C5-6 and Table C5-6, Estimated Changes in Fishery Yield from Eliminating all I&E in the Ohio River, the Agency did convert the estimated changes in recreational fishing harvest into the relative abundance measure. EPA's use of the relative fish abundance index is consistent with the index definition developed by the Ohio Department of Natural Resources. The relative abundance index is defined as fish weight in lbs per 300 meters at a given site. It does not explicitly account for river width or depth. EPA believes that the commenter incorrectly interpreted this measure. See Chapter C5 of the Case Study Analysis Document for the Proposed Section 316 (b) Phase II Existing Facilities Rule for detail (see DCN # 4-0003).

For additional information on the relative abundance index please see the following publication:

Ohio EPA. 1988. Biological Criteria for the Protection of Aquatic Life: Volume II: Users Manual for Biological Field Assessment of Ohio Surface Waters. State of Ohio Environmental Protection Agency, Ecological Assessment Section Division of Water Quality Planning and Assessment, Columbus, Ohio. (DCN #4-1872}

EPA disagrees that the water quality variable is used inefficiently in the model. The RUM model used in the Ohio case study was selected based on the overall model performance, including signs and magnitude of the estimated coefficients, the statistical fit, and consistency with the RUM models from peer-reviewed literature. The model correctly predicts that the value of a site is affected by water quality. The commenter presents no empirical evidence that the value of changes in the abundance of fish at the site is affected by water quality.

EPA believes that its approach to estimating the number anglers expected to benefit from improved fish abundance in the Ohio River is reasonable and consistent with the standard RUM assumptions. The Agency points out that the RUM model estimates the value of an improvement in site quality (i.e., fish abundance) to all anglers whose individual choice sets include a given site. Some of these anglers may not actually visit the affected site, however, the total value of their choice set would increase. Thus, using just the total number of trips to the affected segment of the Ohio River in estimating benefits from reduced I&E is inconsistent with the standard RUM assumptions. For detail, see Chapter A11, Estimating Benefits with Random Utility Model (RUM) of the regional study document (DCN #6-0003)

The Agency disagrees that it used a flawed procedure to obtain fish abundance indexes at sites not sampled by the State of Ohio. EPA used a standard procedure, that is available in the ArcView 3.2 GIS software package with the Spatial Analyst 2.0 extension (Environmental Systems Research Institute, Inc., 2000).

EPA agrees that the data sample is used in the Ohio case study is relatively small. All 74 observations were used in the trip participation model. However, only 65 observations were included in the site choice model because some anglers did not provide sufficient information on the visited site.

The number of anglers who actually chose the affected segment of the Ohio River is irrelevant to the analysis. The RUM travel cost model includes the effects of substitute sites on site values. An angler choosing to fish on a particular day chooses a site based on site attributes. The angler weighs the attributes for various “choice set” sites against the travel costs to each site. These travel costs include both the cost of operating a vehicle and the opportunity costs of time spent traveling. The angler then weighs the value given to the site’s attributes against the cost of getting to the site when making a site selection. If site quality improves more anglers would choose to visit the site. Moreover, based on standard RUM assumptions, anglers are assumed to value all sites included in their choice sets and not only a site that they actually visit on a given day. For detail, see Chapter A11, Estimating Benefits with Random Utility Model (RUM) of the regional study document (DCN #6-0003).

The Agency agrees that the expected increase in the number of trips is negligible given a small increase in the value per trip resulting from improved fish abundance due to reduced I&E in the Ohio River. As shown in Table C5-7, the estimated percent increase in the number of trips is 0.04%. See Chapter C5 of the Case Study Analysis Document for the Proposed Section 316 (b) Phase II Existing Facilities Rule for detail (DCN #4-0003). The Agency also points out that some researchers argue that insignificant variables should be left in the model in the predictive portion of the analysis. For example see: R. Florax, P. Nijkamp, K. Willis, 2002, Comparative Environmental Economic Assessment, Edward Elgar Publishing, p. 148 (DCN #6-3254).

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5:

Methods Used to Evaluate I&E (DCN # 6-0003)

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has explored several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, Non-use Meta-Analysis Methodology, and Chapters C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

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Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.01
Overview of I & E effects on organisms

APPENDIX E:
Impacts of Intake Flow Rate on Fish Populations and Communities

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Environmental Sciences Division
Oak Ridge National Laboratory
Oak Ridge, Tennessee

Principal Investigators
M. S. Bevelhimer
C. C. Coutant

APPENDIX E - 1
EFFECTS OF WITHDRAWAL RATE ON RESERVOIR FISH POPULATIONS

Under an October 1995 Consent Decree, the U.S. EPA is revisiting Clean Water Act Section 316(b) and how it applies to cooling water intake structures (CWIS). As part of that effort, EPA is developing new rules for both new and existing facilities. On November 9, 2001, EPA established location, design, construction and capacity standards for cooling water intake structures at new facilities. On February 28, 2002, the EPA Administrator approved a proposed regulation that will establish similar standards for existing facilities. The proposed regulations will, in part, address approaches for assessing the potential for "adverse environmental impact" (AEI) and measures for minimizing AEI. These measures may include requirements affecting the design, construction, location, and capacity of CWIS. Potentially impacted are all power plants and industrial facilities that withdraw cooling water. One component of EPA's proposed rule for existing plants establishes standards that regulate the volume of water that can be withdrawn for cooling purposes.

The recent regulatory focus on water withdrawal rate or volume as an indicator of likely biological damages from cooling-water intakes begs the following questions:

-What percentage of a source water body can be withdrawn (circulated) without significant adverse environmental impact?
-Is there a single maximum withdrawal rate that can be specified for specific cooling-water uses on all types of waters?
-Is there a single minimum withdrawal rate (intake-to-volume ratio) that can be categorically judged acceptable in any circumstance?

In this analysis we try to address these questions in a unique way by looking at potential biological effects of water releases and withdrawals from reservoirs as a surrogate for CWIS withdrawals. It is our working premise that water withdrawals from reservoirs, often for hydropower but also for municipal and other water uses, can result in an irretrievable loss of fish from the upstream waterbody that might be reflected in the status of fish populations in that waterbody. This irretrievable loss for that waterbody occurs regardless of whether the fish are killed or injured in dam passage, which is another issue not considered here. This chapter presents analyses we performed to determine if there is a relationship between the amount of water withdrawn from a reservoir system (via normal reservoir discharge and/or CWIS withdrawal) and some measure of a fish population or community health, such as total standing stock, sportfish density, forage fish density, etc. Our analyses were performed on two sets of reservoir data where we were able to find records of fish abundance, reservoir discharge (i.e., river flow), and CWIS withdrawal if present. Throughout this chapter we will refer to releases from the reservoir either through hydropower turbines or as spill at the dam as "reservoir withdrawals". Other types of withdrawal will be differentiated by purpose such as "CWIS withdrawals". "Total withdrawal" refers to the combination of releases and withdrawal for all purposes.

As part of our investigation into the contribution of water withdrawal as a factor affecting fish populations, we performed original analyses and revisited past studies of reservoir fish populations. Although these studies had different objectives, they each address fish removal and population response in one form or another. In this section of the report, we present the results of five analyses, which in various forms evaluated the relationship between fish withdrawal from reservoirs and population-level effects. The five analyses include:

-An original analysis of population effects of water withdrawal/discharge for reservoirs in Texas and tributary reservoirs in the Tennessee River system,
-A review of findings of the U.S. National Reservoir Research Program that intensively studied fish populations in reservoirs in relation to numerous environmental factors between the late 1960s and the mid 1980s,
-A review of findings of international efforts to develop simple indexes for predicting the fish productivity of water bodies, particularly the Morphoedaphic Index (MEI), that were hotly debated in the late 1970s and early 1980s,
-A summary of withdrawal rate effects at systems with high discharge rates and reported high entrainment rates, and
-A review fish control programs, in which certain species are targeted for reduction or elimination as a fisheries management tool.

3.1 Reservoir Withdrawal: Population Effects Analysis

The objective of this study was to compile reservoir and fisheries data with which we could evaluate possible relationships between the rate at which water is removed from the reservoir and fish abundance. In particular, we were interested in a relationship that includes the withdrawal (or intake) rate as a function of reservoir volume as we do not think withdrawal rate by itself is a very useful indicator of possible effect. Our working hypothesis is that we expect to find little or no population-level impacts at low intake-to-volume ratios, but at high intake-to-volume ratios, effects might start to become evident. In addition, we expect the greatest impact to be on those species or life stages that reside nearest the intake. For most dam release points (i.e., turbine intakes and spillways), the affected fish are those that reside in the offshore, pelagic zone of the reservoir.

3.1.1 Methods

Fish abundance - To investigate the possible effect of reservoir discharge rate on fish abundance, we first had to identify large data sets of fish abundance information that were collected in a similar manner for many reservoirs. Although estimates of actual abundance in large reservoir systems are not common, we found two data sets with measures (biomass per acre and catch per unit effort, CPUE) that are reasonable surrogates of actual fish abundance. These data sets are described below.

Texas Reservoirs: Fish populations in 111 reservoirs throughout Texas were sampled from 1974 to 1982 to assess the status of reservoir fish communities (Miranda 1984). Fish were sampled using standard cove rotenone techniques, and results reported as fish biomass per acre for each species collected. Many reservoirs were sampled during more than one year. For the analysis presented here, we selected fish abundance data from 36 of the 111 reservoirs for which we could readily find corresponding information on reservoir release rate and other water withdrawal information (Figure 3-1; Table 3-1). Measures of fish abundance used in this analysis included:

-Total fish biomass (lb/ac) of all species collected. Although it is unlikely that release of water from the system affects all species equally, there are likely some species that might be entrained and others that could be affected indirectly by the loss of a food resource.
-Shad species biomass (lb/ac). The shad species (gizzard shad Dorosoma cepedianum and threadfin shad D. petenense) are representative of fish that frequent the pelagic zone of a reservoir and are therefore in close proximity to most dam intakes. The biomass of shad comprised 27% of the total fish biomass across all years and lakes.
-Black bass species biomass (lb/ac). Adult and juvenile black basses (Micropterus spp.) represent species that are structure-oriented and usually found near the bottom or in the littoral zone and less likely to be impacted by dam intakes. Larval black basses, however, may go through a period of pelagic existence at which time they could be more susceptible to open water intakes. The biomass of black basses comprised 8% of the total fish biomass across all years and lakes.
-Ratio of shad to total biomass. Because shad and other clupeids are commonly entrained at dams (as well as CWIS), we might expect to see a decline in the shad biomass relative to other species if population-level effects are present.
-Ratio of shad to black bass biomass. Because adult and sub-adult black bass populations are not expected to be directly affected by reservoir releases, expressing shad abundance relative to black bass abundance may show changes in shad population that would not otherwise be apparent.

[see hard copy for table]
Table 01
Texas reservoirs included in the analysis of the effects of dam release rates on fish abundance. The six reservoirs with the primary withdrawal being for CWIS and with minor reservoir release were not included in statistical analyses, but were included in the figures for comparison.

Tennessee Valley Reservoirs: Fish populations in 31 reservoirs throughout the Tennessee River system were sampled from 1990 to 1999 to assess the status of reservoir fish communities (Dycus and Baker 2000). Fish were sampled using gillnets and electrofishing techniques at three general areas in the reservoirs including the forebay near the dam. Because we were interested in the potential effect of entrainment at dam intakes, we only used those results from sampling at the reservoir forebays that were reported as catch-per-unit-effort (CPUE) for each species. Reservoirs were sampled once a year for 4 to 8 years. For the analysis presented here, we used fish abundance data from 20 Tennessee River tributary reservoirs (Figure 3-2; Table 3-2). Measures of fish abundance used in this analysis included:

-Reservoir Fish Assemblage Index (RFAI) score. The RFAI is a metric developed by TVA biologists to assess the health of a reservoir fish community similar to the Index of Biotic Integrity (IBI) for stream fish communities (Karr 1981). The RFAI uses 12 fish community metrics that describe species richness and composition, trophic composition, reproductive composition, abundance, and fish health (Hickman and McDonough 1996). This measure was used both as yearly values and as site averages (i.e., years combined).
-Average electrofishing CPUE of all species collected. The unit of effort for electrofishing was 300 m of shoreline sampled. A yearly sample for any one reservoir consisted of 15 300-m runs completed on the same night. Electrofishing results from 1991 were not included in the analysis because the unit of effort that year was in minutes and not comparable to subsequent sampling.
-Average gillnetting CPUE of all species collected. The unit of effort for gillnetting was net-nights. Yearly sampling at each reservoir consisted of a single overnight set of 12 30-m long nets.
-Shad species CPUE for gillnetting. The gillnet CPUE of shad comprised 22% of the total gillnet CPUE across all years and lakes.
-Black bass CPUE for electrofishing. Shoreline electrofishing provides a better estimate of black basses abundance than does offshore gillnetting. The CPUE of black basses comprised 9% of the total electrofishing CPUE across all years and lakes.
-Ratio of shad gillnet CPUE to black bass electrofishing CPUE. Because we do not expect adult and sub-adult black bass populations to be directly affected by reservoir releases, expressing shad abundance relative to black bass abundance may show changes in shad population that would not otherwise be apparent.

When sampling fish that school, such as clupeids and many minnow species, it is not uncommon to occasionally collect an abnormally high number of individuals in a single sample. If enough sampling is performed, these unusually high samples do not inordinately affect the final estimate. However, because of the limited amount of sampling during the TVA studies, these outliers have a dramatic impact on the final estimate of CPUE. Therefore, we used Grubbs test (also known as the extreme studentized deviate method) to identify samples that were outliers compared to the other three to six estimates of CPUE for a particular lake. Because the groups within which the outlier test was performed contained only 4 to 7 samples, only extreme outliers were identified, which resulted in 8 out of 585 measures being removed from the analysis.

[see hard copy for table]
Table 02
Tennessee Valley reservoirs included in the analysis of the effects of dam release rates on fish abundance.

Reservoir Withdrawal—The most basic measure of reservoir withdrawal is simply the average rate of release (e.g., cfs or m3/s) over some defined time (e.g., annually). Although we are skeptical of discovering any relationship between the rate of withdrawal (without reference to water body volume) and fish abundance, we include it here to make sure our assumption is correct.

We believe an effect of reservoir withdrawal on fish abundance is more likely to be found if the reservoir withdrawal is presented in terms of reservoir volume, such as storage ratio or residence time. Storage ratio can be defined as the ratio of the daily intake volume to the water body volume. A reservoir's residence time is, in theory, the time that it takes for a complete turnover of the reservoir's water volume. In actuality, because of irregular mixing, the entire volume of water is not replaced molecule for molecule as new water enters the reservoir, however, this metric can provide valuable insight into other physical and biological characteristics of the reservoir. Residence time can be estimated as the time it takes for the volume of either the inflow or the outflow to equal the total reservoir volume. We estimated residence time in days as the reservoir volume divided by the daily outflow (or inflow if outflow was not available). If units are consistent the storage ratio and residence time are simply reciprocals of each other.

Several different estimates of residence time were calculated as follows:

-Long-term annual residence time (days): Average lake storage volume (ft3) divided by the average release/withdrawal (cfs converted to ft3/d) during past 40 years.
-Short-term annual residence time (days): Average lake storage volume (ft3) divided by the average release/withdrawal (cfs converted to ft3/d) during the 2 years prior to the year that fish sampling occurred. These flow data did not exist for some fish sampling events.
-Short-term Spring residence time (days): Average lake storage volume (ft3) divided by the average release/withdrawal (cfs converted to ft3/d) during the months of April, May, and June of the 2 years prior to the year that fish sampling occurred. This time period was chosen based on the possibility that short residence time in Spring when flows are high might flush large numbers of larval and juvenile fish from the system because their small size and/or choice of pelagic habitat makes them most susceptible. These specific flow data did not exist for some fish sampling events.
-Short-term June-July residence time (days): Average lake storage volume (ft3) divided by the average release/withdrawal (cfs converted to ft3/d) during the months of June and July of the 2 years prior to the year that fish sampling occurred. Similar to spring months, June and July are times when juvenile fish might be highly susceptible to high flows. In addition, flows during these months were found to significantly affect year-class strength in largemouth bass (Maceina and Betolli 1998). These flow data did not exist for some fish sampling events.

Texas Reservoirs: Several databases were used to derive the necessary information to calculate residence time for Texas reservoirs. We used the National Inventory of Dams database (NID) managed by the US Army Corps of Engineers (available on the internet at http://crunch.tec.army.mil/nid/webpages/nid.cfm) to find information on the precise location of each dam (latitude and longitude), the average storage volume (acre-feet), and the name of the receiving stream.

The average reservoir releases, both long-term and short-term, were derived from data collected at USGS gage stations and available at the USGS internet site (http://water.usgs.gov/nwis/sw). A site map that shows the location of each gage station was used to ensure that the location was representative of flows below the dam. Long-term annual and seasonal averages were calculated using monthly averages from 1960 to present when available. In a few cases, it was necessary to use pre-1960 data.

In addition to reservoir releases, we also included CWIS withdrawals when present on the reservoir. Intake rates at CWIS were obtained from the Entrainment and Impingement Database (EIDB), which is maintained at Alden Research Laboratory, Inc. (S. Amaral, personal communication). The values for CWIS intake rate in the EIDB are intake capacities and might overestimate the actual withdrawal, which may not always be at the maximum rate. Not having ready access to the actual withdrawal rates for the particular years of interest, we used the intake capacities as the average intake rate throughout the year.

Tennessee Valley Reservoirs: Much of the information necessary to calculate residence times for the Tennessee Valley reservoirs was obtained directly from the TVA (G. Hauser, personal communication). Because some of these reservoirs undergo a significant drawdown each winter, reservoir volume was estimated as the average of the volumes at full pool and at the average winter pool. Daily flow data obtained from TVA was used to estimate long-term and short-term reservoir releases. Flow data for four of the 20 reservoirs were not readily available and these reservoirs were only included in the comparisons that included the long-term annual residence time that was provided by TVA. There are no CWIS on the tributary reservoirs used in this analysis.

Water Withdrawal versus Fish Abundance Comparisons—Because the precise mechanism by which the magnitude and timing of reservoir withdrawals (and CWIS withdrawals) affect fish populations and communities is poorly understood, we made comparisons of several measures of both reservoir withdrawal and fish populations in search of any possible relationships. Regression coefficients (R2) were calculated for each comparison as a preliminary indicator of a possible relationship. For a few select comparisons we performed a linear regression analysis to determine if the relationship was statistically significant (i.e., whether or not the slope of the relationship is different from zero).

Most of the comparisons include fish abundance data collected over several years at several sites, but for a few cases, we also averaged data across years to create a single average value for each site. We present the results below in a progression from broad scale (i.e., long-term annual withdrawal measures and site averages of fish community measures) to fine scale (i.e., recent seasonal withdrawal measures and yearly abundance estimates of specific species), with the feeling that perhaps as the resolution of the analysis gets finer the chance of finding a relationship would increase.

3.1.2 Results

Texas Reservoirs: The results of multiple comparisons of various measures of reservoir withdrawal and fish abundance in Texas reservoirs are presented in Table 3-3 and Figures 3-3 to 3-6. Table 3-3 summarizes the sample sizes and R2 values for the linear regression for the various combinations of two-variable comparisons. These analyses included two types of reservoirs: (1) those where the major source of water withdrawal is release at the dam to a receiving stream and (2) those where water withdrawal includes both substantial release at the dam and withdrawal at a CWIS (see Table 3-1). Some reservoirs in Texas that provide water for CWIS have negligible releases at the dam and, in most cases, do not have corresponding USGS flow gages by which flows can be estimated. These “cooling” reservoirs typically have very small drainage areas and receive additional water to maintain elevations by pumping from nearby rivers and other sources. Although these reservoirs were not included in our analysis of water withdrawal effects, 6 of them are included in the figures for comparison.

[see hard copy for table]
Table 03

Water withdrawal versus fish population comparisons for Texas reservoir data.

At the broadest scale, there does appear to be a slight relationship between reservoir withdrawals (expressed either as mean annual discharge or long-term residence time) and total fish biomass (Figure 3-3A, B, C, D). A statistical analysis of the mean annual discharge versus total fish biomass determined that there is a statistically significant relationship (Table 3-4), though not in the direction expected. These data suggest that higher discharge rates are beneficial to fish production (Figure 3-3C).

[see hard copy for table]
Table 04
Results of select linear regression analyses on various measures of reservoir withdrawal versus fish abundance for Texas reservoirs.

Viewing just the plots of long-term residence time versus various measures of fish abundance (Figure 3-4A, B, C, D), we see little evidence of any relationship except with the ratio of shad to black bass biomass (Figure 3-4D). Regression analysis reveals that this is a significant relationship though the slope of the curve is small (Table 3-4). This relationship suggests that as reservoir withdrawal decreases (and residence time increases) the biomass of shad increases relative to black bass, the species that is less likely to be entrained in reservoir releases.

When the short-term residence time, which is based on flows during the two years prior to fish collection, is used as the measure of reservoir withdrawal, there is little evidence of any affect on fish abundance (Figure 3-5A, B, C, D).

When the short-term Spring residence time (based on recent flows during April-June) is used as the measure of reservoir withdrawal, a slight relationship exists with the shad:black bass ratio (Figure 3-6D). The linear relationship between short-term Spring residence time and shad:black bass ratio is a significant one (at the a=0.05 level) even though the corresponding relationship with shad biomass is not (Table 3-4).

Using flows in June and July during the two years prior to sample collection did not uncover any stronger relationships than those using the Spring flows (Table 3-3).

Although not included in the regression analyses or R2 calculations, fish abundance data collected at reservoirs with CWIS withdrawals but little other withdrawals or releases suggests that fish abundance can be quite high even when the water turnover rate is high (i.e., residence time is low) (Figures 3-4 to 3-6).

Tennessee Valley Reservoirs: The results of multiple comparisons of various measures of reservoir withdrawal and fish abundance in Tennessee Valley tributary reservoirs are presented in Table 3-5 and Figures 3-7 to 3-10. Table 3-5 summarizes the sample sizes and R2 values for the linear regression for the various combinations of two-variable comparisons. The major source of water withdrawal from these reservoirs is release at the dam to a receiving stream; none has any associated CWIS.

[see hard copy for table]

Table 05
Water withdrawal versus fish population comparisons for Tennessee Valley reservoir data.

At the broadest scale, a review of the plots of reservoir withdrawal (expressed either as mean annual discharge or long-term residence time) versus RFAI, the fish community index, indicates no apparent relationship (Figure 3-7A, B, C, D). However, the regression analysis of these two relationships determined that there is a statistically significant relationship between mean annual discharge and RFAI but not between long-term residence time and RFAI (Table 3-6). As one might expect, as discharge increases the measure of community health decreases. However, the slope of the relationship is so small that the statistical significance has little practical meaning.

[see hard copy for table]
Table 06
Results of select linear regression analyses on various measures of reservoir withdrawal versus fish abundance for Tennessee Valley reservoirs.

Viewing just the plots of long-term residence time versus various measures of fish abundance (Figure 3-8A, B, C, D, E, F), we see little evidence of any relationship. Regression analysis of long-term residence versus RFAI corroborated this observation (Table 3-6).

Likewise, when short-term annual residence time was used as the measure of reservoir withdrawal, there was little evidence of any effect on fish abundance (Figure 3-9A, B, C, D,E, F).

When the short-term Spring residence time was used as the measure of reservoir withdrawal (Figure 3-10A, B, C, D, E, F), a slight relationship is apparent with the RFAI score (Figure 3-10A). The linear relationship between short-term Spring residence time and RFAI was a significant one (at the a=0.05 level) (Table 3-6) and in the expected direction based on the operating hypothesis. That is, fish community health increased as reservoir withdrawal as a function of volume decreased. In addition, the relationship between short-term Spring residence time and shad CPUE was also significant, though the slope of the relationship, albeit very small, is contrary to that expected (Figure 3-10D). That is, shad abundance decreased as residence time increased.

Using flows in June and July only during the two years prior to sample collection produced relationships that were generally the same as those using the Spring flows (Figure 3-11A, B, C, D, E, F). Because Maceina and Bettoli (1998) found a relationship between black bass year class strength and residence times based on June-July flows in Tennessee River mainstream reservoirs, we were most interested looking for a similar relationship in the tributary reservoirs. Regression analysis, however, indicates that there was not a significant relationship between short-term June-July residence times and black bass abundance (Table 3-6).

In addition to the RFAI, an additional index, the Sport Fish Index (SFI), was calculated to quantify the status of the sportfish community and selected sportfish species in TVA reservoirs (Hickman 2000). Values of SFI were obtained from TVA for the reservoirs in the analysis from 1997 to 2000. Similar to the analysis presented above, we also investigated possible relationships between reservoir withdrawal and SFI. Except for a moderate correlation between discharge (cfs) and LMB SFI (Figure 3-12A), we found no indication that increased withdrawal resulted in poorer sportfish populations. Instead, we found just the opposite. The relationship between discharge and LMB SFI is counter to that expected from the dose-response analogy; that is, as discharge increases, the SFI for LMB improves.

3.1.3 Discussion

The analysis performed here was not able to identify conclusive evidence for a relationship between population- or community-level effects and rate of water withdrawal, either as a direct measure (i.e., mean annual discharge) or as a function of water body volume (i.e., residence time). A few significant relationships were found (Tables 3-4 and 3-6), but even some of those (e.g., mean annual discharge versus total fish biomass in the Texas reservoirs) were counter to our expectation of a negative effect on fish populations as discharge increased. Of the various measures of withdrawal rate we tested, the residence time based on spring flows for the two years prior to the collection of the fish data seems to be the most useful for explaining variation in fish abundance.

Maceina and Bettoli (1998) compared variation in recruitment of largemouth bass in four mainstem Tennessee River reservoirs (with mean residence times < 20 days) to various types of hydrologic and aquatic plant abundance data to explain factors related to the formation of strong and weak year classes. They found that a majority of the variation was explained by June-July discharge rates when fish were age 0. They found that weak year classes were produced during wet years when reservoir releases were high (and residence times were low) and, conversely, strong year classes occurred during dry years. This study suggests that largemouth bass year class strength is directly related to the effects of early summer flows on young-of-year fish, though it is not clear whether that effect is entrainment (i.e., removal from the system) or whether it is a result of some other mechanism associated with high flows, such as primary production. Slipke et al. (1998) and Buynak et al. (1991) also found that black bass recruitment was higher in Tennessee River impoundments during years when spring and early summer flows were lower than average. Although, Maceina and Bettoli (1998) found that June-July flows predicted largemouth bass year class strength in Tennessee mainstem reservoirs, we found that April-June flows provided better relationships than June-July.

In addition to water release, there are a variety of factors that can affect fish abundance and that may have impaired our ability to find a relationship between withdrawal and abundance. These include supplemental stocking, the effects of water level variation on reproduction, and compensatory mechanisms that might result in the loss of significant numbers of larval or juvenile fish having little effect on the total population of adult fish. Consideration for which life stage is entrained is an important one. There is good evidence that the entrainment of adult and sub-adult fish can have a significant effect on the population as indicated by the kokanee examples above described in Section 3.4 (Cichosz et al. 1999; Skaar et al. 1996).

Other confounding factors in our analysis include unknown diversions (e.g., those for municipal water supply, irrigation, etc.) for which we did not account. This is not likely a significant problem for the Tennessee Valley reservoirs, but might be in Texas where irrigation is more prevalent and where some of the reservoirs were located near large cities that may use the reservoirs for public water supply.

Although we included in our analysis the species that we thought most susceptible to dam entrainment (i.e., gizzard shad and threadfin shad), it is possible that we overlooked a species that might have had a more pronounced interaction with among-reservoir and among-site variations in residence times.

Differences in behavior and life history among fish species have a significant impact on their susceptibility to entrainment and the potential for entrainment to have population-level effects. The entrainment of kokanee in western reservoirs is a function not only of their preference for open water habitat which puts them in close proximity to dam intakes, but also a function of innate migratory behavior that draws them to the outflowing currents at the intakes. The relatively low rate of fecundity of kokanee, which is typical of salmonids, likely contributes to the observed population-level effects resulting from high levels of entrainment. On the other hand, we know that shad are commonly entrained at dam intakes, and given their relative abundance in most southern reservoirs probably at a high rate, but population effects were not observed in our analysis, likely due to their high rate of reproduction.

[comment text continued in 316bEFR.074.402]

EPA Response

Please see responses to Comment 316bEFR.072.049 and Comment 316bEFR.041.037.

Comment ID 316bEFR.074.402

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 6.01
Overview of I & E effects on organisms

[comment continued from 316bEFR.074.401]

3.2 U. S. Reservoir Research Program Synthesis

The question of whether water withdrawal rate has a major influence on the status of fish populations was investigated in the 1963-1980 U.S. Reservoir Research Program, along with the broader question of the relative roles of other factors in controlling fish productivity. Freshwater reservoirs were the focus. This program produced a large literature, which presents the results of extensive statistical correlations among potential environmental factors and different measures of fish populations of many species.

As nearly every major river system in the U.S. was being dammed for navigation, hydropower, flood control, and (as an added benefit) recreation, the U.S. Congress in 1963 established the National Reservoir Research Program (NRRP) to be administered by the U.S. Fish and Wildlife Service. The major goal of this program was to determine the factors affecting the development and sustainability of fish populations (particularly those populations that provided recreational fisheries). The Program inventoried trends in both reservoir construction and the development of recreational fisheries in new and maturing reservoirs. Disbanded formally in 1980, but continued by participants for a few years thereafter, the program's published literature forms a valuable resource for those interested in understanding the factors that regulate fish populations.

Between 1960 and 1980, the former NRRP made four inventories of U.S. reservoirs with a surface area larger than 500 acres. These did not include natural lakes that were regulated by outlet dams unless the lake area or volume was doubled by the dam. By 1985 (the last inventory), there were 1,687 reservoirs with a total surface area of 10,063,000 acres, and the rate of increase in new reservoirs had dwindled (Jenkins et al. 1985). Jenkins et al. estimated that fishing on reservoirs 500 acres or larger accounted for approximately 25% of all freshwater angling in the U.S.

Estimates of annual sport-fish yield were obtained (largely from state fishery agencies) for 294 reservoirs (Jenkins 1982). The database included 18% of the number and 35% of the total area of U.S. reservoirs. The reservoirs are located in 39 states, but half are in 8 states (Oklahoma, 50; Kansas, 20; California, 16; Tennessee, 14; Colorado, 13; Kentucky, 13; Michigan, 11; and Wyoming, 10). Mean age was 22 years (1-118 years). Most data were collected between 1940 and 1979. Other characteristics of the data set are described by Jenkins (1982). Regrettably, the publications do not list all of the relevant physical data for each of the 294 reservoirs (such as withdrawal rate), but instead focus on presenting results of the correlation analyses. The original data files are no longer accessible. We have been able to deduce some of the withdrawal data, such as that used by Ploskey et al. (1984) for their analyses of 11 reservoirs selected to represent a range of reservoir types. These reservoirs had annual average discharges ranging from 1 m3/s (24 MGD) to 821 m3/s (18,744 MGD), with most in the range of 40-225 m3/s (900-5,000 MGD). For comparison, a 1,000-MWe nuclear electricity generating station uses cooling water at a withdrawal rate of about 130 m3/s (3,000 MGD).

The Program focused on several fish-production issues that were important at the time. A large literature was generated; a few key findings and summary papers are cited below. The relevance of a finding for current CWIS issues is indicated.

-Reservoir fish production was not constant over the life of any reservoir, which complicated making correlations with other physical and environmental factors. Reservoirs typically experienced a “boom and bust” cycle of fisheries, in which there was an initial pulse of productivity and high fish catches, followed by a gradual decline. The NRRP established that this cycle was related to nutrients in soils and vegetation that were released on flooding, yielding especially high initial fish populations that could not later be sustained by annual input of nutrients from the watershed. Jenkins (1977) observed that Lake Keowee, a hydropower storage reservoir in South Carolina used also as a cooling lake for a nuclear power plant, exhibited a gradual and typical decline in standing crop of fishes over a 10-year period after impoundment. Recommendations for managing flooded lands during construction to maximize retention of nutrients and fish habitat values were developed (Ploskey 1981, 1985).

The relevance of this finding for CWIS is that long-term monitoring of reservoirs used for cooling may show declines in fish populations unrelated to cooling-water use, but reflecting a normal aging process for the reservoir.

-Water level fluctuations strongly influenced fish populations. Such fluctuations are typical of many reservoirs (particularly those used for seasonal water storage) but atypical for natural lakes and cooling reservoirs. Fish productivity was affected especially by influences on spawning and nursery habitats in spring. The fluctuations in elevation and water surface area caused major disruptive effects, particularly on littoral-zone predators such as largemouth and smallmouth bass. Recommendations for minimizing the detrimental effects of water operations on fish populations and for using selected water fluctuations to beneficially manage certain fish populations were provided (Ploskey 1986).

The relevance of this finding for CWIS is that waters used for cooling are likely to have more productive fish populations than reservoirs not used for cooling, regardless of the volume of water withdrawal, largely because water elevations need to be maintained stable for operation of intake pumps.

-The vagaries of weather (wind, temperature, precipitation) affected fish populations of reservoirs in many ways (Aggus 1979). The effects were often related to disruptive storm events affecting nest survival of shoreline spawning fishes, rapid temperature changes (often declines) at critical times for spawning fish, and differing precipitation regimes that influenced flow of nutrients from watersheds. Reservoir statistics on variations in water through-put relative to reservoir volume (calculated as retention time, storage ratio, or flushing rate) often reflected changes in precipitation and nutrient dynamics (higher flows usually equated to higher ecosystem and fish productivity). Although meteorological events are not controllable, an understanding of their effects aided in understanding cause-effect relationships for other factors that were more manageable.

The relevance of this finding for CWIS is that effects of fairly consistent water withdrawals (characteristic of most cooling-water uses), if any, are likely to be masked by more prominent effects of weather events.

-The ratio of predatory fish to prey fish was found to be an important attribute of reservoirs, which influenced perspectives on stocking of game fish and the importance of forage fish populations. The quantitative relationships between numbers of predators and prey, and the “balance” in fish assemblages, had preoccupied fish managers since the early days of managing fish ponds. Studies in New York reservoirs in the 1930s, TVA studies in their new reservoirs in the 1930s and 1940s, and Swingle’s theoretical and field studies of fish ponds contributed to theories of fish community structure that were tested by the NRRP (Jenkins 1979). There were concerns that popular stocking of predators was ineffective, largely because of an imbalance that was created with abundance of available prey. The NRRP focused on determining desirable ratios of available prey to predators (AP/P ratios) for large southern reservoirs (Jenkins 1979). Prey-predator ratios fluctuated greatly, largely due to environmental perturbations, with food for predators usually determining predator abundance after lags of several years. Jenkins (1977) observed that the predator/prey ratio was not disrupted by the CWIS of the Oconee Nuclear Plant on Lake Keowee, South Carolina (CWIS capacity 129m3/s or 2,945 MGD), although there were year-to-year changes.

The relevance of this finding for CWIS is that maintenance of prey populations, ones often entrained, is important for maintaining strong populations of predators, which are usually the game fish of most direct interest to anglers and fishery managers. Prey populations may be some of those most affected by CWIS because many forage fish have pelagic (drifting) larvae and juveniles susceptible to entrainment. Monitoring of prey populations may be important in CWIS monitoring programs. However, the wide fluctuations caused by natural environmental perturbations makes separation of CWIS effects difficult.

-Total Dissolved Solids (TDS) and average depth were the principal correlates with fish standing crop. Predictors of fish standing crop were sought among the many variables recorded for reservoirs (Jenkins 1977). Of the 166 mostly southern reservoirs included in this analysis, 97 were hydropower reservoirs (52 mainstem and 45 storage; the rest served various purposes). Total dissolved solids (TDS) was the most important independent variable in partial correlation analyses of fish crop vs. 11 environmental variables. When combined with average depth as the morphoedaphic index (see separate discussion), the TDS correlations were highly predictive (Figure 3-13). Jenkins (1977) specifically tested correlations for clupeids (shads), which are the fishes most frequently impinged and entrained at southern power plants, and make up 40 to 55% of the biomass in reservoir cove samples. He reasoned that if mortalities induced by power plants were profoundly affecting the fish populations in reservoirs, the effect should be detected first in clupeids. Nonetheless, he found that TDS was the predominant factor affecting clupeid populations, although with a lower coefficient of determination than for total crop regressions.

The relevance of this finding for CWIS is that factors unrelated to CWIS (TDS and water depth) are the dominant correlates with fish populations, outweighing any dose-response relationship with water withdrawal.

-Factors associated with water withdrawal, e.g., flushing rate, were not clearly related to fish productivity (Jenkins 1970, Ploskey et al. 1984, Ploskey 1993) or the relationship was positive (reservoirs with high inherent water exchange rates supported larger standing crops; Aggus and Lewis 1976). Jenkins (1977) analyzed the effects of selected environmental variables on the standing crop of fishes in 140 large reservoirs and found some significant correlations between standing crop and storage ratio (volume/water flow). Lower rates of water exchange (high storage ratios) increased crops of bullheads, channel catfish, largemouth bass, smallmouth bass and crappie, but decreased crops of flathead catfish, bluegill, and longear sunfish. Physical flushing of young-of-the-year probably contributed to lowered catches of young fish in two run-of-the-river reservoirs (Walburg 1971) but in three large reservoirs studied by Ploskey (1993), predicted catches were positively related to flushing rate at normal-pool elevations. Only when pool elevations were especially low (flushing rate high because of decreased reservoir volume) were there negative relationships. Aggus and Lewis (1976) analyzed 26 reservoirs from 9 states in the Southeast for correlations between environmental variables and standing crops of fish for the simultaneous study years 1972 and 1973. Storage ratios were calculated (annual volume/annual discharge, which is the inverse of flushing rate) and ranged from 0.015 to 5, average 0.87). In multiple regression analyses, storage ratio was negatively correlated with sunfish and black bass crops, positively correlated with carp and catostomids, but not correlated with crops of clupeids, crappie, small fish (less than 4.5 in.) or total standing crop. When the focus is on providing harvestable fish such as sunfish and bass, a low annual storage ratio (high annual flushing rate) was found to be better.

The relevance of these findings for CWIS is that factors associated with water withdrawal rates are generally not as important for determining fish population strength as other features such as TDS and water depth. The importance of withdrawal varies among species and is more of a determinant under peculiar circumstances such as drastic reservoir drawdown. For some game species, high withdrawal rates were beneficial, and by analogy, a high rate of cooling water withdrawal at a CWIS could also be better for the populations than a low rate. The general lack or inconsistency of correlations with withdrawal is perhaps the main point for CWIS applications.

-Seasonal hydrological events had more impact on fish populations than annual average statistics (Ploskey et al. 1984). Summer drawdowns tended to flush young fish from the reservoirs, with negative effects on subsequent populations. Seasonal changes in reservoir area were more important than spring or fall storage ratio. For hydropower storage reservoirs (usually at the upper part of river basins and thus apt to withdraw more fish than are received from upstream), the percent of positive or negative correlations were: spring area (+93), annual change in area (+96), summer area (+89), spring change in area (+95), winter-spring area (+92), fall change in area (+79), summer change in area or drawdown (-89), spring storage ratio (-82), and surface area in the previous fall (-91). Whereas fall storage ratio affected fish populations in mainstem and flood-control reservoirs, it did not do so in upstream storage reservoirs. Overall fish productivity seemed to depend on the balance between positive effects (such as shoreline flooding in spring) and the negative effects of fish losses, such as through summer drawdowns.

The relevance of these findings for CWIS is, as observed above, that the relative consistency in elevation of water bodies used for cooling tend to stabilize and enhance fish populations. Seasonal changes in hydrology (e.g., high flow events) are likely more important for flushing fish from a reservoir system than is a recirculating CWIS.

In summary, the results of the NRRP may not be conclusive for establishing the effects of water withdrawal at CWIS, possible threshold limits on withdrawal for fish protection, or on dose-response relationships between withdrawal and fish population status, but they are valuable in establishing perspective with other (more dominant) effects on fish populations. The NRRP considered numerous reservoirs that varied in many design, operational, and environmental factors. The diversity of potentially causative factors for fish standing crops or yield may have obscured those that could be important when others such as water level are maintained more constant (for example, water level is often nearly constant in water bodies used for power plant cooling). Whether a subset of the about 1,600 reservoirs in the NRRP would provide a good sample of reservoirs having no significant water-level fluctuations but having a wide range of withdrawal rates and storage ratios (and still have good fish production data) is not known. The concluding point made by Jenkins (1977) is important, however: the baseline information and indices (such as normal predator-prey ratios and normal fish standing crop at a given TDS level) provided by the Reservoir Research Program can be used as reference points for CWIS monitoring systems.

The Reservoir Research Program data files still exist and might be mined for additional information. They reside with Dr. L. E. (Steve) Miranda, Mississippi State University (smiranda@cfr.msstate.edu).

3.3 Morphoedaphic Index Synthesis

In the 1960s, fisheries professionals examined potential relationships between the volume of water withdrawn from fresh water bodies and fish production in those waters as part of efforts to develop relatively simple indices for estimating fish production. Water withdrawal (in the sense we are using it in this report) was evaluated as the “flushing rate” of the water body, that is, the ratio of outflow to the volume of the waterbody. Correlation analyses among many parameters indicated that there are standard morphometric dimensions (measurements of size and shape) and water-quality parameters that are of major importance to fish production (Hutchinson 1957; Ryder 1982). These parameters were separated into primary and secondary factors. Primary factors were found to be area, volume, mean depth, and total dissolved solids. Secondary factors were considered to be the extent of the littoral zone, flushing rate, and shoreline or volume development. Flushing rate was considered to be of such low importance generally that it was not considered further for use in a predictive index. From these correlations, a school of thinking arose to explain the basis of fish production using what was called the “morphoedaphic index” or MEI (Ryder 1965). The MEI has been widely (and generally successfully) used to estimate fish production and yield in both lakes (Ryder 1982) and reservoirs (Jenkins 1982). The index is the ratio of the average total dissolved solids in the water and the average depth of the water body. As the index increases, fish production and yield increase (Figure 3-14). What the index seems to encapsulate is that overall ecosystem productivity is higher when there is a high level of nutrients and other mineral matter in the water and the water body is shallow enough to allow that productivity to be expressed in the productive photic zone (where light penetrates). The MEI concept merges Rawson’s (1952) thoughts about the relationships of fish production to water body depth with the analyses of the National Reservoir Research Program (above) and the Canadian Comparative Lakes Study (Schindler 1971) indicating the importance of nutrients and other dissolved substances. Nonetheless, after more than 100 publications and demonstration that it has good predictive power, the underlying mechanisms remain unclear (O’Brien 1990).

Successful use of the MEI depends on meeting a fairly stringent set of assumptions or criteria (Ryder 1982). Water bodies need to be in similar latitudes and have other major similarities. Climatic variability (e.g., wide differences in mean annual air temperature) will cause the MEI to be less predictive than climate (Schindler and Regier 1982, who analyzed 43 intensively fished lakes worldwide). The index works better for comparisons among lakes in the same region. Major limnological anomalies disrupt the MEI correlations. The authors readily admit that the MEI is an attempt to simplify among the many environmental factors that influence the productivity of natural lakes (and reservoirs, by extension), and ultimately the yield of fish. The MEI is an attempt to bridge the gap between ecological theory and management application, in a way that may seem overly simplistic. It is a reasonable compromise between "unimaginable complexity" and "ecological oversimplification" (Ryder 1982). It is intended as " a rapid, first-approximation answer to fisheries yield problems."

When applied to reservoirs by the National Reservoir Research Program (Jenkins 1982; see separate section), the relationship of the index to sport fish harvest was curvilinear, with maximum yields expected at index values of 50 to 100. Fish standing crop in 290 reservoirs was also significantly correlated with MEI (curvilinear), with maximum crops expected at values of 50 to 200. The relationships differed by reservoir type, predicted crops were higher in mainstem reservoirs and lowest in non-hydropower reservoirs where sulfate-chloride ions were dominant (Figure 3-13).

We used data from one of the publications on MEI to further examine the effects of reservoir retention time on fish production. One apparent underlying assumption of the mechanisms behind the success of the MEI is that phytoplankton production is greater in lakes with high TDS (and thereby high nutrients). Adams et al. (1983) set out to test this assumption by examining the trophic dynamics of fish production in 17 southeastern reservoirs. The reservoirs chosen for analysis were those in the U.S. Reservoir Research Program that had physical reservoir data, fish production data, and primary production data. We used their data and extensive analysis of trophic energy and carbon transfer to fish populations to examine the effects of reservoir water retention time. Retention time would be a surrogate for water withdrawal rate from a CWIS, assuming that all organisms were killed by the CWIS (longer retention times would correspond to low amounts of cooling water withdrawal per volume of water body). The trophic analysis of Adams et al. was detailed, and mostly related to testing the hypothesis of dependence of fish production on phytoplankton production (which it wasn't). We found fish production in the 17 reservoirs they analyzed to be inversely related to retention time (the longer the retention time, the lower the fish production), although the relationship was weak, especially when one highly productive reservoir was removed from the data set (Figure 3-15). Retention times were as low as 3 days (Nickajack Reservoir, Tennessee) and as high as 489 days (Moss Reservoir, Texas).

The relevance to cooling water use of the MEI and the historical attempts to find simple indices for predicting fish production in freshwater bodies lies in (1) the apparent low ranking of withdrawal rates (as flushing times) in determining fish production in lakes and reservoirs, (2) the apparent success of the simple MEI (without considering withdrawal rates, but concentrating on TDS and water depth) for making such predictions, and (3) the apparent relationship we found from one set of reservoirs that a higher rate of withdrawal actually may result in higher fish production. From the MEI experience and evidence, we can conclude that an hypothesis for a high importance of water withdrawal for determining fish production is not supported, and that factors other than water withdrawal predominate. A dose-response relationship between fish productivity and water turnover rate does not appear to hold, or the effects are below an effects threshold.

3.4 Reservoirs with High Entrainment and Observed Effects

An essential element of a dose-response model is demonstration that effects do occur at some levels of the stressor that can be quantified (Bliss 1937; Suter 1993). Bioassays are always conducted across a range of exposures from those where effects are clear to those where the effect is not detectable.

Demonstration of effects at high levels may allow definition of the dose-response relationship (that is, the quantity of response associated with a quantity of the exposure) and, with adequate data, indicate a threshold level below which there is no effect. If all data were from exposure quantities below the threshold (i.e., no effects could be demonstrated), then there would be little basis for understanding any quantitative relationships between exposure dose and biological effects. Thus, we sought examples of demonstrated effects of entrainment on fish populations. This was not to suggest that these situations would be typical but that they indicate the high end of dose and effect in our "bioassay" compiled from many water bodies and intake systems, including hydropower. From these examples, the mechanisms that create effective doses can be made clearer for application to CWIS. This context is vital for understanding what follows.

Entrainment losses of fish through large hydroelectric facilities is a familiar problem that is stimulating research and development to find solutions (Maiolie et al. 2001). Some reservoirs, such as that behind Grand Coulee Dam on the Columbia River (Lake Roosevelt, Washington, discussed in more detail below) have flushing rates sufficiently high that populations of reservoir fish (in that case, kokanee and rainbow trout) are severely impacted. Such reservoirs are able to maintain fish populations large enough to provide a fishery only after continual stocking from hatcheries and rearing net-pens to make up for the entrainment losses. Effects of entrainment on reservoir fish populations and communities at other dams are presumed to grade to lesser degrees from extreme situations such as at Grand Coulee, with a potential for identifying threshold withdrawal rates for inducing impacts on reservoir fish populations and communities.

In large western reservoirs, kokanee (landlocked sockeye salmon) seem particularly susceptible to entrainment. High losses of kokanee have been reported not only at Grand Coulee Dam (Lake Roosevelt) in Washington (Spotts et al. 2000) but at Libby Dam in Montana (Skaar et al. 1996), Banks Lake in Washington (Stober et al. 1979) and Dworshak Reservoir in Idaho (Maiolie and Elam 1998). High vulnerability to entrainment is likely a characteristic of this species, as discussed further below. Rainbow trout are also entrained in large numbers by dam discharges, and have been augmented by hatchery operations at Lake Roosevelt in order to maintain a fishery (Underwood et al. 1996). Summaries follow of these situations in which entrainment is known to affect reservoir populations.

Grand Coulee Dam (Lake Roosevelt) - Lake Roosevelt, formed by impoundment of the Columbia River by Grand Coulee Dam in north central Washington state, is unique among large impoundments due to its size, seasonal variation in flow, and the magnitude of annual manipulation of the water level (Wilson et al. 1996). The reservoir inundates 335 square kilometers, is approximately 112 m deep at the dam, and has a full-pool volume of just under 12 billion cubic meters. Lake Roosevelt is characterized by intense annual drawdowns to supply water for hydropower operations at downstream dams and for flows to support salmon migrations. Reservoir water level is reduced an average of 24 m each year, with the mean depth lowered by an average of 7 m. Surface area and lake volume typically drop to 55% and 45% of their full pool values, respectively. Water residence times vary greatly through the year, approximately 70 days in stable full-pool situations to as low as 10 days during the late winter and spring drawdowns. Water volumes released during drawdowns are large, often above 150,000 cfs (97,000 MGD). Despite its large size, this reservoir more closely resembles what one would expect from a regulated reach of a large river than a reservoir or lake. For contrast, Pace et al. (1992) states that water residence times in large lakes typically exceed 1,000 days, in large impoundments just above 500 days, and in regulated reaches of large rivers an average of 18 days.

It is apparent that entrainment of fish through Grand Coulee Dam occurs to a significant degree, depending on species and water year (LeCaire 1999). Based on relative abundance, it is suspected that entrainment of kokanee exceeds that of rainbow trout, although both are entrained (sampling difficulties make species identification difficult). Evaluation of the additional third powerhouse by Stober et al. (1979) indicated that the penstocks were positioned to coincide with the depth distribution of kokanee and thus cause significant entrainment. Reservoir entrainment rates have been indirectly estimated from tag returns of rainbow trout by the Spokane Tribal Fisheries, hydroacoustical estimates at the dam's penstock intakes conducted by the Colville Confederated Tribes, and hydroacoustical pelagic estimates in the reservoir conducted by the Washington Department of Fish and Wildlife. These data are reported to the Bonneville Power Administration (Portland, Oregon) in a series of annual reports and project proposals by each agency (from which this summary is derived). Use of hydroacoustical techniques from 1996 to 1999 yielded estimates of 1.5 million fish lost (smolt size or larger). Monthly entrainment totals ranged between 2 and 16% of the reservoir-wide offshore abundance estimate for the month. When totaled, this amounts to 22-88% of the fish stocked to the reservoir each year (uncertainties of estimation are large). Abundance in the reservoir was strongly correlated with the entrainment rate the month before. Few 3-year-old kokanee remain in the reservoir.

Entrainment of kokanee is aggravated by a tendency of this species to migrate in the spring. There is evidence that the landlocked fish still go through a "smolting event" that replicates the physiological changes experienced by sea-run sockeye salmon. One to 3 year-old juvenile fish apparently seek the outflows and will pass through the turbines at the time of short water retention times produced by large spring draw-downs. More 3-year-old kokanee derived from Lake Roosevelt have been recovered downstream of Grand Coulee Dam in years with major drawdown than in years with minor drawdown.

Current research by the Lake Roosevelt Fisheries Evaluation Program (BPA Project 1994044300; Cichosz et al. 1999) is evaluating alternative reasons why the kokanee population in Lake Roosevelt is not self-sustaining and must be continually augmented by hatchery-raised fish. Although several factors have been considered, entrainment of kokanee is believed to be the primary reason. As a result, a program to deter entrainment using strobe lights at the penstock entrances is underway (funded proposals by BPA Project 199501100).

A comparable pattern exists for rainbow trout, which occur in Lake Roosevelt as both wild and hatchery-derived fish. Wild fish appear to more successfully maintain a sustaining population than introduced fish, constituting about half of the combined abundance in the reservoir but less than 10% of the catch. In 1998, all rainbow trout contributed 64% of the fish catch of all species in the reservoir and 98% of those harvested were from hatchery fish reared in net pens (Spotts et al. 2000). Most net-pen fish are caught in the same year as they are released.

The percentage of net-pen-raised rainbow trout that are entrained appears to be strongly related to reservoir retention time and the drawdown-refill scenarios at the time when fish are released into Lake Roosevelt (Cichosz et al. 1998). Historically, fish were released in spring or early summer, at a time of strong drawdown (March-April) followed by refill (May-June). Experimental releases at other times suggested that high entrainment rates can be expected whenever water retention times are less than 20 days, regardless of time of release. When retention times shorter than 20 days are predicted, there is an advantage to releasing fish later in the year (e.g., June). Interannual comparisons also show distinct relationships of fish populations with water retention time. Spring drawdowns in 1990-1991 and 1996-1997 resulted in low reservoir water levels, water retention times below 30 days, and a poor fishery (based on creel census data). In contrast, 1992 through 1995 had higher mean reservoir elevations, longer retention times, and a better fishery.

The situation at Grand Coulee Dam and Lake Roosevelt has clear site-specific and species-specific attributes that make generalizations to a dose-response model among water intakes difficult. However, the case study shows clearly that entrainment of some fish species can occur at rates that are detrimental to maintaining sustaining populations, even with hatchery augmentation. The situation clearly illustrates the seasonality of entrainment and its effects. Annual average water retention times are a less fruitful statistic for evaluating entrainment effects than are monthly retention times as affected by seasonal water drawdown-refill patterns and the seasonal life-history characteristics of the species affected. The emphasis on site-specific factors affecting entrainment and its effects is perhaps the main lesson from this high-end case.

Libby Dam (Lake Koocanusa) - Another high-end case with demonstrable biological effects of entrainment is Libby Dam, Montana. Libby Dam is located on the Kootenai River, a tributary of the Columbia River, near Libby, Montana. The reservoir, Lake Koocanusa, is 154 km long and 100m deep at the dam at full pool. The normal storage is about 5.8 million acre-feet. All outflow is passed through turbines after entering a selective withdrawal system. Unregulated inflow from the Rocky Mountains of Canada and the U.S. peaks in mid-May through late July (30,000 to 65,000 cfs in 1991-1994) whereas outflow is minimized at that time, resulting in reservoir filling (4,000 to 25,000 cfs) (Skaar et al. 1996). Regulated outflows (4,000 to 28,000 cfs; 2,585 to 18,100 MGD) occur in fall and winter with a spring pulse to aid white sturgeon spawning in the downstream reach. Inflows at that time of year were about 3,000 to 5,000 cfs in 1991-1994, resulting in reservoir lowering. Water retention time in the reservoir would thus vary in a complex, seasonal manner related to drawdown and filling cycles. The entrainment study (Skaar et al. 1996) did not calculate water retention times for the reservoir. However, we estimated the retention times to vary from about 780 days at low outflow rates (4,000 cfs) to 125 days at high outflow rates (25,000 cfs), assuming nearly full pool.

Fish entrainment is significant. Kokanee is the predominant species entrained (97.5%), although 13 other resident species were captured in nets placed over the turbine discharges. Young-of-the-year kokanee predominated (74%) while ages one and two comprised about 13% each. Diel patterns of entrainment were identified by hydroacoustic measurements. Fewer fish were entrained in daylight (22%) than between sunset and sunrise (78%). Entrainment increased immediately after sunset and peaked in the 2-3 hours before midnight, followed by steady numbers until sunrise. Extrapolation of periodic hydroacoustics and netting provided estimates of annual entrainment ranging from 1.15 million fish to 4.47 million fish, depending on assumptions (the higher figure was deemed more reliable, for it used extrapolations between adjacent temporal entrainment data points rather than an annual average entrainment rate for unsampled times). These numbers compared to an estimated 4.78 million fish in the reservoir, as estimated by hydroacoustic sampling (23 to 92% of the total kokanee population was estimated to be entrained, respectively). Entrainment rate was most closely correlated with forebay fish density at 10-20 m depth, although there were significantly more kokanee entrained at high volumes of withdrawal than at lower volumes. There were seasonal trends in entrainment, with spring and fall having the highest rates. In spring, fish densities in the forebay are high and located at depths close to the penstock intakes. In fall, entrainment was high largely because of the high rates of discharge.

Population effects on kokanee were shown largely by density-dependent growth and sizes attained. Larger fish resulted when entrainment was high, presumably due to fewer fish preying on the zooplankton food base. Although large fish are desirable for angler interest, too few can cause population collapse. Management use of entrainment rates to regulate fish size for anglers was suggested.

Although the study by Skaar et al. (1996) did not analyze entrainment in terms of water retention time, as had studies of Grand Coulee Dam, there are several points of agreement between them. First, entrainment can affect fish populations in the reservoir, at least to the extent that density-dependent processes such as growth rates are affected. In the Libby case, population sustainability limits were not reached, however. Second, entrainment is a complex matter, varying daily and seasonally. The reservoir management cycles of drawdown and filling, and their necessary effect of varying retention times, have a strong influence on entrainment losses from the reservoir. From the perspective of a dose-response model, the Libby Dan situation is less severe than Grand Coulee. However, quantifying that "dose" is difficult.

Banks Lake (Washington) - We did not examine the study of Banks Lake by Stober et al. (1979 cited in Skaar et al. 1996). However, Skaar et al. (1996) noted that primarily kokanee of ages 2, 3, and 4+ were entrained. An estimated 60 and 75% of the kokanee population was entrained in 1975 and 1976, respectively. Weekly entrainment sampling over a 4-year period showed kokanee entrainment to be erratic. Entrainment appeared to be related to the volume of water withdrawn (which changed markedly due to irrigation demands), maturation state of the kokanee (tendency of smolt sizes to migrate downstream), and feeding movements that brought fish near the lake's outlet.

The relevance for 316(b) is that the biological effects of entrainment can be viewed as a dose-response problem, with definable effects at the high end of the scale for flushing or turnover rates. Turnover rates are applicable to CWIS on lakes and reservoirs although those for CWIS are generally much lower than seen in these examples. These examples illustrate the importance of seasonal site-specific factors, both reservoir filling-drawdown schedules and the vulnerability fish species of concern for determining the amount of entrainment and its biological effects.

3.5 Fish Control Programs

In principle, fish control programs, i.e., programs in which certain species are targeted for reduction or elimination (or are unintentionally reduced by adverse environmental episodes), could be seen as analogues of CWIS that irretrievably withdraw fish from a water body. In such a hypothesized analogy, the population-level effects of reductions in fish numbers through control programs could shed light on population-level effects of cropping by power stations. In both cases, the biological remains (dead fish) often persist in the waterbody. The responses of fish populations to control measures may also fit a dose-response model, in which the population effects are proportional to the quantitative losses due to eradication measures, with some threshold of eradication effort necessary for any population effects to be seen. The suggested analogy with CWIS and a dose-response model is not perfect, for control programs often occur over broader areas than in the localized zone of a power station intake, and usually have been tested for one-time or a few controlled kills rather than the chronic fish removals at CWIS. They also do not necessarily discriminate among life stages, as do entrainment and impingement at a CWIS. Nonetheless, we felt that the analogy was worth exploring for whatever could be learned.

Manipulation of forage fish populations to enhance sport fisheries is a common fisheries management practice, with introductions outnumbering removals. Some of the fish species targeted for reduction are also known to be particularly vulnerable to power plant impingement and entrainment. Gizzard shad and threadfin shad are two such species. We examined recent summaries of fish control programs to see if their experiences could be instructive for evaluating CWIS impacts.

Three reviews and one recent field study suggest that the analogy with CWIS and the proposed dose-response model is difficult to pursue to a useful conclusion for assessing the effects of CWIS (Lennon et al. 1970; DeVries and Stein 1990; Meronek et al. 1996; Kim and DeVries 2000). The status of chemical control efforts up to 1970 were reviewed by Lennon et al. (1970). They reviewed many successful and unsuccessful fish-removal projects, but did not quantify success rates. In a second review, removals of shad (partial removals, in practice) were concluded to be far less powerful for eliciting a response in the fish community than were additions (stocking) of shad to previously shad-free environments (DeVries and Stein 1990). Even so, 65% of the removal studies reviewed believed that they had successfully documented lowered shad populations. There was little longevity to the effects, however. Because shad are extremely fecund, DeVries and Stein (1990) concluded that effects of a 50% reduction in the adult shad population may only be measurable over a single season. By the following year, a large forage-fish year-class could return the population to its original size. Any trends in secondary effects of shad removal (e.g., on game species) were even more difficult to discern from the 14 removal studies reviewed by DeVries and Stein. Target game species experienced a mixture of positive, neutral and negative effects from shad removal. Strong, sustained fish removals are required to detect system responses. Part of the difficulty in discerning effects is the poor quality of the studies, a point made strongly by DeVries and Stein. Few fish manipulations that are undertaken as fish management strategies include a reference water body, adequately monitor before and after the manipulation, use statistical approaches to data analysis, adequately consider the trophic dynamics of altering a part of the food web, or consider how spatial heterogeneity affects community interactions. From the perspective of applying these data for CWIS analyses, we note that they also did not adequately relate the fish-removal effort to physical attributes of the water body, such as volume and rate of water turnover, which we could relate to cooling-water use, entrainment and impingement.

A broader range of species removals was analyzed by Meronek et al. (1996). They reviewed 250 fish control projects from 131 papers, including chemical applications, physical removal (nets, traps), reservoir drawdowns, stocking of predator fish, and combinations. Species included 13 game fish species, 15 panfish species, and 31 rough or forage species. Success was judged by changes in standing stock, growth, proportional stock density (PSD), relative weight values, catch or harvest rates, and other benefits such as angler satisfaction. Reduction in standing stock was the most common determinant of success. Perhaps the most germane result for CWIS considerations was that less than half of the control programs were viewed as successful (43%). Combined chemical and physical methods made for success in 66% of the projects. Waterbody size (0.2 to >400 ha) made no difference in the results of chemical treatments but there was greater success for physical treatments in larger water bodies. The focus of the Meronek et al. review was, as for DeVries and Stein (1990), on how to improve control procedures, not on the resilience of fish species' populations. Nevertheless, their review highlighted the differences in susceptibility of species groups to different control measures. Somewhat surprisingly, there was more success at reducing rough fish populations than either of the more valued panfish or game fish (panfish and game fish are often removed to reduce stunting and increase individual growth and size when numbers are too high for the food base).

A recent study (Kim and DeVries 2000) highlighted the rapidity with which fecund forage species, which are often impinged and entrained at CWIS, can rebound from removal. Within 2 years of a reduction in a population of gizzard shad in a 66-ha Alabama lake, their abundance rapidly returned to high levels. When density was low after population reduction, larvae and juveniles experienced rapid growth. When density was higher in a later year, growth rates slowed. We note that this density dependence is an excellent example of compensatory mechanisms operating to offset higher mortality (an argument commonly used in 316(b) demonstrations). However, slower growth rates of shad when populations were high favored transfer of energy to largemouth bass; the bass had a longer time period when the juvenile shad were of a size vulnerable to predation. The authors stress the importance of the secondary trophic interactions. The rapid population rebound and trophic consequences of the reduction were paralleled in threadfin shad, which repopulated rapidly after a massive winter kill in Watts Bar Reservoir, Tennessee (McLean et al. 1985).

About the most that can be concluded from the literature on fish control projects with reference to CWIS is that it takes a lot of fish removal to successfully reduce most fish populations and that a strong and persistent removal is necessary or the populations will quickly rebound. In other words, a very high and persistent “dose” of removal is needed to obtain much response. Both situations may occur with some CWIS, and have certainly occurred for commercial species that have been over harvested. Responses differ among species. The trophic responses in the fish community to reductions of forage fish like shad species need to be carefully considered as well as the populations primarily affected. These can be only general conclusions, because available fish-control experiences are not well quantified as research experiments. Also, the focus on population control for sports fish management has not created an incentive to relate the control procedures or the results to physical features of the waterbody of interest to CWIS analyses (waterbody volume, rate of water turnover, etc.). Quantitative criteria for successful fish control (a dose-response relationship) are lacking for transfer to CWIS regulations. Nevertheless, the similarities between intentional fish reduction practices and unintentional losses through entrainment and impingement are potent for understanding how fish populations and communities function. A closer collaboration between these two activities might yield more quantitative information on how much loss can be sustained without population decline (for CWIS regulations) or must be inflicted in order to cause persistent population reductions (for control purposes).

The available summaries of fish control programs indicate that a large-scale, continuous removal is necessary in order to have an impact on many of the controlled fish species. In other words, the threshold dose for fish removal is high. Populations of fecund species like gizzard shad rebound quickly from major losses in numbers. Episodic losses, such as those that often occur through CWIS impingement, are most similar to intermittent fish control programs and are unlikely to have lasting effects on populations. Episodic events at CWIS usually involve species with high abundance and with high reproductive potential (e.g., Clupeid species). It is these characteristics that have limited the success of many fish control programs. The belief that high losses at CWIS create long-lasting and ecologically significant effects on fish populations is not supported by the evidence from fish-control programs.

3.5 Summary

One objective of this study was to identify an intake rate or intake-to-volume ratio (or residence time) that might serve as a threshold above or below which, respectively, an impact would be unlikely. Obviously, such a threshold would be species specific, but given the range of residence times in our analysis we were hopeful of some indication of a threshold for the systems and species we included. Above a residence time threshold we might expect other factors (e.g., habitat, food availability, presence of predators, etc.) to be more important in dictating abundance. Entrainment rates of rainbow trout in Lake Roosevelt were low or non-existent at residence times greater than 35 days, moderate at residence times between 20 and 35 days, and high at residence times less than 20 days (Cichosz et al. 1998; Figure 3-16). Similarly, largemouth bass year class strength as measured by catch curve residuals in Tennessee River reservoirs was fairly constant when residence times exceeded 25 days, declined gradually from 25 to 10 days residence time, and declined more sharply at residence times below 10 days (Maceina and Bettoli 1998; Figure 3-17). With a little imagination, a similar pattern can be seen in the relationship between the short-term Spring residence time and the community index (RFAI) for the Tennessee Valley reservoirs presented in this study. The decline in RFAI begins at a residence time of 45 to 50 days (Figure 3-18). Perhaps a residence time of 25 to 50 days would emerge as a valid threshold if further analyses were directed toward reservoirs in this range of residence times.

Although an effects threshold would be useful as a preliminary screening tool, it is important to note that exceedance of the threshold does not necessarily mean population-level impacts. Data collected during the course of this study indicate that high intake rates and high fish abundance are not necessarily mutually exclusive. Figures 3-4 to 3-6 include data from six Texas lakes that are used to provide cooling water to power plants, release only negligible amounts into receiving streams, and have annual residence times (based on CWIS intake rates only) as short as 8 days. Some of these lakes support fish populations that are among the highest observed in the data set (see Figure 3-5A).

Although the analysis presented here failed to produce clear generalizations regarding the relationship between volume of withdrawal and population- or community-level effects, we believe the evidence from this and other studies suggest that such a relationship often exists, but is dependent on a variety of other factors. These factors include species-specific (and life-stage specific) susceptibility, intake design and location, population-level compensatory mechanisms, and water body type. Likewise, the selection of a threshold that could be used as a screening tool to identify those facilities that might cause impacts versus those that are unlikely to cause impacts would also likely be specific to water body type, species (or species type), and other considerations.

Lastly, we believe that using reservoir releases as a surrogate for CWIS intakes to investigate the relationship between withdrawal volume and population effects is a useful approach. Future studies along these lines should investigate which set of flows (i.e., which months and how many years in the past) is most related to the abundance of the population being sampled. Being able to more precisely identify which life stages are affected by increased flow and what ecological mechanisms are operating will make identification of threshold flows more possible.

EPA Response

Please see response to Comment 316bEFR.041.037.

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Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

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Overview of I & E effects on organisms

APPENDIX E-2:
VOLUME-RELATED CASE STUDIES

As we investigated the contribution of water withdrawal as a factor affecting fish populations, we revisited several past studies for insight. Although the five studies presented below all had different objectives, they each address fish removal and population response in one form or another. The six studies presented in this section include:

-findings from about 25 years of study of Hudson River fish populations affected by several power plants with large volumes of water withdrawal.
-findings of a Nuclear Regulatory Commission analysis of entrainment and impingement at CWIS as two of the potential biological problems being faced by power plants.
-findings of a team of researchers in The Netherlands on entrainment and impingement at several power stations using once-through cooling located on the extensive river and reservoir system in that country (Hadderingh 1978; van Densen and Hadderingh 1982; Hadderingh et al. 1983).
-a summary of fish population trends in Lake Wheeler, Alabama, pre- and post-operation of the Browns Ferry Nuclear plant.
-findings from a comparative ecological study of an Illinois lake used for cooling and similar non-cooling lakes.

5.1 Hudson River

Several power plants and other water intakes are located on the 243-km-long (151 mile) Hudson River Estuary between Albany, NY and New York City. They include major electricity generating power plants (Bowline Point, Indian Point, and Roseton) as well as smaller power plants (Lovett, Albany Steam Plant, Danskammer, 59th Street Station) and other cooling-water intakes (Empire State Plaza in Albany and the Westchester Resource Recovery Plant). Table 5.1 shows the locations, start-up date, and permitted cooling-water flows for each facility (Hutchinson 1988; CHE&G 1999). We calculated that, in aggregate, these power plants are permitted to recirculate 24.35 x106 m3 of Hudson Estuary water per day (6,433 MGD), or 1.024% of the 2,378.8 x106 m3 volume of the estuary per day (data from CHG&E et al. 1999). At this withdrawal rate, the entire estuary would be turned over by the power plants in 98 days (which is the residence time, assuming a static volume unaffected by tidal or freshwater flows). In comparison, the average daily freshwater inflow at the upper end of the estuary is 35.9 x106 m3 (9,485 MGD), the average daily tidal flow is near 600 x106 m3 (158,000 MGD), and the net outflow (total outflow minus tidal excursions) is 49.9 x106 m3 (13,200 MGD)(Cooper et al. 1988). Thus, the cooling-water facilities daily recirculate slightly less than the average primary daily freshwater inflow, about 4% of the average daily tidal exchange, and about half of the daily net outflow of the estuary.

Due to the large length of the Hudson River Estuary, it is informative to examine the withdrawal statistics for one particular segment (RKM 56-93) that contains three plants in close proximity (Bowline Point, Indian Point and Lovett). These three facilities are permitted to withdraw 15.9 x106 m3 per day (4,200 MGD), which amounts to about 2.5% of the volume of the segment (647.2 x106 m3).

[see hard copy for table]
Table 01
Power plants on the Hudson River, with location (river miles from the Battery in New York City) and water withdrawal rates (CHG&E et al. 1999).

There was intense controversy over the initial permitting of the largest of these plants in the 1970s, because their CWIS were located in zones of the estuary where large numbers of fish eggs and larvae would be entrained and juveniles impinged, especially striped bass (Barnthouse et al. 1988). Modeling of fish populations was the main technique used to estimate long-term effects of losing eggs, larvae, and juveniles during entrainment and impingement. The parties disagreed on the models to be used and the numerical values to be used for model elements. A settlement agreement among the plant developers and regulatory agencies (primarily the USEPA and the New York Department of Environmental Conservation) allowed the proposed plants to be built and operated with flow restrictions to minimize entrainment and impingement. Extensive monitoring of key species in the estuary was required.

As a result of the monitoring requirements, the Hudson River now has one of the most complete data sets in the country on the stock status of key species and on the composition (species richness and diversity) of the aquatic community, extending for over approximately 25 years. Empirical data on fish population performance during decades of entrainment and impingement provide the main evidence for any effects (or lack thereof). In addition, there are multiple data sets for many key system attributes (e.g., juvenile abundance indices from independent sampling programs by the utilities and the NYDEC) that provide mutual confirmation of results. The results to 1998 are summarized in CHG&E et al. (1999). Population modeling has improved, as well, allowing this analytical approach to supplement the empirical data.

The empirical data can be evaluated using explicit “risk hypotheses,” in accordance with guidance from EPA for conducting ecological risk assessments (EPA 1998). These hypotheses recognize that an estuary is a variable and complex environment, with many changes occurring over the 25 or so years of monitoring besides presence of CWIS. Testing of the explicit risk hypotheses helps separate changes in fish population abundances that are due to cooling water withdrawals from those that result from other causes. The evidence for testing these hypotheses is presented in CHG&E et al. (1999) and is confirmed for economically important species by stock assessments by the Atlantic States Marine Fisheries Commission (ASMFC), which follows stocks in order to regulate harvest. These hypotheses are:

1. Populations of species that are vulnerable to entrainment and impingement will show a general decline in abundance over the period of record since cooling water has been withdrawn;
2. Populations of the most vulnerable species will have declined more than populations of species that are less or not vulnerable to entrainment and impingement;
3. Loss of vulnerable species will be reflected in altered community composition as measured by species richness and diversity; Abundance of predators and prey will reflect secondary effects of entrainment and impingement, with loss of prey species (e.g., bay anchovy) from entrainment and impingement being reflected in fewer predators (e.g., striped bass) or declines in predators due to

entrainment and impingement effects being reflected in more abundant (non-eaten) prey.

Differences in population effects as a result of differences in vulnerability to entrainment and impingement among species would constitute a test of a dose-response model. Vulnerable species would be receiving a higher dose of entrainment and impingement relative to their population sizes than would less vulnerable species.

The evidence indicates that none of the risk hypotheses is supported by the long-term data, although some data sets are ambiguous. The major species of concern, striped bass, has exhibited an increase in adults and post yolk-sac larvae (PYSL) since the mid 1970s, and a fluctuating but overall trendless abundance of juveniles. The increase in adults is generally attributed by biologists to reduced harvest since the 1980s, allowing more reproductive-age fish to remain in the river. Despite entrainment, PYSL have increased in proportion to abundance of adults. The lack of trend in juvenile striped bass suggests that the increase in cooling-water use during the period is masked by underlying limits to the carrying capacity of the system for rearing PYSL to the juvenile stage. White perch are less vulnerable to entrainment because they reproduce farther up the estuary than the zone with most entrainment, yet they have little trend in abundance (perhaps a slight decline). They do not show less of a decline than that of striped bass, as the second risk hypothesis would suggest.

Atlantic tomcod, a species with a short life cycle (generation times of 1-2 years) and having vulnerable life stages in the vicinity of major CWIS, has declined, but only since about 1990. This decline correlates better with other changes in the ecosystem than with commencement of operation of the CWIS in the 1970s. American shad spawn in the uppermost parts of the estuary and are vulnerable to most CWIS withdrawal during fall out-migrations. There is some slight decline in stock abundance since 1990 that is not correlated with CWIS (abundance increased during onset of most cooling-water use). The river herrings (alewife and blueback herring) show some decline, similar to American shad. Stocks were depleted by overfishing in the 1960s and 1970s according to the ASMFC, resulting in low coast-wide stocks. Tributary access for spawning has been restricted by dams, especially for blueback herring. There is no evidence that the declines in these species are correlated with CWIS use. The main prey species, bay anchovy and spottail shiner show no trends in abundance and remain stable.

Species richness and diversity show little trend. Ichthyoplankton shows a general increase whereas young-of-the-year and older show slight decreases. The slight reduction shows little relationship to CWIS use, being mostly caused by decline in freshwater species in the upper, less saline estuary (attributed by some analysts to increase in abundance of invasive water chestnut and zebra mussel). The species that dominate the ichthyoplankton (a segment of the community showing increasing richness and diversity) are those most vulnerable to entrainment, thus exhibiting a response opposite to that hypothesized for CWIS influence. Both predator and prey species in the estuary have largely stable populations, and do not show the reciprocal increases and decreases hypothesized under the influence of CWIS.

Thus, the lack of support for the risk hypotheses from the exceptionally complete 25-year data set is persuasive evidence for biologists that CWIS on the Hudson River Estuary are not causing adverse effects to the key species or the aquatic community. Despite the large volumes of cooling water used, and the large numbers of individual fish eggs, larvae, and juveniles entrained or impinged, the amounts of water and organisms affected relative to the entire waterbody (or one segment where most influence occurs) are small and the biological effects undetectable at the population and community scales. Viewed in the perspective of a dose-response model, the losses to entrainment and impingement appear to be below the effect threshold for effects for either the whole Hudson River estuary or for the segment nearest the largest power plants.

In principle, the empirical data set also might be useful for comparative purposes among CWIS on the Hudson. Different-sized CWIS might give an indication of the relative influence of intake volumes on several parameters of fish effects (e.g., numbers of fish withdrawn, conditional entrainment mortality, and conditional impingement mortality). In effect, we might be able to see a dose-response pattern among the several Hudson River estuary CWIS. The data in CHE&G (1999) were not very useful for that sort of analysis. This is because the CWIS are distributed over a long distance of the estuary and the vulnerable fish species and life stages occupy distinct zones along this large geographic gradient. For example, striped bass spawning, eggs, and larvae occur near Indian Point but not near the Albany Steam Station. Thus, the several CWIS are not comparable in many biological respects. The smaller CWIS (Albany Steam Station at Albany, NY and the 59th Street Station in NYC) are located at the geographic extremes, with more similar and larger CWIS clumped midway. Also, the CWIS for the Bowline Point plant is located on an embayment off the main Hudson River channel, which contains biological populations and hydraulic characteristics quite different from those near the CWIS of the other plants. We concluded that the value of these CWIS for conducting comparative, dose-response analyses of the influence of water withdrawal volumes is highly compromised by these other variables. A more detailed analysis for this purpose was not conducted.

The Hudson River situation has, however, spawned a novel way to ameliorate the entrainment and impingement of fish by modifying the volume of water withdrawn by several power stations on the same water body during the species' time of most vulnerability (CHG&E et al. 1999). The approach is generally analogous to the concept of "effluent trading" in application of the Clean Air Act, as discussed further below. Although each of the power stations has some form of structural reduction of entrainment and impingement mortalities (e.g., Ristroff screens at Indian Point, barrier net at Bowline Point), the stations together have proposed implementing a river-wide system of Fish Protection Points (FPPs) to guide cooling-water volume reductions and potentially the scheduling of plant outages for maintenance.

Fish Protection points are an evolution of the Settlement Agreement between utilities and the Environmental Protection Agency in the early 1980s. In the Settlement Agreement, the power stations agreed to cease or reduce generation and its cooling-water withdrawal between certain dates when entrainable fish eggs, larvae and juveniles were in the River (primarily spring and early summer). This volume reduction was deemed the best way to minimize fish losses and still maintain generation through much of the year. In effect, a dose-response model was being applied, and the "dose" (volume of water and its contents of entrainable organisms) reduced during critical time periods. The on-off cycle was entirely dependent on the calendar and knowledge of when the concentrations of entrainable fish life stages were usually highest. The concept of FPPs takes this approach further toward technical accuracy by controlling the on-off cycle of plant operation according to the actual abundance of these organisms in real-time. Fish abundance and numbers projected to be saved by outages are calculated as accounting "points." Further, it allows a trading of "off" times among power stations according to calculations of the value of the "off" time for saving fish based on numbers of entrainable organisms present (FPPs). Further, and controversially, the current generators propose to allow the FPPs to be averaged over a 10-year period so that the average level of protection equals or exceeds that of the original Settlement Agreement. A system based on FPPs would allow more operational flexibility than date-specific outages or flow reductions.

Aside from the 10-year averaging, the concept of riverwide FPPs to be appropriated both volumetrically and temporally by the several power stations is akin to regional trading of air-emissions. The generators can negotiate among themselves which facility or facilities will have an outage or targeted flow reduction at any one time in order to meet the river-wide FPP requirement. Permitting with FPPs would dictate the overall outcome, while leaving the implementation more flexible among facilities. With several fish species involved, each having somewhat different seasonal timing and spatial distribution, the allocation of outages among facilities (having different locations and different withdrawal volumes) can, at least in principle, accommodate the many differences in a way most beneficial to the biology and to power generation.

The down-side of attempting to match cooling-water use to actual spatial and temporal differences in species' abundance is that the control system might become overly complicated and too cumbersome to be effective. The Draft Environmental Impact Statement prepared for re-permitting under the NY discharge permitting system (CHG&E et al. 1999) recognizes this difficulty. Several workshops have been held under the auspices of the NY Department of Environmental Conservation (DEC) and the generators to expand understanding and to work out details of proposed implementation. The DEC has hired an independent consulting firm to thoroughly evaluate the proposal. The outcome of acceptance by the regulators is still unclear.

Relevance for Section 316(b)—The Hudson River Estuary is instructive for questions of using CWIS volume as a regulatory tool. Undeniably large CWIS in terms of water volume withdrawn (and numbers of eggs and larvae entrained) can have little cumulative impact on long-term trends in fish populations or community composition when long-term records are available for examination. The essential functional feature of the CWIS scenario appears to be the percentage of the source water withdrawn, which was low, resulting in biological effects that were, therefore, undetectable. In the words of a dose-response relationship, the doses were below threshold for population effects.

5.2 Nuclear Regulatory Commission Synthesis

In 1996, the U.S. Nuclear Regulatory Commission (NRC) judged entrainment and impingement at CWIS to be of sufficient concern to resource agencies that these potential impacts should be included in site-specific environmental impact statements for the relicensing of nuclear power plants. The NRC, with assistance from Oak Ridge National Laboratory, prepared a generic environmental impact statement for license renewal of nuclear power plants in the United States (GEIS; NRC 1996). This GEIS included an analysis of entrainment and impingement at CWIS as two of the potential biological problems being faced by such power plants. Natural resource agencies and power station operators nationwide were questioned about their concerns. A rich published literature was surveyed. Five case studies of individual operating power stations representing the diversity of cooling-water sources were reviewed by the NRC study (Arkansas One, McGuire, Cook, San Onofre, and Crystal River), and two that were aggregates of several plants on a single water body (Hudson River, Lake Michigan). The flow data are tabulated in Table 5-2. The EIS recognized that entrainment and impingement are not unique to nuclear power plants, but instead are typical of potential impacts from any large steam-electric power plant using once-through cooling, whatever the fuel type. The intent of the EIS was to identify industry-wide issues and approaches to their solution rather than in-depth, site-specific analyses of any particular situations. The main purpose was to identify aquatic ecology issues that generally would not need to be considered in detail in the license renewal process as opposed to those that may or do need to be considered on a site-specific basis.

[see hard copy for table]
Table 02
Water withdrawal rates for nuclear power plants examined in case studies for the Nuclear Regulatory Commission's Generic Environmental Impact Statement (NRC 1996).

The EIS cautioned that power plant impacts cannot be measured simply; for example, by comparing pre-operational data with post-operational data. Environments are in constant flux even without a power plant, for reasons that often are poorly understood. For example, reservoirs change as they age affecting productivity and species composition, and fish standing crops change from year to year and decade to decade (see separate discussion of the U.S. Reservoir Research Program). Power plants superimpose their effects on a mosaic of background influences. The NRC study identified concerns that CWIS issues may increase as fish population status improves in many water bodies as a result of water quality regulations resulting in more fish being available for entrainment and impingement. On the positive side, most nuclear power plants reviewed had been operating for several years, so effects, both local and system-wide, could be evaluated on the basis of monitoring data as well as predictions.

The results of the NRC analyses "indicates that many of the aquatic resources issues evaluated in the licensing stage [of the nuclear power stations] have not materialized as significant problems." However, "entrainment and impingement of fish … from once-through power plants continue to concern some regulatory and resource agencies. …and will need to be considered in the license renewal application." The concerns and the NRC's results are described further below.

5.2.1 Entrainment

Agencies consulted by the NRC for the generic impact statement expressed concerns about large losses of organisms by entrainment at several power stations (Zion, Salem, Oyster Creek, Indian Point, Calvert Cliffs, Millstone, Yankee Rowe, and Surry). Some of these had unresolved 316(b) determinations at the time (Indian Point, Oyster Creek, Comanche Peak, Salem, and Zion). At other nuclear power plants (Beaver Valley, Susquehanna, Three Mile Island, and Peach Bottom), the U.S. Fish and Wildlife Service expressed concern about future losses of organisms by entrainment as restoration efforts, particularly of anadromous fishes, increase fish populations. In such cases, entrainment analyses conducted at the time of the original licensing would not be valid.

The NRC report concluded that entrainment effects on phytoplankton and zooplankton were minor or nonexistent -- "Because of large numbers and short generation times, impacts of entrainment on phytoplankton and zooplankton have rarely been documented outside the immediate vicinity of the plant and are considered to be of little consequence." No special mitigation has been required for these components of the ecosystem.

The NRC recognized entrainment effects on fish and shellfish as one of the important issues examined in initial licensing of the plants and one that is periodically revisited by permitting agencies for NPDES permits and 316(b) demonstrations under the Clean Water Act. The NRC concluded, "Although significant adverse entrainment effects have not been demonstrated at most facilities, the entrainment of fish and shellfish in early life stages remains an issue at some nuclear plants with once-through cooling."

In a discussion of the combined effects of power plant entrainment and impingement on fisheries resources of Lake Michigan, the NRC GEIS cites regression equations developed by Kelso and Milburn (1979) for annual entrainment and impingement as functions of power plant size (Figures 1-7 and 1-8). The larger power stations, with their larger volumes of water withdrawal for cooling, appear to entrain more fish larvae. The relationship of entrainment to population status is hotly debated, however (Scott-Wasilk et al. 1981). A critical question is whether compensation in the fish populations occurs before or after mortalities incurred during entrainment (if compensating mechanisms operate after entrainment mortalities occur, then the losses are less likely to be significant for the population; if compensating mechanisms occur before the life stage at which organisms are killed, then the results are more likely to be significant). Generally, compensation occurs after entrainment of early life stages.

Among the seven case studies presented in the review, the site-specific circumstances overweighed any clear relationship between entrainment and effects on populations. The degree of concerns expressed by resource agencies, although subjective, did not appear to be proportional to water volumes withdrawn, but to other environmental factors. Thus, there did not seem to be any dose-response relationship demonstrated between entrainment and fish population decline. No-effect thresholds may not have been exceeded and other site-specific characteristics dominated.

5.2.2 Impingement

Impingement was recognized by the NRC EIS as one of the unresolved issues in power station licensing. The NRC concluded, "[O]perational monitoring and mitigative measures have allayed concerns about population effects at most plants, but impingement mortality continues to be an issue at others." Concern is especially high where restoration of anadromous fishes may be affected. The NRC cites cases where significant modifications had to be made to the intake structure to substantially reduce impingement once the plant was operating (Oyster Creek, Salem, Surry, and Prairie Island). Of the case studies presented, only San Onofre appears to have scientifically demonstrated a relationship between impingement and population declines of certain species in the vicinity of the plant (a dose-response threshold seems to have been exceeded).

The NRC GEIS cites Kelso and Milburn (1979) for their development of a relationship between numbers of fish impinged and power plant size (as an index of cooling-water volume) for the Great Lakes. There does appear to be a relationship, particularly for clupeids (Figure 1-8). Kelso and Milburn attempted to relate the total number of impinged fish to population size by using commercial catches as an index (losses amounted to about 25% of the commercial catch by weight). This index was disputed by Scott-Wasilk et al. 1981, who noted that the fishery caught only 2.9 to 23.5 percent of the estimated standing stock, depending on species and year. Thus, the commercial catch was an unreliable, and demonstrably low, estimate of the population sizes with which to compare impingement rates. Commercial catches of 2.9 to 23.5 percent would translate to impingement of 0.7% to 5.9% of a population rather than the 25% estimated by Kelso and Milburn.

Among the other case studies presented, the analysis found no clear relationship between volume of water withdrawal and the occurrence and severity of fish impingement. Other factors, such as water temperature and sharp temperature changes, were believed most responsible. Impingement was recognized by the NRC study as a visible problem that still needed to be addressed, but also that waterbodies on which nuclear power plants were located generally had highly productive fisheries even with the plants operating.

Relevance for Section 316(b)—The NRC study demonstrates the subjective opinions of resource agencies that entrainment and impingement are problems at large nuclear power stations. The hard, quantitative evidence for such concerns is lacking in most cases. No general relationship between volume of water withdrawn and effects on fish populations could be shown (no general dose-response relationship). The NRC report concludes that site-specific analyses are essential because it was site-specific circumstances (often unique) that caused the episodic occurrence of high levels of fish losses.

5.3 Dutch Studies

To test the hypothesis of a dose-response relationship, i.e., show that larger water withdrawals for CWIS cause larger biological effects, one needs a comparative study of several power stations of different sizes. Researchers in The Netherlands examined entrainment and impingement at several power stations using once-through cooling from the extensive river and reservoir system in that country (Hadderingh 1978; van Densen and Hadderingh 1982; Hadderingh et al. 1983). Studies included estimates of numbers of fish and species entrained and impinged, mortality rates by species, differences in entrainment and impingement among six power stations located on different river and reservoir systems, and a detailed examination over a 4-year period of the effects of entrainment and impingement on the first-year fish populations of one reservoir used for cooling. Taken together, these studies illustrate the difficulty in defining a dose-response relationship and in selecting regulatory standards for CWIS from the multi-plant comparisons.

At the Bergum Power Station, Hadderingh (1978) found most fish affected by entrainment and impingement were larvae or juveniles. Numbers of individuals were highest after spawning in spring. Many species were affected, the most abundant being smelt (Osmerus eperlanus), pike-perch (Stizostedion lucioperca), and perch (Perca fluviatalis). There were five other species represented. Nearly all fish entering the cooling system in April and May were entrained, while a shift to impingement was seen as fish increased in size in June. Entrainment numbers dropped markedly in June as natural mortality and growth reduced numbers of entrainable fish. Immediate mortality of smelt ranged 54-90%, averaging 74% for the whole period, with an additional 50% mortality of survivors after 24 hours. For Percidae species, mortality was 18-61%, average 34%, with an additional 5% mortality after 24 hours. Impingement mortality was also species dependent, ranging from 95% mortality for smelt to only 3% for three-spined stickleback (Gasterosteus aculeatus), and Percidae of about 65% (little delayed mortality). It was clear that substantial numbers of fish were entrained and impinged. Because fish numbers at the intake were highest at night when power station load was least, it was suggested that cooling-water flow be reduced commensurate with load to minimize the number of fish entrained and impinged.

A comparative study of six power stations on different Dutch rivers (and compared to other studies of the Bergum station on a reservoir) illustrated strong differences in impingement rates among stations (Hadderingh et al. 1983). Each power station had a unique site plan, although intakes often were located on canals diverging from the main river flow. Flow volumes ranged from 6 to 44 m3/s (137 to 1,005 MGD). The numbers of fish impinged differed greatly, with annual numbers ranging from an estimated 14,000 at the Maas station to 1,400,000 at the Amer power station. Normalized to volume of cooling-water flow, there were similar impingement rates per unit volume at four stations (1-2.5/1,000 m3) but highly divergent rates at two (0.2-0.6/1,000 m3). There was no general relationship between flow volume and numbers impinged among all six power stations but there was a relationship for four of them that was apparent whether the volume of cooling water or the percentage of river flow withdrawn was considered (Figure 5-1). The river sites generally had less impingement than the reservoir site. The number of species ranged from 12 to 25, and was strongly affected by the intensity of sampling at each site. The species differed among stations, with permanently fresh water species dominating (some migratory species were seen). The two stations with especially low impingement rates were both located on the same river (Meuse), which may have had low fish populations. These stations had the next-to-lowest and highest cooling water flow rates among the 7 studied indicating that flow rate was not the controlling factor. However, both stations also had deep intakes, which withdrew water from depths at which few of the surface-oriented fish were present. Most impingement in summer was due to mass appearances of juvenile fish. Such appearances diminished as fish grew in capability to avoid the intakes and the numbers available for impingement dropped due to natural mortality. Thus, it appears that the intake type and the waterbody type are more important to impingement than the volume of water withdrawn, although relationships with flow volume are apparent for some otherwise similar plants (Figure 5-1).

The difficulties inherent in translating entrainment and impingement numbers (and their mortalities) to effects on populations of fish in the water body were apparent in a 4-year study of the Bergum Power Station on a small reservoir, the Bergumermeer. The shallow reservoir (average depth 1.3 m, 4.64 km2, 6.0 x 106 m3) lies at an intersection of several canals in the Frisian lake district of The Netherlands. The study included detailed examination of both entrainment and impingement at the power station and of first-year fish distribution, abundance, and sizes throughout the reservoir and in its in- and out-flows. Because the water intake (27.8 m3/s; 635 MGD) is large in relation to lake volume (about 40% of the lake volume is circulated by the power station each day), entrainment mortality in May and June was large and believed to be of the same magnitude as natural mortality. However, the in-flowing canals provided large numbers of fish larvae, immigrating passively with in-flowing currents. Year-to-year variations in fish numbers and entrainment rates were large. There was an exponentially decreasing vulnerability to the intake with increasing size of fish, as shown by ratios of the concentrations of fish in the cooling water and in the lake across a broad range of fish sizes during the spring an summer growth period. Impingement later in the season was considerable, but insignificant compared to natural mortality. The heated effluents from the power station influenced the distribution of 0+ fish in the reservoir (largely by influence of fish temperature preferences in relation to water temperatures; both attraction and repulsion were identified in different species and at different times; there were no lethal temperatures). Faster growth of pikeperch due to the warmer water seemed to have improved both fish sizes and year-class strength compared to a reference reservoir not used for cooling, in spite of the high level of mortalities of larvae early in the season from entrainment.   This result is somewhat counter-intuitive and shows that the influences of power stations on fish populations must be treated comprehensively, and not just as mortalities from entrainment and impingement. Natural mortality rates in the reservoir far exceeded any influences of the power station. The most effective action for having the power station aid fish populations was believed to be reduction in cooling-water flow volume in May and June, when fish larvae are most abundant.

Relevance for Section 316(b)—The revelance for the Dutch studies show that there is a dose-response relationship between the estimated numbers of fish entrained or impinged and both cooling-water flow rate and percent of the river withdrawn, at least for some power stations. The relationship breaks down when a waterbody generally has few fish and the intake is at a depth where few fish reside. Population effects do not necessarily follow the same trend, for a population was better where the water was used for cooling than in a reference site. Thermal and CWIS effects combine to affect fish populations, such that the power station influence must be viewed in its totality, not just as intake effects. The importance of the site-specific situation for each power station is clearly apparent.

5.4 Lake Wheeler

Wheeler Reservoir, Alabama, is a 45,450-acre mainstem reservoir on the Tennessee River. Average annual flow through the reservoir is about 50,000 cfs, and the reservoir has an average retention time of about 7 days. Browns Ferry Nuclear plant (BFN), located on the reservoir about 20 miles upstream of the dam, began operating in 1974. BFN withdraws water for cooling at a rate of roughly 4,400 cfs (2,840 MGD) or about 1% of the reservoir volume per day. Between the water released at the dam and that withdrawn at BFN, about 14% of the reservoir volume is removed from the system on an average day. Water removed from the system is for the most part replaced instantaneously from upstream and tributary inflow and return water from the BFN cooling system. However, organisms that were entrained with the withdrawn water are for the most part lost from the system.

From 1969 through 1997, Tennessee Valley Authority biologists monitored fish abundance in the reservoir by annual cove rotenone surveys (Baxter and Buchanan 1998) to determine if operations of the BFN had any effect on reservoir fish populations. The three sites sampled were about 8, 13, and 19 miles downstream of BFN and about 1, 12, and 13 miles upstream of the dam (note: one of the sites was located 2.7 miles into a tributary embayment). These surveys provide ample data with which to evaluate the effects of long-term withdrawal from a system on its fish community.

A follow-up report to Baxter and Buchanan (1998) presented a regression analysis on the cove rotenone data to identify significant trends in the abundances of species that had been characterized as either important or of special interest from 1969-1997 (TVA 1998). Regression analyses were performed on abundance data (number per hectare) for three size classes (young-of-year, intermediate, and adult) for each of nineteen species. The nineteen species represented three categories of fish – games species (10), rough species (7), and forage species (2) (Table 5-3).

[see hard copy for table]
Table 03
Summary of trends analysis of population dynamics (1969-1997) of 19 fish species in Wheeler Reservoir (TVA 1998).

For ten of the species, no significant increasing or decreasing trends were observed for any of the three age classes (Table 5-3). For the other nine species, there were 6 instances of significant decline and 5 of significant increase. No species experienced a significant decline for all three age classes, and only the spotted sucker showed a decrease for two of the three age classes. There is no indication that any of the declines are a result of entrainment at BFN or at the Wheeler Dam.

In addition to the species-specific analysis, a similar analysis was performed for total standing stock, both numbers and biomass. Although standing stock estimates commonly exhibited extreme fluctuations, the regression analysis found neither a significant increasing nor decreasing trend over the coarse of the study.

Relevance for Section 316(b)—This extensive study of a large CWIS showed no significant trends for many fish species, declines for certain age classes of some species and increases in others. Thus, these is strong species and age specificity for the sum of all of the power plant effects, including the CWIS.

5.5 Illinois Cooling Ponds

Illinois Reservoirs

In the 1970s, EPRI and the Illinois Natural History Survey (a natural resources research arm of the State of Illinois) teamed to conduct a detailed, 4-year, ecological study comparing a lake used for power plant cooling (Lake Sangchris) with lakes not used for cooling, particularly Lake Shelbyville (EPRI 1980). Lake Sangchris is the site of the 1,232-megawatt Kincaid Power Plant (then owned by Commonwealth Edison Company). Other reservoirs studied less intensively were Lake Taylorville, Otter Lake, Lake Lou Yaeger, Evergreen Lake, and Lake Coffeen (another cooling lake). There were three major objectives: (1) acquire data on the functioning of the systems sufficient to represent the systems in the form of a mathematical model, (2) understand the dynamics of the fishery, and (3) understand the quality and distribution of fish food resources. Whereas all impacts of the use of Lake Sangchris for power plant cooling were of interest, the primary concern was for ecosystem effects of the added heat. However, because Lake Sangchris was a nearly closed system, intake effects of entrainment and impingement were necessarily part of the overall power station influence.

Major factors used in selecting lakes Sangchris and Shelbyville for detailed study were physical and biological attributes, background data available, access, and proximity (Table 5-4; Figure 5-2). Although Lake Shelbyville was larger than Lake Sangchris, many of the parameters used to compare the morphometry of the lakes were similar. A major difference between the reservoirs was that Lake Shelbyville functioned as a flood control reservoir and thus had added effects of water level fluctuations.

[see hard copy for table]
Table 04
Morphometric comparisons of Lake Sangchris (cooling lake) and Lake Shelbyville, Illinois (from EPRI 1980).

Lake Sangchris was constructed in 1964-1966 by construction of an earthen dam across a small creek. The shallow, 876-ha (2,165-acre) reservoir consisted of three 8-km-long, narrow (300 m average width) arms extending generally southward with irregular shorelines (Table 5-3; Figure 5-2). The reservoir was created to supply condenser cooling water for the 2-unit, coal-fired Kincaid Power Plant, which was cooled by one to four 160,000-gpm pumps to maintain a temperature rise of between 7 and 10° C between the intake and the discharge. Normally, 480,000 gpm (691.2 MGD) was used when both units were operating at full capacity in summer. Water was withdrawn from the west arm by an intake canal and discharged by a canal to the middle arm. The power plant was a load-following plant, so operation varied considerably during the study (recorded in EPRI 1980).

Lake Shelbyville was constructed in 1970 by the U.S. Army Corps of Engineers using an earthen dam. The Kaskaskia and Okaw rivers were impounded, creating a Y-shaped, 4,490-ha reservoir approximately 30 km long with irregular shorelines (Table 5-3; Figure 5-2). The main purpose of the reservoir is to provide flood control and navigation flows in the Kaskaskia and Mississippi rivers, but it is a multipurpose reservoir serving water quality, water supply, fish and wildlife, and recreational uses. Water inflow and outflow varied greatly (0.28 to 127.42 m3/s; 6.4 to 2,915 MGD) with a typical annual pool fluctuation of about 7 m (20 ft).

The study identified physical and water quality differences between lakes Sangchris and Shelbyville that were related largely to the cooling circuit in Lake Sangchris and the stable water level maintained in it for power plant cooling. Lake Shelbyville exhibited summer thermal stratification, which was largely lacking in Lake Sangchris. Lake Sangchris was horizontally segmented between the warm thermal discharge arm and the more ambient east and west arms. Lake Shelbyville fluctuated in elevation much more than did Lake Sangchris, as noted above. Nutrient fluxes also differed between the nearly closed Lake Sangchris and Lake Shelbyville with its higher flow-through. These characteristics likely dominated any overall effect on fisheries (including entrainment and impingement).

Fish populations differed between lakes Sangchris and Shelbyville in ways that reflected thermal patterns and reservoir-elevation changes (Shelbyville) more than other factors. The average catch of fish was lower in Lake Sangchris (59.1 kg/ha) than in Lake Shelbyville (85.7 kg/ha). Lake Shelbyville had a more diverse fish fauna with higher abundance of carp and gizzard shad making up most of the difference in catches. The biomass of sport fishes was high in both lakes, comprising 26.6% (Sangchris) and 28.3% (Shelbyville) of the total fish catch. Lake Sangchris had not experienced a decline in productivity of largemouth bass with reservoir aging, commonly observed in unheated Illinois reservoirs. There were clear behavioral responses by fish to the thermal discharge: spawning concentrations of white bass appeared in the discharge area of Lake Sangchris whereas in Lake Shelbyville these concentrations occurred in tributaries. Yellow bass, gizzard shad and largemouth bass exhibited seasonal shifts in abundance in Lake Sangchris, moving away from the warmest thermal-discharge areas in summer and toward them in cold months. Gizzard shad, a species often entrained and impinged elsewhere, were smaller and less abundant in Lake Sangchris than in Lake Shelbyville, a fact that was attributed to more rapid maturation and shortened life span due to warmer water. Standing crop biomass of fish was estimated to be somewhat less in Lake Sangchris than in Lake Shelbyville (360.9 and 449.6 kg/ha, respectively), due primarily to lower biomasses of carp and gizzard shad in heated Lake Sangchris. Lake Sangchris' biomass was within normal bounds (intermediate between typical biomasses for reservoirs in the midsouth and midwest). Studies of growth rates, reproduction, movements (telemetry), and food habits indicated either no differences between reservoirs or differences attributable primarily to the differences in thermal regimes. Relative growth rates of fish between Sangchris and Shelbyville reservoirs differed among species: e.g., growth rates were faster in Lake Sangchris for channel catfish, freshwater drum, and largemouth bass whereas bluegill growth was faster in Lake Shelbyville; growth rates were similar in both lakes for white bass, white crappie, and carp. Annual growth of largemouth bass was greater in Lake Sangchris than in other lakes, reflecting the longer growing season due to heated water.

Entrainment and impingement at the power plant's intakes were not purposely studied, but their effects were integrated with other power plant effects on the fish populations of Lake Sangchris. Thus, their influence should have been shown in the comparative studies with non-cooling lakes. The differences in fish populations and their dynamics between the cooling lake (Sangchris) and non-cooling lake (Shelbyville) were largely attributed to the heat load in Lake Sangchris and the periodic drawdowns of Lake Shelbyville for flood control.

Relevance for Section 316 (b)—The overall result of the comparative study was that Lake Sangchris was shown to maintain a highly productive fish community in spite of (or perhaps because of) power plant cooling. There was ample abundance of fish food organisms for maintaining a highly productive sports fishery. Entrainment and impingement, while not measured but certainly occurring, was of minor importance for the dynamics of fish populations when compared to other reservoirs.

Summary

These case studies provide strong empirical evidence that large water withdrawals do not imply large effects on fish populations. The Hudson River power plants have withdrawn over 6,400 MGD for over 25 years (4,200 of that in a sensitive segment for entrainable fish), yet extensive monitoring has shown little impact. When change has occurred to some populations it is in conflict with power-plant-related mechanisms and likely has other causes. The Nuclear Regulatory Commission found little empirical evidence for actual damage from entrainment and impingement in its review of five nuclear plants with withdrawal rates ranging between 486 and 2,785 MGD. Despite this information, it found that natural resource agencies subjectively considered entrainment and impingement to be a problem. It therefore recommended including case-by-case analyses in its nuclear plant relicensing actions. Studies by TVA of Wheeler Reservoir (Browns Ferry Nuclear Plant) showed no significant changes in fish populations beyond the normal increases and decreases in a small percentage of species. Dutch studies found that whereas cooling-water flow rate and numbers entrained or impinged varied proportionately in most plants, the effect on fish populations was the reverse—populations were in better shape with power plant cooling because of the combined effects of thermal (stimulatory) and intake effects. Intake type and water body type dominated over cooling-water volumes in determining numbers of organisms entrained and impinged. Viewing the cooling system effects in totality and on a case-by-case basis was stressed by the Dutch researchers. A detailed study of the fisheries of a reservoir used for cooling in Illinois (691 MGD) and reference reservoirs showed that the combined effect of heating and water circulation in the cooling lake did not yield fish populations greatly different from those in reservoirs not used for cooling. The available studies in the literature provide a poor scientific basis in empirical data for regulating power plant intake systems on the basis of the volume of cooling-water use.

EPA Response

Please see response to Comment 316bEFR.041.037.

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Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

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RFC: Entrainment vs. entrainment mortality

APPENDIX F – EVALUATION AND COMMENT ON EPA'S ASSESSMENT OF ENTRAINMENT SURVIAL – CASE STUDY METHODOLOGY, CHAPTER A7 OF THE PROPOSED §316(B) RULE

SUMMARY

EPRI has reviewed, from a scientific and risk management point of view, EPA's decision to base the proposed §316(b) performance standard on entrainment, rather than entrainment survival. Detailed comments resulting from review of sections VI.A.7 and VI.A.8.b of the rule and the support document on entrainment survival, Ch A7, are provided below. The major findings and recommendations resulting from the review include:

-The proposed rule's exclusion of entrainment survival from the BTA performance standard is scientifically flawed;

-The proposed rule's exclusion of entrainment survival from the BTA performance standard can be ecologically unprotective and would not provide comparability in quantifying resource impacts among facilities and waterbodies;

-To provide a solid scientific and resource management foundation for BTA determination, the performance standard should be based on realistic estimates of entrainment losses (i.e. entrainment mortality) and be linked to protection of higher biological levels of organization.

-EPA's evaluation does not reflect consideration of the evolution of entrainment survival study methods—methods have matured and later methods do allow for valid estimates of entrainment survival with appropriate levels of precision.

-EPA's assumption of 100% entrainment mortality is not supported by the overwhelming evidence of substantial entrainment survival of many species that has been found in studies conducted to date, and is not justified by the concerns EPA presented in Ch A7.

1. THE PERFORMANCE STANDARD FOR BTA SHOULD BE BASED ON REDUCING ENTRAINMENT LOSS, AS IT CURRENTLY IS FOR IMPINGEMENT

EPA correctly states that:

Assessment of ecological and economic consequences of entrainment is based on estimates of the number of fish and shellfish killed as a result of entrainment" (p. A7-1) (Emphasis added.)

Despite the above statements, EPA, instead, proposes a performance standard that requires reducing numbers entrained rather than reducing numbers killed (VI.A.7 of the proposed rule). Their decision was based the belief that appropriate entrainment mortality data for existing and potential intake technologies used as the basis for the rule was either absent or insufficient. However, EPA, in reality, is not excluding entrainment mortality from consideration in choosing this approach, but rather assuming all entrained organisms die (100 percent mortality) as a result of passage through cooling water intake system (CWIS) for all of the baseline and benefits evaluations. EPA notes in Chapter A7 (e.g. Section A7-5), that they believe this assumption of 100 percent entrainment mortality is consistent with a precautionary approach, is protective of biological resources, and implies consistency in quantifying resource impacts at different facilities and waterbodies.

It is of utmost importance that EPA reevaluate this position, which fundamentally influences the soundness of the decision-making process for 316(b). A performance standard that is scientifically sound, consistent with risk assessment and management frameworks currently in use by EPA, and environmentally protective should be based on numbers killed, as EPA currently proposes for impingement, to provide better measures of potential risks at population and community levels. Our comments are elaborated in more detail below.

1.1 The proposed rule should clarify terms dealing with entrainment mortality and distinguish between entrainment loss as a performance standard and estimates of entrainment mortality rate that may be used in benefits assessment

A reading of the proposed rule and Chapter A7 together makes it apparent that EPA is using the terms "entrainment mortality" to refer both to the loss of organisms as a result of entrainment and to the rate as which entrained organisms die. However, it is important to recognize that these two concepts are not the same and that by combining the two concepts considerable confusion can result. Consequently, we recommend the following clarifications:

-The term "entrainment loss" should be used to refer to the number of organisms of each species killed by entrainment. Entrainment loss is a function of both the exposure (entrainment) and sensitivity (death rate as a result of entrainment) of the organisms. Measures of entrainment loss can be either qualitative estimates of susceptibility, or quantitative estimates of direct, equivalent, or fractional losses (EPRI 2002a, EPRI 2002b).

-The term "entrainment mortality rate", then, is a measure of the sensitivity of the organisms to entrainment exposure (i.e. probability of dying as a result of entrainment). Estimates of entrainment mortality rate can be based either on entrainment survival measured under specific CWIS conditions of interest, or estimated using process models that combine independent estimates of sensitivity to mechanical, thermal, and chemical stresses of entrainment.

The distinction between these two concepts (by using different terms) is applied to these comments.

However, using entrainment loss as the performance requirement for benefits assessment does necessarily impose the requirement for field-study measurement of through plant survival or measurement of survival under all exposure conditions. In fact, benefits assessments for proposed alternatives will inherently involve projection of effects for conditions not-yet studied at a facility. Benefit assessments will, in practice, be accomplished only by combining information available from site-specific studies and from the general literature into process models, using professional judgment.

1.2 The protection requirements should be consistently based on actual risks to the ecological entities of concern for both entrainment and impingement.

As acknowledged by EPA, the ecological risks posed by CWIS operation depend on loss of organisms from entrainment and impingement. As illustrated in Figure 1, CWIS risks at all levels of biological organization depend on susceptibility of species to entrainment and impingement, which is a function of both exposure (number entrained or impinged) and sensitivity (mortality rate from entrainment or impingement). EPA has appropriately recognized this conceptual model in setting a performance requirement based on reducing impingement loss, but chose not to do so for entrainment. To provide sound scientific and risk assessment/management bases for BTA determination, as well as to be internally consistent in establishing the Phase II rules, EPA should therefore base the BTA performance requirements and the process for assessing fish protection benefits on reducing the loss (i.e. mortality) of entrained organisms, as EPA has done in the case of impingement.

1.3 To assure BTA performance requirements are protective, they should be based on entrainment loss.

EPA's assumption of a 100 percent entrainment mortality rate (i.e., using total entrainment rather than entrainment loss) is an appropriate precautionary approach only for establishing baseline conditions for the BTA determination, not for assessing the impacts of the existing CWIS or proposed alternatives. Assuming 100% entrainment mortality is appropriate for the baseline condition since, as correctly noted by EPA, the entrainment survival rates are highly species- and size-specific and can be greatly influenced by a variety of environmental (e.g., water temperature) and plant operating (e.g., ΔT, transit time) factors. Previous studies have demonstrated that across the range of species sensitivities and plant and environmental conditions, entrainment survival can range from 0 to 100 percent. Hence in the absence of entrainment survival estimates applicable to a facility, it is reasonable to initially assume that all organisms perish as a result of entrainment as a means of dealing with the uncertainty associated with this lack of information in a way that is maximally protective of the environment.

However, the assumption of 100 percent entrainment mortality is not necessarily environmentally protective for setting BTA performance requirements (i.e. assessing protection benefits provided by the existing CWIS or proposed alternatives). As described above, the loss of organisms through entrainment is determined by organisms' presence in the cooling water flow (exposure) and the mortality rate experienced by the organisms upon passage through the CWIS (sensitivity). Intake alternatives, whether structural or operational, can reduce entrainment loss by reducing one or both of these two factors (exposure and sensitivity). However, some alternatives can affect exposure and sensitivity in opposite directions. For example, reducing cooling water flow and, hence, numbers entrained can result in higher discharge temperatures and transit times leading to higher entrainment mortality rates and higher entrainment losses. On the other hand, increased cooling water flow can result in higher numbers entrained but lower entrainment mortality rates by reducing ΔT and transit time and potentially lowering entrainment losses.

The tradeoffs in intake alternative effects between entrainment exposure and entrainment mortality need to be carefully considered in selecting an optimal intake alternative. An intake alternative that appears protective based on numbers entrained could even result in greater environmental impact than the existing intake. For example, some species with relatively high entrainment involvement (e.g., striped bass, white perch) are highly tolerant of the mechanical stresses of entrainment. For these species, meeting the performance requirement by reducing flow could cause high thermal mortality by increasing condenser discharge temperature above the temperature tolerance of the species. Similarly, meeting the performance requirement by screening may increase the number killed by trading off low entrainment mortality for high impingement mortality. In both of these cases, the actual number killed by entrainment could easily be higher under the proposed alternative than with the existing intake, despite the reduction in numbers entrained. Under such a scenario, a regulatory requirement based solely on reducing numbers entrained could result in increasing the environmental effects of cooling water withdrawals.

In contrast to the need to use entrainment losses (i.e. numbers killed rather than numbers entrained) in evaluating alternatives, it is nevertheless appropriate that the baseline for potential entrainment impacts be calculated assuming a 100% entrainment mortality rate. At the time §316(b) was initially enacted, little or no thought was given to how cooling systems could be operated to reduce the entrainment mortality rate because it was generally believed to be 100% for all entrained organisms. Now that we have conclusive evidence that mortality can be less than 100% when thermal parameters are maintained within certain limits, when biocide use is restricted, and when the physical stresses are reasonably low (See Section 2.1), it is highly appropriate that stations incorporating design features and operational practices that reduce entrainment mortality rate be encouraged to maintain these features and practices by comparing their benefits to a situation in which they are absent.

EPA has appropriately considered the impingement rate baseline to be a situation in which 100% of impinged organisms perish, and evaluating the existing intake configuration and alternatives on the basis of their ability to reduce the numbers impinged and/or to reduce the mortality rate of impinged organisms. There is no logical reason for treating entrainment differently.

1.4 Facility operators should be allowed to address the baseline assumption of 100% entrainment mortality by inclusion of entrainment survival estimates in the BTA assessment, as EPA proposes for impingement.

There are two ways to reduce the uncertainty that underlies the precautionary assumption of 100% entrainment mortality used in the baseline: 1) demonstrate otherwise by providing unbiased estimates of entrainment survival for the existing CWIS and appropriately characterize the uncertainty of those estimates; and 2) optimize the CWIS fish protection performance by evaluating alternatives that further reduce entrainment losses. Incorporation of entrainment survival into both approaches would provide realistic estimates of ecological risks of the existing CWIS and better perspective on the relative benefits of management alternatives.

Comparing estimates of actual entrainment losses, based on demonstrated entrainment survival at the existing CWIS, with losses for the baseline (assuming 0% survival), provides more realistic estimates of facility-specific ecological risks, which should form the basis for risk management action. For example, a CWIS at which entrainment survival approached 100% would likely represent little or no ecological risk, and therefore require no risk management action. To ignore entrainment survival in making this comparison would fly in the face of the accumulated evidence from §316(b) studies and assessments over the past several decades. The significant entrainment survival measured in numerous site studies (EPRI 2000), may explain, in part, the absence of any observable adverse impacts on sustainable resources from power plant operations to date.

Comparing estimates of actual entrainment losses, based on demonstrated entrainment survival at the existing CWIS, with losses for the baseline, provides better perspective on the relative fish protection benefits of, and economic justification for, implementing CWIS alternatives. That is, the risk scale (relative to entrainment mortality rate) extends from the 100% mortality rate baseline (assumed maximal risk), to 0% mortality rate (no risk), and all CWIS alternatives, including the existing intake, can be ranked along this scale.

1.5 To assure BTA performance standards are protective, and to provide a basis for evaluating tradeoffs among species as part of BTA determination they should provide for consideration of risks to higher biological levels in the BTA determination.

Even when entrainment mortality is explicitly included, focusing the BTA performance requirement solely on direct losses of organisms from entrainment and impingement could also be unprotective. Selecting BTA alternatives based solely on proscribed or achievable reductions in exposure, susceptibility, or entrainment and impingement losses does not, a priori, assure the protection of valued ecological entities, such as the populations of entrained and impinged species and the beneficial uses they support. Assuring that the performance requirements are conceptually linked to ecological assessment endpoints (Figure 1), would provide a protective approach, as well providing the most complete picture of the potential risk reduction benefits of each CWIS alternative and the most information for understanding tradeoffs of BTA alternatives among different species. Balancing tradeoffs among species will undoubtedly be required since CWIS alternatives will provide different levels of loss reductions for different species.

In addition, risk managers will undoubtedly be faced with the need for information on risks posed by the CWIS at population and community levels in order to determine whether costs are ‘significantly’ higher than benefits, under EPA’s proposed method for qualifying for a site-specific BTA determination. Appropriately balancing costs and benefits of CWIS alternatives ultimately requires an understanding of the threat that the existing CWIS poses to the biotic integrity or “health” of the water body. We recommend that the ecological risk assessment (ERA) process, as adapted for §316(b) determinations (EPRI 2002b), be incorporated into the Phase II rules as a methodology for addressing all of the issues discussed above. Characterization of risks using this process will help risk managers determine whether the reduction in entrainment and impingement losses achievable with alternate CWIS technologies at a specific facility represent an appreciable and economically justifiable reduction in risk to aquatic populations and communities, under the cost-benefit option provided in the proposed rules.

Finally, conceptually linking the performance standard to risks at the population and community levels provides a stronger foundation for a tiered approach to implementing §316(b). For example, a variety of factors, including entrainment survival estimates, can be integrated to screen facilities based on the relative risks they pose for impacting sustainable resources (EPRI 2002b).

1.6 Comparability in quantifying resource impacts and determining BTA at different sites and waterbodies requires that the entrainment mortality rate be considered.

The entrainment survival studies conducted to date clearly indicate that survival varies widely depending on species, CWIS attributes, and waterbody characteristics. EPA justifies its assumption of 100 percent mortality in part based on a desire for comparability in quantifying resource impacts at different facilities and waterbodies (Ch A-7, Section A7-5). However, in reality this approach is likely to achieve the opposite result—ecological risk estimates that are not realistic and not comparable among different locations—because it assumes that entrainment mortality is equal (100 percent) for all species and at all sites. However, this is clearly not the case. Thus, EPA approach does not result in consistently accurate measures of ecological risk. We recommend, instead, that EPA address the objective of comparability among sites by: 1) adopting a standardized approach such as the ecological risk assessment framework, which has recently been adapted for use in §316(b) assessments (EPRI 2002b <FN 1>), and 2) emphasizing realistic (i.e., unbiased) estimates of entrainment/impingement losses for each CWIS alternative using all reasonably available information.

1.7 The description of the entrainment vulnerability is overly broad and misleading.

EPA assigns high vulnerability to fish eggs and larvae (Section A7-1.1). However, entrainment does not affect all fish species equally and vulnerability depends upon life history characteristics and intake structure design features. Fish eggs and larvae, to be subject to entrainment, must occur in the water column. Many species, such as the catfishes, sunfishes, and pikes, build nests and/or spawn in the shore zone, and therefore are seldom entrained. Species that are most commonly entrained in high numbers are pelagic spawners or have larval and/or juvenile stages that move into the water column. This type of life history is also usually associated with high fecundity, and high mortality rates from the egg stage to adulthood. Such a life history strategy (i.e., high fecundity, high early life stage mortality) is common among species that utilize highly variable environments (e.g., estuaries, pelagic areas of large lakes and the ocean). This high reproductive potential must coincide with strong density-dependent processes to keep the population within levels supportable by available habitat. Hence, those species that are most commonly entrained tend to be pelagic species with high reproductive potential and strong density-dependence that can compensate for early life stage mortality whether natural or from man-induced sources such as entrainment.

Further, the high natural mortality does not necessarily occur within the egg stage, and high natural mortality rates are not necessarily indicative of high entrainment mortality, i.e. high natural mortality could be due to predation. EPA should also recognize that entrainment of a life stage with a high natural mortality rate, or a high natural mortality rate in subsequent life stages, will mean that most of the entrainment losses would have been removed from the population at a later stage due to natural causes, thus the population effect is not accurately characterized by the number lost to entrainment.

2. ESTIMATES OF ENTRAINMENT MORTALITY RATE CAN AND SHOULD BE USED IN BENEFITS ASSESSMENT

EPA indicates that the proposed Phase II rule does not preclude the use of estimates of entrainment mortality and/or survival rates when estimating benefits to be achieved through installation of BTA (Section VI.A.8.b). However, EPA expresses some reservations about the quality of existing entrainment survival data and the potential of collecting reliable survival data in the future based on its review of 13 entrainment survival studies, which it provides in Chapter A7.
We believe that it is scientifically appropriate to allow consideration of entrainment mortality rates in benefits estimation for the same reasons discussed in item 1, above. Further, as elaborated below, previous entrainment studies, including those reviewed by EPA, were conducted during a period when equipment and procedures for estimating entrainment survival were being refined to minimize the potential confounding influences of handling stress. Consequently, not all previous entrainment

survival studies can be viewed with the same degree of scientific certainty. However, much valuable information exists (far more than "a provocative set of anecdotes") that could and should be used as part of the evaluation of alternatives. Finally, the success of some of the most recently conducted studies clearly demonstrates that entrainment mortality can be estimated with a level of confidence comparable to that of other biological testing (e.g., bioassay testing). Thus, assuming a 100 percent entrainment mortality rate for the many relatively hardy species would clearly result in biased estimates of entrainment loss and introduce much greater uncertainty in the decision-making process than would inclusion of best available estimates of entrainment mortality rate. In such cases, an assumption of 100 percent entrainment mortality rate cannot be scientifically justified.

2.1 Entrainment survival is a scientifically demonstrated reality for some species

We believe that the information presented by EPA in Chapter A7 is incomplete and has provided a skewed perspective on the status of existing entrainment survival information and methodology, which has led EPA to draw incorrect conclusions about the status of existing information and methods for measuring entrainment survival. This perspective is clearly indicated in Chapter A7 (at A7-1.1), where EPA implies that biologists currently presume that entrainment "…would kill most if not all organisms", so that "…any assertions that survival rates are appreciably greater than zero should be viewed with skepticism". This statement may reflect the opinion of informed biologists in the late 1960' and early 1970's, but not now. The carefully evaluated evidence from entrainment survival studies conducted since then has once again demonstrated the appropriateness of the scientific method, rather than presumption based on intuition, as the basis for drawing conclusions on important issues.

Scientists informed about entrainment and impingement now recognize the reality of entrainment survival and that some species may have quite high entrainment survival rates. This transition in attitude occurred in the late 1970s under the highest-level of scientific scrutiny associated with the Hudson River case involving the EPA and numerous other federal and state regulatory agencies and their scientific consultants. It involved the development and evolution of sampling gear and methods for measuring entrainment survival. For example, Oak Ridge National Laboratory staff, acting as EPA's consultants, not only reviewed study methods and results, but personally participated in the studies and observed high percentages of larval striped bass, white perch and other species alive and vigorously swimming in collections from the discharges of the power plants. The establishment of valid estimates of entrainment survival through these studies was acknowledged as a critical step in defining management action in the Hudson River case:

"This [entrainment survival larval table] collection device improved the measurement of in-plant entrainment mortality by minimizing collection-induced mortality and consequently increased the accuracy and precision of mortality estimates (Vaughn and Kumar 1982). Development of the larval table was an important step in the progression of knowledge that led initially to a convergence of utility and regulatory agency estimates of conditional entrainment mortality estimates and ultimately to the settlement agreement" (Klauda et. al. 1988).

Entrainment survival estimates have since been widely used in assessing impacts and comparing benefits of alternatives (Gammon 1976; McNaught 1976 Schlicht 1976; Englert and Boreman 1988; Boreman and Goodyear 1988; PSEG 1999, 2001; CHGE et. al. 1999) verifying their utility for those purposes. In addition, many of the studies on entrainment survival have been published in the peer-reviewed scientific literature, lending credibility to their findings (e.g., McGroddy and Wyman 1977; Jinks et al. 1981; Muessig et al. 1988).

The review of entrainment survival studies cited by EPA (EPRI 2000) reports large number of entrainment survival estimates for more than 50 species and taxonomic groups from 21 power plants. This review found few reports of no entrainment survival (i.e., 100 percent entrainment mortality) and the authors concluded, "…assuming 100 percent mortality or loss of entrained organisms cannot be supported by available data" (p. 3-8). This review concluded that entrainment survival for most species and taxonomic groups exceeded 50 percent and that high mortality was limited to a few relatively delicate species (e.g., clupeids and anchovies). Thus, it would appear that assuming 100 percent entrainment mortality would result in estimates of entrainment loss that are consistently biased and that are typically more than 100 percent too high.

2.2 Entrainment mortality rate is estimatable with sufficient precision

For more than a decade, a number of studies were conducted in an effort to estimate entrainment mortality as part of a larger effort to assess the potential for adverse environmental impacts of cooling water withdrawals at electric generating stations. These studies are summarized in EPRI (2000), which the EPA included in their review of entrainment survival. However, as previously noted, substantial improvements were made in sampling equipment and procedures over the course of these studies that lead to significantly improved estimates of entrainment survival. The improvements in sampling methods are reviewed by Muessig et al. (1988) and are brief described below. These improvements in sampling methods explain many of the differences in entrainment survival observed across years and locations.

The question of entrainment survival at power plants was first addressed in the late 1960s and early 1970s. These earliest studies focused on relatively delicate species (river herring) and found little evidence of entrainment survival (e.g., Marcy 1971). The results of these studies were used to support the general assumption that entrainment high for all species was high and approaching 100 percent. However, subsequent studies (especially on the Hudson) documented that some commonly entrained species (e.g., striped bass and white perch) can and do survive passage through the cooling water systems (e.g. Lauer et al. 1974). These same studies also revealed that the mortality associated with the collection of these organisms was high and that this sampling stress was not the same between intake and discharge samples. These two factors made reliable estimation of the mortality rate associated with entrainment alone, exceedingly difficult. The findings of the Hudson studies lead to substantial efforts to both reduce the stresses associated with sample collection and to make sampling stresses at both intake and discharge locations as similar as possible.

The first step in improving estimates of entrainment survival was the development of the larval table. Larval tables, first tested in 1974, are basically flumes modified for the collection of planktonic organisms. Water is supplied from the intake and discharge by pump, and the flume provided equivalent velocities and sampling stresses at both the intake and discharge locations. Using the flume, sampling stress and associated collection mortality was substantially reduced. For example, the fraction of striped bass post yolk-sac larvae alive at the intake increased from approximately 19 percent observed with nets to 45 to 61 percent with the larval table. Unfortunately, confidence intervals about the estimates of entrainment survival remained quite wide.
The next step in improving entrainment survival estimates was the development of the rear-draw

flume. This modification eliminated the passage of organisms though a pump by moving the pump to downstream of the collection device. This design was first implemented in 1979 and refined in 1980. Using this technology, sampling stress and associated collection mortality was even further reduced. For example, fraction of striped bass post yolk-sac larvae alive at the intake increased to more than 95 percent with the rear-draw flume and confidence intervals about the estimates of entrainment survival were significantly reduced.

The final step in improving entrainment survival estimates (although not described in Muessig et al. 1988) was the recognition that the length of larvae was an important determinant of entrainment survival. This led to the explicit inclusion of length as a covariable in the analysis and estimation of larval entrainment survival (EA 1989). Inclusion of length as a covariable can potentially explain many of the differences observed in entrainment survival between time periods and year.

These advances in sampling methodology, coupled with analytical advances (Vaughan and Kumar 1983; EA 1989), have provided the means, given sufficient sample sizes, to estimate entrainment survival with precision comparable to that accepted for use in other areas of regulatory compliance. Due to the heterogenous nature of entrainable fish eggs and larvae in the wild, entrainment survival estimates typically will require higher sample sizes than bioassay studies in order to achieve comparable levels of precision. However, well-planned sampling that matches the occurrence of entrainable organisms (e.g. EA 1989) can provide sufficiently precise estimates.

2.3 Existing data has utility in benefits assessment

Although not all commonly entrained species have been studied in sufficient detail, existing information related to entrainment survival does cover many of the commonly entrained species and can have important utility for evaluating the potential benefits of CWIS alternatives. Information on entrainment survival has long been recognized as an important evaluative tool for making better decisions on the selection of technologies for minimizing impacts (Jinks et. al. 1981). In addition to the results of previously conducted field studies of entrainment survival, other available information that assessors should consider includes:

-Thermal tolerance data relevant to short-term exposures of early life stages to elevated temperatures;

-Pressure bomb and condenser simulator studies that help to define the general range of mechanical stresses tolerated by fish eggs and larvae.

-Direct release studies of through-plant survival using live hatchery-reared eggs and larvae

-Monitoring data demonstrating species and life stages obtained and seasonal distribution.

While actual entrainment survival assessments have been conducted at only a relatively small number of existing power plants, the studies to date support the transferability of results to other power plants with similar pumping and thermal regimes. Hence, the results of studies conducted at one facility can be used to support the evaluation of potential benefits of intake alternatives at other, similar facilities.

The following example serves to illustrate how existing entrainment survival information can be used to aid in the selection of potential intake alternatives to reduce CWIS impacts:

An existing steam-electric generating facility operates in load following mode at less than full generating capacity throughout most of the year. Load is typically lowest during late evening and nighttime hours. Unfortunately, the existing cooling water pumps run at a fixed speed regardless of facility generating load and cooling requirements. Therefore, it appears that a significant reduction in entrainment exposure might be achieved through reductions in cooling water withdrawal by installation of variable speed pumps that could better match the changing cooling water need of the facility. However, both the permitting authority and the facility operators are concerned that installation of variable speed pumps could result in elevated condenser discharge temperatures and higher thermal stress. This increased stress might result in a higher entrainment mortality rate that could offset potential reductions in the numbers entrained for the species being entrained. Facility operators are further concerned that flow reductions being sought with the use of variable speed pumps will result in losses of condenser efficiency resulting in severe economic penalties to operation of the facility.

A review of available information for the facility indicates that no site-specific measurements of through-plant survival are available for any of six species that are most abundant in entrainment at the facility. However, estimates of entrainment survival are available for two of the species and on a congeneric of a third species at other facilities. These data indicate that these three species could be very tolerant of the mechanical stresses of entrainment at the facility being evaluated. In addition, laboratory-based thermal tolerance data for short-term exposures to temperature elevation is also available on the early life-stages of these species. Although no entrainment survival data is available anywhere for the other three species, data for related family members indicates low (0-15 percent) entrainment survival.

All parties decide to include an analysis of the limits on flow reduction imposed by thermal mortality and condenser performance in the benefit assessment. The permitting authority and facility operators felt that the most realistic estimates of potential benefits for the three focal species that have potentially high entrainment survival would be obtained by using mechanical mortality rate estimates and thermal tolerance threshold limits available from studies conducted at other facilities. The analysis assumed 100 percent mortality rates for the other three focal species. Losses were estimated for variable speed pumps and for projected typical operation of the existing intake. By comparing these results with losses for a baseline assuming 100 percent mortality rate for organisms entrained at full capacity operation, the assessors provided information on the incremental benefits of variable speed pump installation compared to the protection already implemented by facility operation. Further, should the assessment show significant potential benefits of installing variable speed pumps, the facility plans to incorporate site-specific studies to verify entrainment mortality rates for the entrained species as part of the overall engineering and implementation plans.

[comment continued in 316bEFR.074.502]

Footnotes

1 This EPRI report, as discussed in our introduction, has been provided to the Water Docket and to key EPA Cooling Systems Task Force staff. EPRI requests EPA Task Force review of the document as a potential framework for performing 316(b) assessments. EPRI also requests that the EPA Task Force forward the report to the EPA personnel responsible for developing EPA's Ecological Risk Assessment Framework for their professional peer review of the report.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.074.502

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 12.03
RFC: Entrainment vs. entrainment mortality

[comment continued from 316bEFR.074.501]

3. SPECIFIC ISSUES FROM EPA REVIEW

In addition to the general issues discussed above, EPA raises several specific concerns with the use of entrainment survival estimates based on their review of 13 of 31 entrainment survival studies reported in EPRI (2000) with which we disagree. These concerns and our responses are discussed below.

3.1.1 Majority of studies reviewed collected samples at times of low organism abundance, had small sample sizes, and did not estimate survival for all species entrained.

Although large samples are always desirable to increase the precision of estimates, sample sizes in entrainment survival studies are limited by several factors. First, it is very difficult to sample large volumes of water in a manner that will not kill eggs and larvae during the sampling process. The evolution of entrainment survival sampling from the standard plankton nets used in early studies, to nets with flow-reducing cones, to pump-fed larval tables, to rear-draw and pumpless flumes has shown the value of reducing sampling mortality, but a concomitant effect is that volumes sampled, and therefore number of organisms collected, are reduced.

A second reason for small sample sizes, for some species, is that many species are not all that abundant in the water column. Even though it would be useful to have large samples for all species, in most cases over 95 percent of entrained fish are composed of only a few species. These commonly entrained species typically have been the focus of prior entrainment survival studies. Obtaining large samples for the species that make up the last 5 percent of those entrained would require an impractically large amount of sampling and would be unnecessary given their relatively low entrainment abundance.

Third, even for the most commonly entrained species, the temporal occurrence in entrainment is highly seasonal, often lasting on the order of one month or less. Thus the time during which large numbers of organisms, especially of any single species and life stage, are available for sampling may be limited.

Although EPA recommends studies throughout the year (A7-4.1), year-round sampling would be very expensive, and would not collect useful information for much of the time. A better strategy would be to use existing data on the seasonality of entrainment, or knowledge of the spawning seasons of the dominant taxa, to tailor the survival sampling to the proper periods.

Finally, EPA should recognize that sample sizes for the dominant taxa were not necessarily low. Many of the entrainment survival estimates presented in EPRI (2000) and reviewed by EPA were based on collections of hundreds, if not thousands, of organisms. These numbers are considerably larger than sample sizes used in most bioassay studies, which have the similar goal of estimating man-induced mortality rates.

3.1.2 Majority of studies reviewed collected samples at times when the facility was not operating at full capacity, or did not study worst-case conditions.

Entrainment studies were typically conducted during periods of normal facility operations. Reduced operating capacity of a facility at the time of an entrainment survival study may not be particularly important for several reasons: 1) At multi-unit facilities, one unit may be operational while other units may not be. The conditions experienced by organisms entrained at the operating unit may be independent of the operational status of other units. 2) At facilities that vary their operational levels seasonally, the occurrence of significant entrainment may not typically coincide with high generating loads. This is common where peak entrainment occurs during the late spring spawning period (e.g. Alosids, Morone), yet peak ambient temperatures and peak generating loads occur during mid-summer. 3) The conditions that occur during the study represent typical conditions (plant operation, ambient temperatures, stream flows) for that time of year, and thus are representative of survival rates expected. Consequently, the entrainment survival estimates obtained during these studies should also be representative of conditions typical for those species at that facility.

3.1.3 Majority of studies reviewed collected samples at times when biocides were not in use.

In 1974, EPA published its Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Steam Electric Power Generating Point Source Category, which established Best Practical Control Technology Currently Available as: limitation of free chlorine residual concentrations to an average of 0.2 mg/l and a maximum of 0.5 mg/l during the maximum time of 2 hours (aggregate for all units at a facility) that chlorination of the cooling system could be conducted. These conditions were incorporated into the conditions for subsequent NPDES/SPDES permits. For example, the SPDES discharge permit issued for the Indian Point (NY) units in 1987 limited use of chlorine in the cooling water system to a maximum of 2 hours per day at any unit, and 9 hours per week at all units combined. Although chlorination of the cooling system is still permitted, Indian Point has ceased any use of chlorine in the condenser cooling system and only chlorinates the service water system. Biocide use has also been reduced or eliminated at other power plants as well. For example, biocides are not used in the cooling water systems of the Bowline Point, Lovett, Roseton, and Danskammer Point generating stations on the Hudson.

In addition, while many of the studies reviewed did not explicitly describe biocide use at the time of sampling, the period of biocide use is regulated by the EPA guidelines described above. Thus, exposure of organisms to biocides is likely to occur during a small fraction of the day (maximum of 2 out of 24 hours or just over 8 percent of the time). While the studies conducted may not be representative of survival during periods of biocide use, they are representative of typical conditions, i.e. those that occur the majority of the time. Even a conservative assumption of 100 percent mortality rate during the time biocides are used would not be likely to result in significant change to total entrainment mortality.

3.1.4 Majority of studies reviewed collected samples at times that may not reflect current entrainment rates at the facilities.

The entrainment rates, the numbers of organisms entrained per unit volume of water withdrawn, may change as the sizes of the fish populations residing in the source water body change. However, the entrainment survival rate (probability of surviving entrainment) would be independent of the entrainment rate, thus even if current entrainment rates are substantially different than historical rates, the entrainment survival information may still be valid.

Factors that may cause entrainment survival rates to change include significant changes to the physical equipment in the cooling system (e.g. pumps, condensers, conduit materials or lengths), or changes in operating practices that result in different thermal exposure regimes. If new operational practices cause a facility to operate outside the parameter envelope encompassed by previous studies, then new entrainment survival information may be warranted.

3.1.5 Entrainment survival estimates were based on mortal effects only and did not address sublethal effects, which can include changes to growth, development, and reproduction.

EPA's comments on sublethal effects raise irrelevant questions that entrainment survival studies cannot and should not be expected to answer. Entrainment survival studies examine the effects of exposures to primarily mechanical and thermal stresses that occur over a period of generally 15 minutes to 1 hour. The organisms exposed are small, relatively fragile, and often are severely affected not just by the entrainment process, but also by the sampling process, as evidenced by the mortality of organisms captured at the intakes. In addition, even unentrained organisms of these life stages typically have high natural morality rates. Therefore, as would be expected, any damage to entrained fish eggs and larvae shows up very quickly as a lethal effect within the typical 24 to 96 hour observation period.

If one were to attempt to examine potential effects of entrainment that are not manifested as mortality within the latent effect observation period, such as reduced growth, abnormal development, or reduced reproduction, one would first need a plausible biological hypothesis for how such delayed effects would arise. Even with a plausible mechanism, measurement of such effects, if they were to occur, would be extremely difficult. First, the number of organisms that would be required for measurement of the effect at the desired endpoint would dictate that initial sample sizes be extremely large, certainly far greater than could be provided with a reasonably sized sampling effort. Second, the size of the on-site laboratory facilities that would be needed to hold the required number of organisms until the desired endpoint would be impractical, especially for endpoints more than a couple weeks post-entrainment. Third, the experimental environment itself is very unnatural, and becomes increasingly unnatural as the organisms grow. The artificiality of the holding environment would induce additional effects that could confound the effect being measured. It is for these reasons that bioassay studies utilize laboratory-reared, rather than wild-collected, organisms. Although the experimental environment eliminates interspecific predation as a possible confounding factor, many other possibilities remain, e.g. cannibalism, food limitation and starvation, and disease.

The current practice of 24 to 96 hours for observation of latent effects represents a reasonable compromise that allows the effects of any physical damage or (initially) sublethal temperature stress to be manifested as mortality, without extending the experiment to the point that the holding period itself becomes lethal.

Measurement of the effect of entrainment on eggs is the one area where additional observations might prove fruitful. Although, in many studies, eggs were held until hatch rather than for a specified time period, observation to a fixed time post-hatch might allow for the effects of possible developmental anomalies to be manifested and observed.

3.1.6 Critical information on cooling system characteristics, water quality, and environmental conditions was not collected.

In Section A7-1.2 (Thermal stress), EPA lists a large number of temperature-related variables that potentially affect entrainment survival rates. Although these factors may be theoretically relevant, past studies have shown that exposure temperature (i.e. the temperature measured in the discharge after it exits the condensers) is typically the most important factor. For instance, in Jinks et al. (1978) demonstrated that entrainment mortality for striped bass could be reasonably predicted from exposure temperature alone. Even if the temperature data EPA requests were recorded, it would be practically impossible to collect sufficient sample sizes of many entrained species to statistically test the influence of all the factors, and potential interactions of the factors, that EPA lists.

A great deal of the information EPA requests in Section A7-4.1, paragraph 4, is superfluous to measuring entrainment survival at a particular plant (e.g. impacts caused by speed and pressure changes within the condenser, the occurrence of abrasive surfaces, turbulences within the condenser). While collection of all te information EPA requests could aid in development of predictive models for entrainment survival, it is highly unlikely that any sampling program could provide sufficient samples to conduct a valid analysis to examine their potential effects.

An intensive program which can adequately describe entrainment survival under typical operating conditions need not produce a complete understanding of the actual levels of mechanical, thermal and chemical stress, and their interactions, in order to be useful or valid. Information on the mechanisms of entrainment mortality, and interactions among sources of stress, can best be developed using simulation studies where conditions can be closely controlled, and large sample sizes of the required species can be obtained. Although survival studies should collect as much of the indicated data as possible, it should not be viewed as a requirement that all of these variables be measured.

3.1.7 Estimation of entrainment mortality rates should be based on raw survival values in discharge samples, without adjustment for intake (control) mortality.

In its review of studies at the Braidwood station, EPA suggests that "…the percent survival of all individuals sampled from the discharge without correcting for sampling equipment related mortality be used to ensure a fair, accurate, and conservative estimate of entrainment survival." (p. A7-5). Further, in it’s critique of the Cayuga studies EPA claims that adjustment of discharge survival for intake survival gives "…falsely high survival rates"(p. A7-6). Both claims are without scientific merit. Intake (control) sampling is designed to address two sources of mortality unrelated to entrainment: sampling stress and natural mortality. Note that the early life stages of many of the most commonly entrained species experience high natural mortality rates (up 10-15 percent per day or more). Hence, the likelihood of there being significant numbers of dead organisms in the sample prior to being entrained cannot be ignored.

Both of these sources of mortality will affect estimates of fraction observed dead at the discharge sampling station. Consequently, failure to account for these two sources of mortality will result in a biased estimate of entrainment mortality. Hence, since estimates of entrainment mortality based on discharge sampling alone are inherently biased they cannot be considered accurate. Further, EPA offers no justification for their claim that intake sample results should be ignored. Interestingly, in their review of the Quad Cities study (p. A7-11), EPA suggests use of control data to account for mortality due to natural causes; a position that appears to contradict earlier admonitions no to adjust estimates for control mortality.

The suggestion to eliminate correction of the raw discharge proportion for (control) intake survival should not be implemented and would not help ensure a fair and accurate estimate. Use of the raw discharge proportion as a “conservative” estimate will be biased low, depending on the severity of sampling mortality and/or the proportion of already dead organisms in the samples.

3.1.8 Entrainment mortality should not be calculated when “erroneous” results (e.g. discharge survival proportions higher than intake survival proportions) occur.

When entrainment mortality rates are low (i.e., entrainment survival is high), it is entirely possible, and even likely, that at least some valid samples (i.e. samples meet the assumption of equal sampling stress at intake and discharge) will have higher survival proportions at the discharge than at the intake owing to random chance alone. Rather than indicating invalid data, these results indicate that entrainment mortality rate is low. In such cases, the maximum likelihood estimate of entrainment mortality rate is zero, but the estimate should also include confidence bounds that will place an upper limit on the entrainment mortality rate.

EPA’s recommendation to discard study results is surprising when one considers the similar situation that can arise in bioassay testing when control mortality exceeds the mortality under at least some of the toxicant concentrations. In EPA’s “Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms”, which similarly uses Abbot’s formula to adjust for control mortality, there are no recommendations to throw out or ignore such data as long as the control mortality is acceptably low (i.e. <= 10 percent). For reasons discussed in section 3.1.12, we feel the imposition of a fixed standard for control mortality is not appropriate for entrainment survival studies, but appropriate analytical procedures should be used to place lower and upper bound on the estimated entrainment mortality rates.

3.1.9 Latent effects of entrainment were studied under unnatural conditions.

In Section A7-3 (Cayuga and Indian Point), EPA criticizes the handling and latent effects studies because the conditions "…may not accurately simulate the actual conditions to which organisms are exposed after discharge from the facility." Typically, latent period holding is done at ambient temperatures. Cooling from the exposure temperature occurs gradually as the sampling apparatus is drained and the sample is sorted in the laboratory. Of course, the unsampled entrained organisms undergo a highly variable process of temperature decline depending on how long they remain in the thermal plume, and how rapidly the plume mixes with the ambient-temperature source water.

If EPA is referring to other aspects of the latent effects studies as being unnatural, then it is setting an impossibly high standard for the studies. It is not possible to reproduce natural conditions and still be able to monitor the status of large numbers of individual eggs and larvae. The important point is that the entrained and control organisms are both held in the same environment, so that their relative mortality rates can be appropriately compared.

In other contexts, such as Whole Effluent Toxicity testing, EPA sanctions the use of unnatural settings as a way to measure the effects of pollutants. The experimental setting, although unnatural, allows the researcher control of many extraneous factors that could affect the interpretation of results.

3.1.10 Unequal sample sizes for intake and discharge samples have an adverse effect on accuracy and precision of estimates.

In A7-3 (Port Jefferson; Page A7-10, paragraph 3 and elsewhere), EPA infers that unequal sample sizes at intake and discharge are problematic. We know of no statistical requirement for equal or nearly equal sample sizes, although equal sample sizes at both stations may produce the most precise estimates for a given total sample size.

A more serious issue with unequal sample sizes is whether the inequality may indicate non-random sampling at one or both of the stations. This issue is difficult to address experimentally, but information on the survival rates, species compositions, and length frequencies at both stations can generally be used to shed some light on issue. At the discharge, the turbulence of the discharge flow can generally be counted on to assist in randomizing the distribution of eggs and larvae and reducing their ability to avoid the sampler (should they still be alive). However, at the intakes flow may be slower and far less turbulent and organisms may be stratified within the inflow, perhaps more abundant in areas away from the actual point of sample withdrawal. This stratification may partially account for those instances where discharge samples are significantly larger than intake samples. In addition, sample design may result in greater quantities of water being sampled at the discharge than at the intake. For example in the 1988 Indian Point studies, the discharge sample volume was approximately twice as large as the intake sample volume.

3.1.11 Past studies are plagued by design flaws and incorrect data analysis decisions.

In section A7-3 (Braidwood Nuclear and elsewhere), EPA comments on the need to lag the starting time of the discharge samples so that both intake and discharge samples are drawing from the same pool of organisms. While this seems to be a useful design concept, in practice the slight conceptual advantage of appropriately lagged samples might be overweighed by the opportunity to process intake and discharge samples simultaneously and thus ensure identical post-sample treatment. (However, we note that in many cases, such as entrainment survival studies conducted at power plants on the Hudson River, discharge samples were, in fact, lagged).

In the same section, EPA concludes that dead-opaque larvae should be included with dead in order to calculate entrainment survival instead of removing them from the analysis as was originally done. However, it is important to recognize that fish eggs and larvae are typically translucent and almost transparent when they are alive. This translucency appears to be a camouflaging mechanism that may reduce predation mortality. It is only upon death that the tissues begin to breakdown and the eggs/larvae loose their translucency and become opaque. This opacity is commonly used in hatchery operations to identify dead fish eggs and larvae for removal. Because opacity requires some amount of time to develop, typically an hour or more, one can be assured that any opaque organisms found in a sample at collection have been dead for some time and are not opaque as a result of mortality at the time of collection. Hence, inclusion of these larvae in the analysis will decrease both the accuracy and the precision of the entrainment survival estimate. Therefore, the best (most accurate and precise) estimates of entrainment survival will result from exclusion of previously dead organisms that are entrained in the cooling water flow.

3.1.12 Precise estimates of entrainment mortality rates and model parameters are required.

Although EPA is clear that it requires precise estimates of entrainment mortality rates and model parameters for predictive models of entrainment mortality, it provides no standards for determining adequacy. We agree that no thresholds of precision should be established. Instead, the results of any valid study of entrainment mortality should be used in a weight-of-evidence evaluation. The more precise the estimates, the more weight should be given to the results in evaluating the impacts.

Although entrainment survival studies are superficially similar in concept to bioassays where survival of organisms exposed to various concentrations of a toxicant is compared (adjusted) to survival of control organisms, they differ from bioassays in three very fundamental ways. First, while the test organisms in a bioassay are generally of the same age, genetic lineage, and physical condition, the organisms sampled in an entrainment survival study are very heterogeneous. Even within the same life stage of the same species, there will be a great deal of variability in age, genetic lineage, and physiological state. This variation often results in relatively high mortality in control organisms, even when extreme care is used to minimize stress. Thus we feel it is not appropriate to set thresholds on control mortality or precision of the resulting entrainment survival estimate to have an acceptable result.

The second key difference between bioassays and entrainment survival studies is that bioassays utilize test organisms that have been selected to survive well under laboratory conditions. Thus, they are relatively insensitive to the routine stresses associated with the handling and care associated with laboratory rearing and testing. With such “tried and true” organisms it is reasonable to expect high survival of control organisms and relatively precise estimates of toxicant effects. On the other hand, entrainment survival studies are conducted using wild-caught individuals; many of which are difficult to hold under laboratory conditions.

The third key difference between bioassays and entrainment survival studies is that bioassays can increase precision by either repeating the experiment, or by using larger sample sizes initially. In entrainment survival sampling there is a distinct trade-off between sampling rate (volume/time) and sampling stress. It is very difficult to sample large volumes of water over a short period of time and do so in a manner that does not stress the organisms. Use of additional sampling gear might be limited by space available, and additional organisms require additional on-site laboratory space for sample sorting and latent effects observations. In short, it is not a trivial matter to increase sample size by increasing sampling intensity or duration.

We agree that precise estimates are desirable, but feel that arbitrary thresholds for precision are not appropriate. Studies should report precision of their results and agencies should then properly consider the weight they should be given and the manner in which they should be used in the assessment. Even where confidence intervals are relatively large, entrainment survival estimates can be factored into BTA assessments by appropriate handling of the uncertainty (e.g., by bounding the estimate or treating it probabilistically in the assessment).

A final point to consider is that, when taken as a whole, all 13 of the studies EPA has reviewed in Chapter A7, demonstrate that entrainment mortality is not 100%—there is a consistent pattern of some significant level of survival in all studies. Use of the 100% mortality assumption may appear to make it simpler to compare situations across power plants, but an erroneous use of the assumption will confound the plant and regional comparisons EPA is interested in, inflate the apparent benefits of certain alternatives, and could potentially result in actual negative benefits for some alternatives. In the face of overwhelming evidence for substantial entrainment survival, EPA's generic assumption of 100% mortality is not supported by the concerns raised by EPA in its review of these prior studies.

EPA Response

Please see response to 316bEFR.074.501.

Comment ID 316bEFR.074.600

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPRI submitted with its comments (OW-2002-0049, 4-1.74 in the docket or 316bEFR.074 in this database): "Defining and Assessing Adverse Environmental Impact: A Collection of Peer-Reviewed Papers"

EPA Response

No response necessary. Please see all comments for this author.

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Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPRI submitted with its comments (OW-2002-0049, 4-1.74 in the docket or 316bEFR.074 in this database): "Evaluating the Effects of Power Plants on Aquatic Communities: Guidelines for Selection of Assessment Methods"

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Maureen F. Vaskis & Mark F. Strickland

On Behalf Of:

PSEG Services Corporation, Ofc of Environmental Counsel

Author ID Number:

316bEFR.075

Comment ID 316bEFR.075.001

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code OPP

General Statement of Opposition

As it is a presently formulated, the Agency's Preferred Option could serve as an excellent starting point for crafting regulations that would be consistent with the statutory mandate of 316(b) and that would reflect good science and economics and therefore sound public policy. Notwithstanding this, PSEG believes that there are numerous flaws in the analyses conducted by the Agency's contractors, which calls into question many of the underpinnings of this rulemaking.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.075.002

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06

Option: Site-specific determination of BTA

As EPA is well aware, PSEG implemented permits issed by the New Jersey Department of Environmental Protection ("NJDEP") which the Agency reviewed and approved for its Salem Generating Station. These permits relied upon a suite of innovative technological and restoration measures to address the requirements of 316b. In complying with those permits, PSEG has made substantial investments and has advanced the state-of-the-art in intake screen technologies and the state-of-the-science on wetlands restoration and the links between coastal marsh and estuarine and marine fisheries. PSEG believes that the outcome of this rulemaking should confirm the wisdom of the Agency's prior actions in approving Salem's permit.

EPA Response

A goal of today’s rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.075.003

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06

Option: Site-specific determination of BTA

PSEG owns and/or operates steam electric generating stations that each withdraw more than 50 million gallons a day ("MGD") of cooling water through cooling water intake structures ("CWIS"). These stations, including the Salem Generating Station ("Salem"), will be subject to the requirements of the Proposed Phase II Rule. PSEG operates state of the art CWIS technologies at the Salem facility, and has implemented a major habitat restoration program that provides significant benefits to the Delaware Estuary ecosystem. Data and information from Salem were collected and subsequently used by EPA in a case study that formed a partial basis for the Agency's assessment of benefits associated with the Proposed Phase II Rule. The outcome of the Proposed Phase II Rule will determine whether PSEG's substantial investment in scientific study and evaluation, technological development and implementation, and significant ecosystem enhancement will continue to be recognized as a viable approach to providing valuable benefits to society and to the environment. PSEG strongly encourages EPA to promulgate a final rule that allows and encourages flexibility to continue measures such as those implemented at Salem to maximize benefits to the environment and society.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

A goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.075.004

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06

Option: Site-specific determination of BTA

THE AGENCY HAS SOUGHT COMMENT ON A WIDE RANGE OF REGULATORY APPROACHES OF VARYING MERIT

In general, PSEG supports an approach that recognizes that the protection of the aquatic ecosystems by the regulation of existing facilities under § 316(b) of the Clean Water Act ("CWA") can only be accomplished through assurances to the permittee and the regulator that the unique nature of each facility and ecosystem will be considered. Simply stated, § 316(b) should be applied on a site-specific basis with great consideration given to site-specific conditions.

The CWA, the regulatory history and the Docket in this rulemaking clearly support site-specific regulatory approaches for implementing § 316(b). USEPA's Preferred Regulatory Option relies on technology based performance standards, and provides some flexibility. For this approach to be workable in practice, however, certain clarifications and enhancements are necessary.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.075.005

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

PSEG endorses USEPA's decision not to propose a rule based on closed cycle cooling and provides additional information to bolster the already strong record in this regard.

EPA Response

No response necessary.

Comment ID 316bEFR.075.006

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.09

Option: PSEG site-specific alternative

Site-Specific Approaches

USEPA sought comment on several site-specific alternatives, including one submitted by PSEG in January 2002. PSEG's regulatory approach contemplates three demonstration options. The first would allow permit writers to rely on prior analyses, data and best technology available ("BTA") determinations if still valid and representative of current conditions. The second would utilize alternative technology assessments and a determination of BTA based upon a cost-benefit analysis; under this demonstration type there would be no separate analysis of adverse environmental impacts ("AEI") since the impacts of impingement and entrainment ("I&E") losses on the population level would be addressed in a cursory fashion through the estimation of benefits derived from the application of alternative technologies. The third demonstration option would begin with a full assessment of the potential for AEI, using adverse impact at the population/community level as the standard. If AEI were detected, the permittee would determine BTA based on the analyses outlined in the second demonstration type. PSEG's regulatory approach also specifically authorized the use of restoration measures, when volunteered by the permittee, as a means to minimize AEI.

PSEG continues to endorse this approach, and also endorses the Utility Water Act Group ("UWAG") approach, and believes it is a better option than the Agency's site-specific approach. The language of § 316(b), the Agency's long-standing practice, and the absence of significant credible scientific data or information suggesting that the operation of CWISs at existing facilities have had a negative impact on fisheries or aquatic biota all support the selection of a site-specific rule for existing facilities.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.075.007

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

USEPA's Preferred Regulatory Option

USEPA's Preferred Option is based on performance standards for reductions in impingement mortality and entrainment. Compliance with the performance standards can be achieved by demonstrating either (1) intake flow commensurate with closed cycle cooling using cooling towers or ponds or similar methods of recirculation or (2) an 80-95% reduction in impingement mortality and, for many facilities, a 60-90% reduction in entrainment.

USEPA's Preferred Option would allow the permittee to rely upon an alternative site-specific performance standard upon a demonstration that its cost of compliance with the performance standards would be "significantly greater" than either the costs the Agency considered in developing the Phase II Rule or the benefits that would accrue. USEPA also proposes to allow alternative requirements under other specified circumstances.

USEPA's Preferred Option would allow permittees to use restoration measures (for example, creating or restoring a wetland or operating a fish hatchery) instead of, or along with, intake technologies if a permittee can make certain demonstrations concerning the efficacy of the restoration. USEPA's proposal also requires substantial engineering and biological studies for permit application and multiple years of monitoring during the permit term to verify compliance with the performance standards.

The Preferred Option for the Proposed Draft Phase II Rule represents a positive, critical departure from the approach taken in EPA's Phase I Rule by not proposing one particular technology as BTA. EPA does not appear to intend to require existing facilities to retrofit to closed cycle cooling. For these reasons, PSEG endorses the general approach of the Preferred Option, which allows permittees considerable flexibility in determining the most appropriate means of achieving compliance with §316(b).

Nonetheless, EPA should make several clarifications and enhancements for its Preferred Option.

EPA Response

The commenter has summarized the basic elements of the proposed rule. EPA appreciates the commenter's support of the regulatory approach in the proposal, and notes that the final rule uses a similar approach. Please refer to the response to comment 316bEFR.072.029 for a discussion of the framework of the final rule.

The commenter has characterized the proposed rule; therefore, no response is necessary.

EPA notes that it has not required, in this rule, that existing facilities retrofit to closed-cycle cooling.

For a discussion of this issue, please refer to the preamble in the final rule.

No further response is required, as the concerns referred to in this comment will be addressed individually in other comments.

Comment ID 316bEFR.075.008

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.02

Performance standards

The performance standards proposed by USEPA are overly stringent and go beyond what would likely be required to ensure protection of aquatic resources.

The values the USEPA proposed as performance standards are arbitrary; the ability to achieve the proposed levels are too highly site specific. Site-specific analyses PSEG has conducted at existing facilities demonstrate that the biological efficacy and/or availability of alternative technologies to reduce entrainment and impingement losses are highly site-specific. USEPA acknowledges that the mortality rate of entrained fish and macroinvertebrates can vary from 2 to 97 percent depending upon the species and life stages entrained. The fact that entrainment survival does not occur everywhere at the same rate is no reason to refuse to consider it at all, especially at a site where the permittee has data establishing survival rates.

Some of the proposed technologies have only been tested in a limited number of waterbodies and with the fish and shellfish species and life stages that are unique to the particular location. PSEG believes the performance standards should be targets and not absolute values because there is limited experience with certain of the technologies used to establish the values. The preamble of the USEPA Proposed Phase II Rule states that the presumptive performance standards specified at § 125.94(b) through (d) for impingement mortality reduction and entrainment reduction are based the following technologies: fine and wide mesh wedgewire screens, aquatic filter barrier systems, barrier nets, modified screens and fish return systems, fish diversion systems, and fine mesh traveling screens and fish return systems. The technologies on which USEPA has based the criteria for impingement survival efficiency and entrainment are not readily applicable in all applications or could be considered experimental and unavailable at certain sites. In larger capacity plants that require larger flows or areas with site-specific characteristics such as high intake velocities, these technologies would not be appropriate.

EPA Response

Please see responses to comments 316bEFR.307.064 and 316bEFR.311.002. See also the preamble and the final rule.

Comment ID 316bEFR.075.009

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The benefit/cost test should be consistent with the Agency's own Guidelines for Preparing Economic Analyses and should incorporate UWAG's recommended test to "maximize net benefits" test.

EPA Response

EPA's benefit-cost test is consistent with the Agency's guidelines. Please see response to Comment 316bEFR.005.020.

Comment ID 316bEFR.075.010

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.01

Submittal of required information

The Agency also should establish more reasonable requirements relating to the implementation of § 316(b) in National Pollutant Discharge Elimination System ("NPDES") permits. Specifically, the proposed schedule will not work in the real world; the timing of and requirements for the comprehensive demonstration study are unrealistic. Although the proposed regulatory language gives a State Director great flexibility in determining monitoring requirements, the preamble language identifies burdensome monitoring recommendations that could be incorporated into permits. USEPA should clarify the discretion to permitting agencies relative to monitoring. EPA's Preferred Option, with certain clarifications, could prevent adverse environmental impacts to the aquatic environment using BTA.

EPA Response

EPA has clarified timing requirements the preamble to today's final rule. Please see response to comment 316bEFR.034.066 for details.

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

Comment ID 316bEFR.075.011

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.0

Other technology-based opt. under consideration

The Agency also sought comment on three additional technology based options that are uniformly unreasonable, unworkable, and contrary to the statutory provisions of § 316(b). In general, the costs and impacts on energy supply and system reliability are underestimated, and the benefits on the aquatic ecosystem are overestimated. None of these three options should receive further consideration by EPA.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.075.012

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.01.02

PSEG definition of "adverse environmental impact"

THE AGENCY MUST MAKE REASONED DECISIONS ON KEY POINTS, REGARDLESS OF THE REGULATORY APPROACH ADOPTED

In addition to seeking comment on a range of regulatory options, USEPA has put forward definitions, standards or approaches for addressing a wide range of issues that cut across some or all of the regulatory options discussed in the proposal. In this section, PSEG holds strong views, based on decades of operating and regulatory experience, on several of these issues. First, the Agency should adopt a definition of adverse environmental impact. USEPA intentionally omits the regulatory definition of Adverse Environmental Impact ("AEI") because the determination of AEI can take a considerable length of time and EPA believes the determination of AEI imposes a burden on the regulatory agencies according to the Agency. Establishing a clear definition of AEI would provide for informed, scientifically-based decisions consistent with the statutory mandate. The burden on regulatory agencies will not be increased and cost-effective and appropriate implementation of the CWA would occur if AEI were defined as proposed by UWAG.

Section 316(b) requires intakes to reflect "best technology available for minimizing adverse environmental impact." The plain language of § 316(b) interposes an environmental-effects test to determine whether an intake structure reflects the BTA standard. If there is no "adverse environmental impact," then there is nothing "for minimizing," and the objective of BTA is satisfied. As the Agency has stated on previous occasions "adverse environmental impact" is an important legal concept that needs to be addressed in the § 316(b) regulations.

EPA has solicited comment on an alternative definition of Adverse Environmental Impact that includes a component that focuses on entrainment and impingement of significant numbers of critical aquatic organisms without considering the source and magnitude of the change and its resultant impact on the relevant aquatic populations, communities, and ecosystems. Significant numbers of aquatic organisms can be impinged or entrained without affecting the community or population of the ecosystem. PSEG supports modifying the AEI definition in accordance with UWAG's comments which provides a foundation of assessing the impacts on ecosystem, community, or population basis, which is appropriate under § 316(b).

EPA Response

EPA has rejected the definition of adverse environmental impact as proposed by UWAG. EPA does not believe that the plain language of section 316(b) of the Clean Water Act requires "an environmental-effects test" that would require no technology unless an impact is determined to occur (and be attributable to a particular cooling water intake structure) on an ecosystem, community or population level. There are many environmental factors which can act concurrently and impact fisheries. In today's final rule, EPA seeks to simplify the section 316(b) determination process and include compliance options requiring the reduction of impingement and entrainment by a performance standard. These reductions will reduce stress on fish populations. Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact for today's final rule.

Comment ID 316bEFR.075.013

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The economic test proposed by USEPA for evaluating costs and the benefits under § 316(b) must reflect credible methods and practices that are widely accepted in the environmental economics profession. USEPA has requested comment on the role of cost and benefit analyses for determining the best technology available for minimizing adverse environmental impact. PSEG supports USEPA's proposal to include a cost-benefit test in both its Preferred Option and its site-specific option and believes it essential to any reasonable rule implementing § 316(b). This is the case whether USEPA ultimately adopts a site-specific approach as urged by PSEG and UWAG or whether the Agency adopts its Preferred Option based upon Performance Standards. Congress clearly mandated that costs must be considered when determining BTA. PSEG supports UWAG's position that "maximize net benefits" is the most appropriate test for evaluating the cost and benefits of cooling water intake structure technologies and any operational and/or restoration measures considered in site-specific BTA evaluations.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

Comment ID 316bEFR.075.014

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02

Benefit Estimation Methodology

In addition, the accurate valuation of benefits is critical. USEPA requested comment on the appropriate methodology for benefits assessment. The accurate valuation of benefits is critical to make an informed decision regarding whether a technology is BTA for minimizing adverse environmental impact. Without an accurate valuation of benefits, determination of the maximum net benefit will not allow decision makers to make an informed determination. Similarly, without an accurate valuation of benefits, the cost-benefit test described by EPA in its "Site-Specific Determination of Best Technology Available" will be unusable.

EPA Response

EPA agrees that accurate valuation of benefits is critical when applying the benefit-cost test. However, no methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis.

Comment ID 316bEFR.075.015

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

The narrative benefits assessment approach should not be used to develop nonuse values. Nonuse values cannot be credibly established on a national or national waterbody scale. If non-use values are appropriate, they should be developed on a case-by-case, site-specific basis, which could take into account more realistically any actual nonuse values that could be assigned in a scientifically defensible manner.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis (DCN #6-0002).

Please see response to comment 316bEFR306.105 for additional discussion of the constraints the Agency faces in conducting primary stated preference research on nonuse values.

Comment ID 316bEFR.075.016

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.07.02

RFC: Appropriateness of “significantly greater”

USEPA requests comment on the "significantly greater" cost test. Neither the "significantly greater" nor the "wholly disproportionate" cost tests are the best means for evaluating BTA for minimizing adverse environmental impact. As explained in the UWAG comments, the appropriate cost test is the "maximize net benefits" test.

EPA Response

See responses to 316bEFR.006.003 and 045.012.

Comment ID 316bEFR.075.017

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

PSEG supports USEPA's proposal to include restoration measures in the Phase II Proposed Rules, including USEPA's Preferred Option, as well as its other options, that allow implementation of restoration measures by a facility in lieu of or in combination with reductions in impingement mortality and entrainment. PSEG firmly believes that, for many facilities, implementation of restoration measures can provide increased ecological benefits over a purely technology-based approach.

EPA Response

EPA does not believe restoration measures necessarily provide greater benefits than design and construction technologies or operational measures. However, allowing restoration measures as a compliance option under the final rule provides permitting agencies and permit applicants with additional options, some of which will provide greater ecological benefits than others.

Comment ID 316bEFR.075.018

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

PSEG also believes that USEPA should allow permitting agencies and permittees to determine the spatial scale under which restoration efforts should be allowed. Restoration measures may not equally benefit all species of concern at a particular CWIS and the spatial scale for restoration measures must depend on the species to be addressed and the type of restoration measures to be implemented. The nature and extent of consultations with state, tribal and federal agencies should be dictated by the nature and scale of the restoration measures under consideration.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures and on flexibilities in the requirements for restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.075.019

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.01

Submittal of required information

PSEG has concerns about the timing and schedule for preparation and submission of the required components of NPDES permit renewal applications, and believes this consultation process must occur prior to preparation of the Comprehensive Demonstration Study proposed in § 125.95(b) of the USEPA's Preferred Option.

EPA Response

EPA has clarified timing requirements. See the preamble to today's final rule. Please see response to comment 316bEFR.034.066 for details.

Comment ID 316bEFR.075.020

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.02

Performance standards

USEPA recognizes that it may not always be possible to establish quantitatively that the reduction in impact on fish and shellfish resulting from the implementation of conservation measures is comparable to that intended through compliance with the performance standards. USEPA should allow flexibility in the Final Rules for application of multiple approaches to demonstrate “substantial similar performance” of restoration measures and should allow the Director to determine on a permit-by-permit basis what data and methodologies are sufficient to demonstrate that restoration measures will maintain fish and shellfish at a level comparable to that which would be achieved through application of the performance standards (§ 125.95(b)(5)).

EPA Response

Please see response to comment 316bEFR.060.026.

Comment ID 316bEFR.075.021

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

PSEG supports allowing voluntary implementation of restoration measures by a facility in lieu of or in combination with implementation of technological measures which reduce impingement mortality and entrainment and concurs with UWAG's comments regarding mandatory implementation of restoration.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.075.022

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

PSEG also agrees with USEPA's promotion of the voluntary use of trading as an innovative way to develop common sense and cost-effective solutions for a variety of environmental issues. Limiting the scope of trading to entrainment losses, however, is unnecessarily restrictive. Trading both impingement and entrainment losses would afford maximum flexibility and provide enhanced environmental benefits under § 316(b). PSEG believes that the goal of trading is not only cost-effective solutions, but solutions that optimize the benefits to the potentially impacted resource and provide the maximum net benefit to society. PSEG's experience suggests that any of the trading units (i.e., density counts, biomass) suggested by USEPA will be subject to various limitations. To reduce the complexity, PSEG suggests that the trading focus on the biomass of dominant species and life stages of fish and shellfish impinged and entrained over a representative monitoring period.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule. Please see response to comment 316bEFR.077.052 regarding the appropriate units for trading.

Comment ID 316bEFR.075.023

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.03

Spatial scale for entrainment trading

PSEG believes that trading should not be limited to the watershed level because of the relatively small areas encompassed by specific watersheds as compared to the large spatial areas covered by the natural distribution of a number of potentially affected species (e.g., striped bass, weakfish, herrings). If the USEPA adopts PSEG's recommendation and allows the specifics of trading to be established by the local Director, then these types of issues, based on ecological facts, should also be resolved by the Director.

EPA Response

This comment summarizes the points made by the same author in comment 316bEFR.075.090. Please see response to that comment.

Comment ID 316bEFR.075.024

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.02.01

PSEG recomm. for using previous studies

PSEG strongly believes EPA's final rule should provide that if a facility has received a reasoned BTA determination based on still valid scientific, technical and engineering information, no additional actions should be required for compliance with § 316.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.075.025

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.01

Submittal of required information

Permit requirements must allow for the time needed to collect, analyze, and report the data, needed for a comprehensive demonstration study.

EPA Response

EPA has clarified timing requirements. See the preamble to today's final rule. Please see response to comment 316bEFR.034.066 for details.

Comment ID 316bEFR.075.026

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.02.01

PSEG recomm. for using previous studies

If USEPA establishes clear Phase II rules and provides definitive guidance for assessing previous § 316(b) determinations, USEPA could accept the re-validation of prior § 316(b) determinations.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.075.027

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.01.02.02

Fish Population Modeling

USEPA did not have a reasoned basis for rejecting the operation of density-dependent compensation.

EPA Response

Please see response to Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.075.028

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.03

Monitoring requirements

USEPA has substantially underestimated the costs associated with its proposed monitoring and application requirements based on site-specific work PSEG has conducted.

EPA Response

See the final rule preamble and responses to comments 316b.efr.075.098, 316b.efr.075.101, and 316b.efr.029.119.

Comment ID 316bEFR.075.029

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

The Preamble includes errors or inaccuracies in the Proposed Phase II Rule in regard to PSEG facilities.

EPA Response

Please see response to comment ID 316b.EFR.075.103 which details the author's concerns regarding errors or inaccuracies in the preamble to the Proposed Phase II rule with regard to PSEG facilities.

Comment ID 316bEFR.075.030

Subject Matter Code 10.03.01.01

Salem

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

PSEG's comments on USEPA's Delaware Estuary Case Study focus on information regarding PSEG's Salem Generating Station, which formed the basis for the Delaware Estuary Case Study. PSEG is concerned that USEPA published incorrect or misleading information on Salem's I&E estimates and provides a summary of PSEG's critique of USEPA's I&E loss estimates for Salem and the economic value of Salem's I&E losses. PSEG also notes some factual errors regarding Salem in USEPA's case study. PSEG is concerned that USEPA's characterization of biases and uncertainties in USEPA's benefits estimates is misleading, and that USEPA's case study ignored critical information. In particular, PSEG is concerned that USEPA has overestimated the economic value of Salem's I&E losses. Finally, certain comments USEPA made in the Case Study Report and Economic Benefits Analysis regarding I&E loss estimates in general are not applicable to Salem.

EPA Response

Please see response to Comment 316bEFR.075.104. In addition, EPA wishes to point out that EPA's final analysis did not evaluate Salem's impingement and entrainment rates directly. Rather, EPA averaged impingement and entrainment estimates developed by EPA for multiple facilities in the mid-Atlantic region, in addition to Salem, to develop a regional estimate of impingement and entrainment.

Comment ID 316bEFR.075.031

Subject Matter Code 10.03.01

Delaware

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

In addition to its general interest in the outcome as it may affect the continued economic viability of these Stations, PSEG has specific interests with respect to its Salem Generating Station ("Salem" or "SGS"). Data and information collected at and for Salem on the Delaware Estuary have been re-evaluated by USEPA and have been extrapolated to other facilities, including PSEG's Hope Creek Generating Station (“Hope Creek”), in the Agency's case study of the Delaware Estuary (“Delaware Case Study”). <FN 3> The Delaware Case Study, together with the other case studies formed the bases for the Agency's assessment of benefits associated with the Proposed Phase II Rule.

Footnotes

3 Case Study Report, Chapter B.

EPA Response

This comment refers to the extrapolation procedure used at proposal. Results of this analysis are not included in EPA's final analysis for the 316b Phase 2 rule. For the final analysis I&E for the entire mid-Atlantic region was estimated on the basis of 6 facilities in different parts of the region Calvert Cliffs, Indian River, Chalk Point, Morgantown, Indian Point, and
Salem). For a discussion of EPA's extrapolation procedure for its final analysis, please see Chapter A5 of the Regional Analysis Document (DCN #6-0003) and EPA's response to Comment 316bEFR.041.041.

For a discussion of EPA's commercial fishing benefits analysis, please see Chapter A10 and Chapter D3 of the Regional Analysis Document and response to Comment 316bEFR.005.029.

For a discussion of EPA's recreational fishing benefits method used for the mid-Atlantic, please see Chapter All and Chapter D4 of the Regional Analysis Document and response to Comment 316bEFR.041.452.

Comment ID 316bEFR.075.032

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Finally and perhaps most importantly, PSEG has made substantial investments in CWIS technologies at Salem and has implemented a major habitat restoration program, referred to as the Estuary Enhancement Program ("EEP"). The outcome of the Proposed Phase II Rule will determine whether PSEG's EEP will serve as a model for resolving controversial environmental issues or whether the substantial investment in the EEP with its real and long-lasting benefits to the Estuary and its aquatic resources will continue to be recognized as a viable approach for providing valuable benefits to the environment and society.

EPA Response

For a discussion of existing restoration measures, see EPA's response to comment 316bEFR.307.046.

Comment ID 316bEFR.075.033

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

USEPA's Proposed Phase II Rule includes a preferred regulatory option ("Preferred Option") based on performance standards. USEPA is seeking comments on its Preferred Option and on a number of alternative regulatory options ("Alternative Options"), including an approach proposed by PSEG, as well as a myriad of issues that go to the very core of any rule implementing § 316(b). The Preferred Option proposes a comprehensive regulatory scheme, addressing many of the key statutory components as well as requirements for monitoring programs and renewal applications. In sum, the Agency's Preferred Option proposes three alternative means of demonstrating best technology available ("BTA"):

1. cooling water intake flow commensurate with operating with a closed recirculating cooling system;

2. compliance with the performance standards applicable to the waterbody type and facility capacity factor of a given facility through the implementation of technological, operational and/or restoration measures; or

3. a case-by-case determination of BTA, if the permittee can meet one of two proposed cost tests.

In addition, the Preferred Option also proposes requirements for baseline monitoring studies, a comprehensive demonstration study to be submitted with renewal applications, and monitoring to be required during the term of a permit.

EPA Response

Please refer to the response to comment 316bEFR.038.007.

Comment ID 316bEFR.075.034

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.0

Other technology-based opt. under consideration

The Alternative Options included in the Preamble to the Proposed Phase II Rule run the gamut from an option which would require retrofits to closed cycle cooling on all in-scope existing once through cooling steam electric power plants to a solely site-specific option based on a population level determination of adverse environmental impact ("AEI") with BTA determined based on maximizing net benefits to society. USEPA also seeks comments on the key concepts and/or issues that would arise in implementing any of these regulatory options.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.075.035

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

PSEG applauds and wholeheartedly endorses the Agency's recognition that the regulation of CWISs at existing facilities requires a substantially different approach than the establishment of uniform national technological requirements, <FN 4> which the Agency adopted in its final new facilities rule. <FN 5> Likewise, PSEG strongly supports the Agency's proposal to allow permittees to utilize restoration measures to demonstrate compliance with § 316(b) under either a performance standard or site-specific demonstration. Similarly, PSEG fully endorses the Agency's proposed determination that existing facilities operating with a recirculating cooling system would be deemed to be in full compliance with BTA.

Footnotes

4 See, e.g., 67 Fed. Reg. 17168. ("For example, under a uniform national requirement based on dry cooling, facilities in the southern regions of the U.S. would be at an unfair competitive disadvantage compared with those in cooler northern climates").

5 40 CFR § 125.80 - §125.89, 66 Fed. Reg. 65256 (December 18, 2001).

EPA Response

With respect to the approach taken in the Phase II rule, EPA recognizes that the requirements implementing section 316(b) are applied in a variety of settings and to Phase II existing facilities of different types and sizes. As such, no single technology is most effective at all existing facilities and a range of available technologies has been used to derive the performance standards. Please refer to section VII of the preamble for more information.

With respect to the role of restoration, please refer to sections VII and VIII in the preamble for the final rule.

With respect to facilities with closed-cycle recirculating cooling systems, EPA agrees that these facilities are to be considered to be in compliance with the rule. The final rule contains a separate compliance alternative for these facilities. Please see 125.94(a)(1) for more information.

Comment ID 316bEFR.075.036

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.0

Other technology-based opt. under consideration

II. THE AGENCY HAS SOUGHT COMMENT ON A WIDE RANGE OF REGULATORY OPTION OF VARYING MERIT

In the Proposed Phase II Rule, USEPA takes an approach similar to the approach taken in the Phase I Rulemaking - the Agency has put forward a Preferred Option (i.e., the Performance Standard draft rule) and then seeks comments on several Alternative Options. In this section, PSEG provides comments on each of the regulatory options discussed in the preamble. In general, PSEG supports the options that recognize that the regulation of existing facilities under § 316(b) can only be accomplished through rules that ensure maximum flexibility to the permittee and the regulator in establishing CWIS requirements. The Record the Agency has developed clearly supports this approach. Likewise, PSEG applauds the Agency's very wise determination not to propose requiring that all or some sub-set of existing facilities be retrofitted to operate with closed cycle cooling. There is no basis for such a costly and draconian requirement in the Record; in fact the available evidence points toward a contrary conclusion. However, as PSEG, UWAG, EEI and others have consistently argued and, as USEPA has implemented the statutory provision for thirty years, §316(b) should be applied on a site-specific basis.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the preamble for more information.

Comment ID 316bEFR.075.037

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Each Of The Site-Specific Options USEPA Put Forward Has Merit

As noted above, USEPA is seeking comment on whether it should adopt regulations that would determine BTA for minimizing AEI at existing facilities on a site-specific basis. As PSEG and UWAG have long urged, USEPA should continue to implement this statutory provision on a site-specific basis. The language of the statute, the Agency's guidance and long standing practice and the very essence of what's being regulated -- the interaction of a CWIS with a specific aquatic environment -- all dictate that this is the best approach. This section explains PSEG's position on the alternative site-specific options in the Preamble as well as the language for a site-specific rule PSEG is proposing in these comments.

There is more than sufficient justification based on legal and regulatory precedent, and the information and data in the Docket to support the promulgation of a site-specific rule for existing facilities. The language of § 316(b), itself, together with the Agency's long-standing and consistent application supports such an approach. Moreover, as USEPA recognizes throughout the preamble and in the design of its preferred regulatory option, the engineering and economics at existing facilities pose materially different considerations than when dealing with a new facility. Finally and perhaps most importantly, there is little, if any, data or information in the Docket that suggests the operation of CWISs at existing facilities have had a negative impact on fisheries or aquatic biota. Attachment 3 to PSEG's comments provides a summary of the legal, regulatory and scientific bases supporting this contention.

Despite all of this, the Agency explains it is reluctant to continue with site-specific BTA determinations. <FN 7> The environmental groups who sued EPA allege that site-specific BTA determinations have resulted in inconsistent or non-existent regulation under §316(b). <FN 8> USEPA also cites concern with the burden a site-specific rule would place on permitting agencies. <FN 9> PSEG submits that all of these concerns can be addressed through promulgation of a clear and carefully drafted site-specific rule, which includes definitions of key terms and standards, and which references to existing USEPA guidance, or the promulgation of additional guidance. <FN 10> The Agency must recognize that the above-cited criticisms of and concerns with site-specific § 316(b) decision-making arose in the absence of regulations or, for that matter, final guidance.

As discussed in detail in the comments on the Agency's Proposed Phase I Rule <FN 11> by both UWAG <FN 12> and PSEG, <FN 13> both of which PSEG incorporate by reference herein, a site-specific determination must be made to achieve the objective.

Footnotes

7 See, e.g., 67 Fed. Reg. 17161 – 17168.

8 Cronin, et al. v. Reilly, et al., U.S.D.C. S.D.N.Y. 93 Civ. 0314 Complaint, at 11-12.

9 67 Fed. Reg. 17167.

10 The Code of Maryland Regulations ("COMAR") in existence for many years addresses many of the issues posed by the proposed Phase II Rule such as what is AEI and support site-specific evaluations (McLean, et al. 2002). PSEG believes the Maryland program provides an example that such an effective § 316(b) regulatory program can and has been implemented. The EEI comments (p. 7) notes that USEPA has received letters from the Environmental Departments of Illinois, Texas, Pennsylvania and a letter from the Governor of North Carolina, that indicate their states continued commitment to a site-specific approach.

11 65 Fed. Reg. 49060, Proposed § 316(b) Rule for New Facilities and ICR NO. 1973.01 (Aug. 10, 2000) ("Proposed Phase I Rule").

12 Comments of the Utility Water Act Group on EPA's Proposed § 316(b) Rule for New Facilities and ICR NO. 1973.01, Docket Control Number 4-0000 (November 9, 2000). (Hereinafter "UWAG Phase I Comments").

13 Comments on EPA's Proposed §316(b) Rule for New Facilities, Docket No. W-00-03. Docket Control Number 4-0000 (November 8, 2000). (Hereinafter "PSEG Phase I Comments").

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

The rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.075.038

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

The Agency’s Sample Site-Specific Rule Has Merit

USEPA provides a draft regulatory language for implementing the requirements of § 316(b) on a site-specific basis. <FN 14> USEPA’s site-specific sample rule is a formal process for determining the BTA for minimizing AEI at particular facilities, focusing on the site-specific interactions between cooling water intakes and the affected environment and the costs of implementing controls. <FN 15>

The site-specific sample rule provides that a previously conducted § 316(b) demonstration may be used if it reflects current biological conditions in the waterbody and the current design of the intake structure. The determination of BTA for minimizing AEI may be based on a previously conducted § 316(b) demonstration or an analysis based on the Design and Construction Plan, operational measures, and restoration measures, considering an assessment of risks.

USEPA’s site-specific sample rule would not define adverse environmental impact but would instead establish factors to be considered for determining BTA including: (1) minimization of impingement mortality; (2) minimization of entrainment mortality; (3) consideration of non-aquatic environmental impacts; and (4) the costs and benefits using a “significantly greater” standard. Voluntary restoration measures could also be applied to minimize adverse environmental impact; however, coordination with "appropriate" fish and wildlife management agencies would be required. Finally, the Agency’s site-specific approach would also require biological surveys to identify and characterize the target aquatic populations of concern, protected species, and other chemical, water quality and anthropogenic stressors.

As noted above, the approach clearly has merit. First and foremost, it would continue site-specific determinations. Second, it would allow agencies to renew still valid, prior § 316(b) determinations. Third, it would provide a framework for making such determination. This would fill the present void and provide the requisite guidance to regulators and permittees on key issues, thereby streamlining the site-specific determination process. It would also recognize already existing state programs that achieve levels of protection comparable to those that would be achieved under the Agency’s sample rule. PSEG believes either its or UWAG’s site-specific approach has greater merit than the approach outlined in the Agency’s sample site-specific rule.

Notwithstanding the above support, unlike UWAG’s or PSEG’s approaches, the Agency’s sample site-specific rule would place the primary focus on the reduction of entrainment an impingement losses. PSEG believes this runs counter to assessing the effects of a given CWIS on the particular ecosystem it affects. In addition, this sample rule would impose onerous monitoring and application requirements.

Footnotes

14 67 Fed. Reg. 17159-17161.

15 67 Fed. Reg. 17159.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

With respect to the use of previous studies, a goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

For information on the role of restoration, please refer to the preamble to the final rule.

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. (see § 125.90(c)).

Comment ID 316bEFR.075.039

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.08

Option: UWAG's recommended approach

UWAG's Site-Specific Approach Has Merit

UWAG recommends <FN 16> a reasonable framework for a site-specific regulatory options that focuses on the critical components of a § 316(b) determination. As discussed below, UWAG defines adverse environmental impact and provides an approach for assessing alternative technologies. UWAG also endorses the use of a Representative Indicator Species as the focus of the assessment.

UWAG proposes three approaches for assessing the environmental impact of a cooling water intake structure: (1) re-assessment of a currently valid, prior § 316(b) demonstration; (2) use of ecological risk assessment by means of demonstration of adverse environmental impact using conservative decision criteria; and, (3) assessment of risk utilizing a structured decision making process consistent with current USEPA Ecological Risk Assessment Guidelines. These alternative approaches provide the opportunity for the permittee and the regulatory agency to develop the most appropriate assessment of environmental impact for the specific facility and ecosystem.

If an adverse environmental impact were identified, UWAG proposes that facilities would then identify and assess alternative intake technologies and then determine BTA, which would be the CWIS technology that maximizes net benefit. Finally, UWAG's approach would authorize agencies to consider the benefits of restoration measures if volunteered by permittees.

As noted above, PSEG endorses UWAG's approach and believes it to represent a better option than the Agency's site-specific approach. If promulgated as the Final Rule, it would, like the approach PSEG describes in Attachment 1, provide a reasonable site-specific regulatory framework, that is consistent with applicable law, and sound science and economics.

Footnotes

16 USEPA discussed this recommendation in the preamble. See, e.g., 67 Fed. Reg. 17162.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.075.040

Subject Matter Code 17.09

Option: PSEG site-specific alternative

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

PSEG’s Site-Specific Approach Has Merit

USEPA is also seeking comment on a site-specific alternative recommendation submitted by PSEG in January 2002. <FN 17> This regulatory approach contemplates three demonstration options. The first would allow permit writers to rely on prior analyses and data, and BTA determinations if still valid and representative of current conditions. The second would utilize alternative technology assessments and a determination of BTA, based upon a cost-benefit analysis. <FN 18> Under this second demonstration option, there would be no separate analysis of AEI since the impacts of impingement and entrainment (“I&E”) losses on the population would be implicitly addressed through the estimation of benefits derived from the application of alternative technologies. The third demonstration option would begin with a full assessment of the potential for AEI, using adverse impact at the population or community level as the standard. If AEI were detected, the permittee would determine BTA based on the analyses outlined in the second demonstration option. PSEG’s proposed regulatory alternative also specifically endorsed the use of restoration measures, when volunteered by the permittee, as a means to minimize AEI.

PSEG drafted its January 2002 site-specific proposal in an effort to demonstrate to the Agency that it was possible to craft a site-specific approach that would be workable, and would not impose undue burden on permittees or regulators. To this end, PSEG relied on standards or tests that the Agency had previously endorsed. <FN 19> PSEG believes this is still the case since the first demonstration option would require validation of prior determinations and the second option would not require full AEI demonstrations, which typically entail assessments of population level effects on the aquatic populations.

Footnotes

17 See, e.g., 67 Fed. Reg. 17162. A copy of this regulatory language is included as Attachment 1 to these Comments.

18 Although PSEG’s January 2002 proposal references the cost-benefit test previously endorsed by USEPA in a number of prior § 316(b) determinations and by the NJDEP in § 316(b) determinations for Salem, PSEG believes that the “maximize net benefits” test is the more appropriate test and is the test PSEG includes in its refined site-specific alternative, included as Attachment 2 to these comments.

19 PSEG adopted the concept of reaffirming prior, still valid § 316(b) determinations from the Agency's approach for renewals of thermal variances under § 316(a). As with the cost-benefit test, PSEG invoked factors for assessing AEI that USEPA had set out in its 1977 draft § 316(b) Guidance.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.075.041

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

USEPA's Preferred Option Marks a Wise Departure From the Phase I Rule

USEPA’s Preferred Option is based on performance standards for reductions in impingement mortality and entrainment. Compliance with the performance standards can be achieved by demonstrating either (1) intake flow commensurate with closed cycle cooling using cooling towers or ponds or similar methods of recirculation <FN 20> or (2) an 80-95% reduction in impingement mortality and, for many plants, a 60-90% reduction in entrainment. The only plants that would not have the entrainment requirement would be facilities on lakes (other than the Great Lakes), facilities withdrawing 5% or less of the mean annual flow of a freshwater river or stream, and facilities with a capacity utilization rate of less than 15%.

Permitting agencies would establish the appropriate performance standard for a given waterbody or waterbody segment and the selection of an appropriate technology or technologies for a given CWIS would be site-specific. The reductions in impingement mortality and entrainment being achieved or to be achieved by a given technology (or restoration measure) would be compared to the “calculation baseline” losses (impingement mortality and entrainment). A calculation baseline would be the amount of impingement and entrainment that would occur if the facility had a shoreline intake, once-through cooling, and no impingement or entrainment reduction controls.

USEPA’s Preferred Option would allow permittees to use restoration measures (for example, creating or restoring a wetland or operating a fish hatchery) instead of, or along with, intake technologies or operational measures if a permittee can demonstrate (1) quantitatively that the restoration measures would produce benefits that achieve compliance with the performance standard or (2) qualitatively that the restoration measures would maintain fish and shellfish in the waterbody, including community structure and function, at a level of protection comparable to what could be met by intake technologies or operational measures.

USEPA’s Preferred Option would also allow the regulator to establish more lenient, site-specific, performance standards upon a demonstration from the permittee that the cost of compliance with the performance standards would be “significantly greater” than either the costs the Agency considered in developing the Phase II Rule or the benefits that would accrue. USEPA also proposes to allow alternative requirements if the Nuclear Regulatory Commission ("NRC") were to determine that compliance with the rule would conflict with NRC-established safety requirements.

USEPA’s Alternative (3) provides that a Site-Specific Determination of Best Technology Available may be made by the State Director if the “costs of compliance with the applicable performance standards and paragraph (b) of this section would be significantly greater than the costs considered by the Administrator when establishing such performance standards, or that your costs would be significantly greater than the benefits of complying with such performance standards at your site” (67 Fed. Reg. 17221).

The performance standards of Paragraph (b), as prescribed at § 125.94(b) in the proposal, include four alternative performance standards, one of which is reducing intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system (§ 125.94(b)(1)).

If this is the performance standard that is used for comparison when determining whether your site-specific costs are greater than those considered by the Administrator in establishing the applicable performance standards, a facility could be required to demonstrate costs that exceed the cost of a closed-cycle recirculating cooling system before being allowed to utilize the site-specific determination alternative of § 125.94(a)(3). EPA should clarify that it does not intend to compare the site-specific costs of compliance with the performance standard set out in § 125.94(b)(1). The appropriate comparison should be between the site-specific costs and the costs the Administrator considered for intermediate (mid-range) technology costs for complying with the performance standards.

Finally, USEPA's proposal appears to require substantial engineering and biological studies. Permittees would be required to conduct in-stream and in-plant aquatic monitoring to determine "baseline" conditions and to select the "best available" technology. Permittees would also be required to perform engineering design studies for the technologies potentially applicable at the CWIS and compare those costs to USEPA's cost estimates for those facilities. Permittees would further be required to conduct multiple years of monitoring during the permit term to verify compliance with the performance standards. The Preferred Option would also establish a multi-step procedure in connection with initial and subsequent permit renewals once the Phase II Rules are in effect. These procedures would address plans of study, consultations with other resource protection agencies, the Comprehensive Demonstration Study, itself, as well as post-installation verification monitoring.

Footnotes

20 See 67 Fed. Reg. 17130.

EPA Response

The commenter has described the proposed rule. No response is required for this portion of the comment.

Please refer to the response to comment 316bEFR.410.001 for a discussion of the implementation of the cost-cost test.

Comment ID 316bEFR.075.042

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

With Certain Recommendations, USEPA's Preferred Approach Could Establish a Workable Framework for Implementing § 316

In crafting its Preferred Option for the Proposed Phase II Rule, USEPA clearly gave appropriate consideration to the inherent differences between new and existing facilities. <FN 21> The Preferred Option for the Proposed Phase II Rule represents a positive, critical departure from the approach taken in its Phase I Rule -- USEPA is not proposing to establish a single technology as BTA that would be applicable absent a facility's meeting the requirements for a site-specific demonstration. <FN 22> Moreover, USEPA does not propose to establish uniform requirements for impingement mortality and entrainment reductions of the same extreme magnitude as it did in its Phase I Rule and does not propose to require additional monitoring or retrofit requirements for existing facilities that operate with a closed cycle cooling system. Moreover, in developing its Preferred Option, USEPA again wisely recognized the scientifically demonstrated value that restoration measures can and do play in enhancing aquatic ecosystems, thereby addressing the effects of impingement and entrainment ("I&E"). The Preferred Option proposes that restoration measures be an available means for achieving compliance and, recognizing the limitations of science, would establish reasonable criteria for determining the benefits of restoration measures. For these reasons, PSEG fully endorses the general approach of the Preferred Option, which allows permittees considerable flexibility in determining the most appropriate means of achieving compliance with § 316(b).

PSEG, however, believes that USEPA should entertain certain modifications to its Preferred Option, as discussed below <FN 23> and recommends that USEPA consider the following points if promulgating the Preferred Option as the Final Phase II Rule. PSEG urges USEPA to consider: (1) the information presented in these comments as well as in the comments filed by UWAG and EPRI that clearly demonstrate that the performance standards proposed by USEPA are overly stringent and go beyond what would likely be required to ensure protection of aquatic resources; (2) whether the performance standards would be achievable based on the suite of technologies relied upon at the universe of Phase II facilities, given site-specific factors; (3) establishing a benefit/cost test that is consistent with the Agency's own Guidelines for Preparing Economic Analyses; <FN 24> (4) establishing clear standards for interpreting the "significantly greater" test put forward in the Preferred Option if the maximize net benefits test is rejected; (5) establishing more reasonable requirements relating to the implementation of §316(b) in National Pollutant Discharge Elimination System ("NPDES") permits, because the proposed schedule will not work in the real worlds and the timing of and requirements for the comprehensive demonstration study are unrealistic; and (6) allowing greater discretion to permitting Agencies relative to the implementation of the Preferred Option.

Footnotes

21 See, e.g., 67 Fed. Reg. 17125 ("New facilities have the opportunity to install the best and most efficient production processes and wastewater treatment technologies."); Id. at 17140 (USEPA did not vary the requirements for new facilities based on the type of waterbody, but did define five waterbody types for new facilities.); Id. at 17145 (USEPA applies a "wholly disproportionate" standard for new facilities and proposed a "significantly greater" standard for existing facilities.);

Id. at 17168 (USEPA acknowledged that retrofitting an existing facility costs more than installation of the same equipment in a new facility.)

22 PSEG does not intend that this be deemed in any way to be an endorsement of a uniform technology approach for new facilities. PSEG incorporates by reference its comments on the Draft Phase I Rule, dated November 8, 2000.

23 PSEG also directs the Agencies attention to UWAG's comments in this regard.

24 USEPA, Guidelines for Preparing Economic Analyses, Office of the Administrator, EPA 240-R-00-003 (Sept. 2000). PSEG endorses UWAG's Phase I and Phase II comments on the superiority of the "maximize net benefits" test.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

For a discussion of the role of restoration, please refer to sections VII and VIII in the preamble for the final rule.

The items numbered 1 through 6 in the comment refer to more detailed discussions by the commenter in other parts of its comment letter. Items 1 and 6, regarding the performance standards, is addressed in 316bEFR.075.044. Item 2, regarding the performance of intake technologies, is addressed in 316bEFR.075.050. Item 3, regarding cost-benefit tests, is addressed in 316bEFR.075.064. Item 4, regarding the term "significantly greater," is addressed in 316bEFR.075.043. Item 5, regarding the implementation schedule, is addressed in 316bEFR.075.093.

Comment ID 316bEFR.075.043

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

In making a determination under the site-specific determination of this technology available, a facility would have to demonstrate that its costs would be "significantly greater" than those considered by the Administrator when establishing performance standards, or that the cost would be significantly greater than the benefits of complying with the performance standards at the facility. USEPA does not define the term significantly greater. USEPA should clarify that "significantly greater" is not intended to be a rigidly applied test, and that the Director may consider a variety of factors in determining whether the threshold is met. Capital and operating costs at affected facilities for existing CWIS compliance may cost tens of millions of dollars.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.075.044

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.02

Performance standards

Permitting Agencies Should have Discretion in Setting and Applying Performance Standards

Assessing and then "minimizing" the environmental impact of entrainment and impingement depends on many site-specific features and is highly variable from site to site. USEPA has addressed this complexity in its Preferred Option, first by setting not single number standards for reductions in losses to entrainment or impingement, but ranges (80-95% reduction of impingement mortality, 60-90% reduction of entrainment) and, second, by providing an alternative when the costs of the standards are "significantly greater" than the benefits or the costs USEPA used in this Phase II Rulemaking. The flexibility offered, first, by a range instead of a single number and, second, by the alternative approach where costs are high, is clearly supported by the Record and reflects sound public policy.

PSEG questions, however, whether the Record includes adequate information to support the proposed levels of reductions in losses due to entrainment or impingement mortality proposed in the Preferred Option as national standards. As proposed by USEPA, a value within the ranges of the performance standards would apply to each Phase II facility regardless of the CWIS characteristics or ecology and species present (unless one of the cost tests is met). PSEG believes, instead, that the Record supports a contrary conclusion. It is highly likely based on PSEG's experience at its generating stations that the resources are protected and would continue to be protected if the performance standards were to require lower levels of reductions in these losses. <FN 25> Moreover, as noted in UWAG's Phase II Comments, Dr. Hartman correctly presents numerous examples that biological populations affected by CWISs vary considerably within a waterbody category (e.g., tidal rivers or estuaries) or even within the same waterbody. Moreover, as discussed below, the ability of the technologies to achieve these standards will vary considerably from site to site.

Assuming that USEPA's Preferred Option is promulgated as the Final Rule, the Agency should allow permitting agencies to take this appropriate flexibility one step further. Either USEPA should establish targets for reductions in losses rather than nationally applicable performance standards or permitting agencies should be afforded discretion to determine, based on its site-specific knowledge of the status of the aquatic ecosystem, that a lower standard is sufficient to ensure protection of the resource in a given waterbody.

Likewise, if a facility were able to demonstrate an overall reduction in impingement mortality of 70% with installed and/or proposed technologies and the performance standard for the waterbody was an 80% reduction in impingement mortality, then the permitting director should have the authority to determine that the facility had achieved "substantial" compliance with the performance standard. <FN 26> Based on this demonstration of substantial compliance, the permitting agency should have the discretion to make a favorable BTA determination without requiring the facility to first prove it met one of the cost tests and then to make a full demonstration that less stringent standards are justified for the site. Allowing such discretion to permitting agencies would also address the Agency's concern with the level of burden associated with making determinations first that a site-specific demonstration would be appropriate and then setting site-specific BTA requirements without any substantial risk that harm to the ecosystem would be occurring.

Footnotes

25 See for example appendix H to Salem's 1999 Renewal Application that demonstrates that the losses at Salem have not caused or will not cause substantial declines in any of the species affected by the Station's CWIS.

26 As shown below, there is limited experience with certain of the technologies used to establish the ranges; therefore, the level of performance achievable with one or more of these technologies at a New York given site will vary.

EPA Response

Please see the responses to comments 316bEFR.307.064, 316bEFR.311.002, and 316bEFR.063.005.

Comment ID 316bEFR.075.045

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

If Based on the Preferred Option, The Final Rule Should Allow Permitting Agencies to Consider Entrainment Survival in Determining Compliance with the Performance Standard

USEPA's proposed performance standards for entrainment do not consider entrainment survival. A facility gets no credit for an egg or larva that passes through the cooling system unharmed, as many do. Many power plants were designed specifically to enhance survival of entrained organisms; these plants operate with high CWIS flows and low increases in temperature rise over ambient to minimize thermal mortality. This is the case even though USEPA acknowledges <FN 27> that the mortality rate of entrained fish and macroinvertebrates can vary from 2 to 97 percent depending upon the species and life stages entrained. Furthermore, if a facility is proceeding under a site-specific demonstration, entrainment survival would be a valid consideration in assessing the costs and benefits of potentially available alternatives.

If the Agency acknowledges that certain organisms survive entrainment and entrainment survival is a valid factor under a site-specific demonstration, there is no logical reason for prohibiting a permitting agency from considering this survival when making a site-specific determination of compliance with the performance standards under Proposed § 125.94(b) of the Preferred Option. USEPA has rightly noted that entrainment survival rates, like so many other things, are species-specific and site-specific. The fact that entrainment survival does not occur everywhere at the same rate may make it difficult for the Agency to establish nationally applicable ranges; however, this should not preclude the Agency from authorizing permitting agencies from considering it in determining whether a given facility has complied with the performance standard. This is the case, if a facility has data establishing site-specific survival rates or if studies from another site with similar species and operating parameters affecting entrainment survival (e.g., transit time, maximum temperature, temperature rise above ambient) are available for use at another facility. Contrary to USEPA's concerns, if addressed in the manner PSEG proposes, taking account of survival rates will not create unacceptable risks or introduce unmanageable uncertainty.

Footnotes

27 67 Fed. Reg. 17136. See also Mayhew, D.A., Jensen, L.D., Handon, D.F., Muessig, P.H., A Comparative Review of Entrainment Survival Studies at Power Plants in Estuarine Environments, Environmental Science and Polity: 3:S295-S301 and Electric Power Research Institute ("EPRI"), Review of Entrainment Survival Studies: 1970 – 2000, prepared by EA Engineering Science and Technology for EPRI (2000).

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.075.046

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Performance Standards for Freshwater Rivers and Streams Based Upon Percent Flow Should be Tied to Biologically Relevant Periods

Under §125.94(b)(3) of the Preferred Option, <FN 28> a facility must meet the 60-90% entrainment reduction standard if, among other things, its design intake flow is greater than 5% of the mean annual flow of a freshwater river or stream. USEPA has requested comments on this issue. <FN 29> PSEG recommends that the threshold not be 5% of the "mean annual flow" of the river or stream but 5% (or whatever threshold is ultimately deemed appropriate) of the flow during the period of entrainment or impingement vulnerability. For example, if entrainment is a concern only during spawning season (e.g., spring and early summer), then the threshold ought to be a specified percent of the flow at the time when entrainable eggs and larvae are present and vulnerable to being entrained.

Footnotes

28 67 Fed. Reg. 17221.
29 67 Fed. Reg. 17151, Col. 2 & 3.

EPA Response

Today's rule establishes a design intake flow criterion for Phase II existing facilities. For facilities withdrawing water from a freshwater stream or river, the design intake flow cannot exceed 5% of the source water's mean annual flow. This standard is not applicable to the daily operation of a facility's cooling water intake structure. That is, a facility is not expected to constantly monitor the instream flow of the source water and adjust its water intake accordingly.

EPA believes the alternative presented by the commenter would be difficult to incorporate into a permit as seasonal flows are rarely consistent year to year as are spawning and migration patterns. Incorporating a seasonal flow (or other standard) into a permit would introduce unnecessary implementation and monitoring costs on both the permitting authority and the facility. EPA believes the design intake flow standard for riverine facilities affords a level of protection for the source water body acceptable under most, if not all, stream conditions.

Comment ID 316bEFR.075.047

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Facilities Should be Able to Commit to Comply with the Capacity Utilization Factor

USEPA correctly recognizes that facilities with low capacity factors should be subject to less stringent regulations. PSEG applauds this. In its Preferred Option, USEPA proposes that the applicability of the capacity utilization rate be determined based upon the operating history of a station over the past five years. PSEG proposes that the Final Rule, if based on the Preferred Option, include a provision that would allow permittees to commit not to operate the facility so as to exceed the 15% capacity utilization rate (or whatever rate ultimately deemed appropriate <FN 30>) in the future. This commitment would, of course, become a condition of the facilities NPDES permit. This refinement to USEPA's approach in the Preferred Option would alleviate the need to expend resources on costly monitoring studies for a facility that would only be in operation for minimal numbers of days per year. It would also reduce the burden on regulatory agencies associated with reviewing the studies.

Footnotes

30 PSEG endorses UWAG’s comments on this issue.

EPA Response

The Agency agrees with the suggestion and has adopted the provision for the final rule.

Comment ID 316bEFR.075.048

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.02

Performance standards

USEPA Should Clarify How Compliance with the Performance Standards Will be Determined

As presently contemplated, compliance with the performance standards will depend on reductions in numbers of organisms entrained and numbers of organisms lost to impingement compared to these losses calculated for the baseline calculation. The baseline calculation is computed assuming a fixed CWIS design and location, which determines whether a particular organism is an "entrained organism" or an "impinged organism." Once alternate technologies are installed, the characteristics of what would be an “entrainable” or “impingeable” organism will change. USEPA should resolve this issue by defining an “entrainable” organism for purposes of compliance with the entrainment reduction standards as an organism that will fit through a standard 3/8-inch intake screen. This will lend certainty and consistency to the implementation of the Final Phase II Rule, if based upon USEPA's Preferred Option.

EPA Response

For a discussion of compliance issues, see response to comment 316bEFR.063.005. For a discussion of the definition of calculation baseline, please see 316bEFR.063.022.

EPA has modified the definition of calculation baseline to include standard 3/8-inch mesh screens. This allows a more consistent estimation of the organisms that are considered “entrainable” vs. “impingeable” by specifying a standard mesh size that can be related to the size of the organism that may potentially come in contact with the cooling water intake structure.

Comment ID 316bEFR.075.049

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

The Metrics for Quantitative Demonstrations of Restoration Benefits Should be Determined on a Site-Specific Basis in Consultation with the Permitting Agency

When restoration measures are components of the Comprehensive Demonstration Study submitted to satisfy the performance standards under Proposed § 125.95(b) of the Preferred Option, <FN 31> PSEG believes the metric should be determined as part of the consultation with the permitting agency on the restoration plan since the appropriateness of the metric will, of necessity, be tied directly to the type of restoration measure that had been implemented and/or is being proposed for implementation.

In the case of a wetlands restoration, PSEG believes that a metric based on total biomass basis may be the most practical metric. Estimates of biomass for at least a portion of the total production can be determined and be consistently exchanged among the measures used to evaluate impingement and entrainment effects and the increased production associated with the restoration. However, if releasing hatchery-reared fish were the restoration measure being implemented, the more appropriate metric may be numbers of fish released at a given life stage.

Footnotes

31 67 Fed. Reg. 17222.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.075.050

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.03

Available I&E technologies

The Technologies Upon Which USEPA Has Based its Performance Standards May Not be Capable of Achieving the Same Levels of I&E Reductions at all Phase II Facilities

The preamble of the USEPA Proposed Phase II Rule <FN 32> states that the presumptive performance standards specified at § 125.94(b) through (d) of the Preferred Option for impingement mortality reduction and entrainment reduction are based the following technologies: fine and wide mesh wedgewire screens, aquatic filter barrier systems, barrier nets, modified screens and fish return systems, fish diversion systems, fine mesh traveling screens and fish return systems and variable speed pumps.

Chapter 3 of the Technical Development Document ("TDD") discusses alternative technologies that can be used to minimize I&E. USEPA's overall conclusion is that "performance and applicability vary to some degree based on site-specific conditions. However, the Agency has also determined that alternative technologies can be used effectively on a widespread basis with proper design, operation, and maintenance."(TDD, p. 3-1).

PSEG concurs with USEPA that alternative technologies can be applied to a variety of sites, but that the level of reductions achievable at any given site may be substantially less certain than alluded to by USEPA. Moreover, the applicability of these technologies is highly site-specific and depends on the location of the CWIS and the vulnerability of the species and life stages that are impinged and entrained. For the reasons discussed below, PSEG believes the performance standards cannot be met nationally using these technologies.

a. Modified Screens and Fish Return Systems

Based on work performed at Salem and other locations, PSEG concurs with USEPA that modified screens (e.g., ¼" x ½" Smooth-Tex mesh, "Fletcher-modified Ristroph" screens) with fish returns can generally achieve an overall 70 to 80 percent reduction in impingement mortality over conventional traveling screens (TDD, 3-5). However, certain fragile species (e.g., bay anchovy, alewife) and the early life stages of some species (e.g., weakfish) can exhibit lower survivals (PSEG, 2001a). <FN 33>

b. Wedgewire Screens

PSEG concurs with USEPA's statement that wide mesh (for purposes of these comments, PSEG is assuming a 10 mm opening, since the term was not defined by USEPA) wedgewire screens may minimize impingement (TDD, 3-6) and that fine mesh (<10 mm opening) wedgewire screens also have the potential to minimize further both I&E for facilities that have relatively low intake flow requirements (i.e., closed-cycle systems) and ambient currents that would reduce the time of impingement. However, PSEG believes the employment of wedgewire screens in conjunction with once-through systems potentially poses much greater obstacles than the Preamble or TDD suggest in certain environments. Prior to installing wedgewire screens it would be necessary to assess the potential for adverse effects due to: (1) shoreline excavation or dredging that exposes potentially hazardous dredged material; (2) the screens' interference with spawning and migration behaviors of fish; and (3) interference with boat navigation in the River.

The feasibility of applying wedgewire screens as a CWIS technology in marine and estuarine environments is not clear (Versar <FN 34> at VII-22). Installation of wedgewire screens would require site-specific, pilot scale tests of the screens in the configuration and flow field intended for use at the facility to obtain reliable estimates of screening efficiency and to determine if biofouling and re-impingement on adjacent screens are concerns that might limit the practical application of the screens. Furthermore, biofouling and detrital clogging have been identified as presenting serious operating impediments in estuarine applications (Hanson, <FN 35> Versar 1989). At two facilities, PSEG determined that if wedgewire screen were installed, they would have to be very large in scale. For example, the Mercer Generating Station ("Mercer") located in the tidal reach of the Delaware River (River), would require a new intake canal extending approximately 750 feet along the shore of the River to house the 28 wedgewire screens that would provide the approximate 690 MGD of intake flow needed to operate the facility. <FN 36> At Salem, the withdrawal of approximately 3,000 MGD would require about 240 wedgewire screens to produce a slot flow velocity of 0.5 feet per sec ("fps"). <FN 37> This wedgewire screen configuration would occupy an area of 45,500 square feet or greater than an acre of river bottom.

c. Aquatic Filter Barrier Systems

The Agency states that microfiltration barriers, including the Gunderboom, show significant promise for minimizing entrainment and acknowledges that the Gunderboom is currently "experimental in nature." <FN 38> PSEG believes that additional studies are required to resolve design and operational problems that have limited effective deployment to date. PSEG believes that the Gunderboom is currently not an available technology for most of its existing facilities because of water withdrawal volume requirements and the likely frequent maintenance that would be required to address sediment buildup and fouling, which have been problems experienced at another estuarine site. <FN 39> Future Gunderboom applications are probably limited to those facilities where water withdrawals are relatively low. <FN 40> At facilities with high intake flow rates, the size of a Gunderboom would have to be very large to maintain the low velocities through the filter barrier fabric required to achieve the predicted reductions in I&E losses. In such circumstances, the size of the Gunderboom would likely conflict with other waterbody uses (e.g., navigation).

d. Variable Speed Pumps

Section 3.5.11 of the TDD <FN 41> discusses other technology alternatives and states that the use of variable speed pumps can provide greater system efficiency and reduce flow requirements (and associated entrainment) by 10-30 percent. Based on analyses performed for a number of facilities, PSEG believes the installation of variable speed pumps would likely result in directly proportional increases in the temperature of cooling water from the condensers to the point of discharge into the waterbody. Flow reductions using variable speed pumps would likely occur in the spring or summer, times of high biological productivity, and would result in a reduction in the capacity (i.e., reductions in electrical output) of a facility. Contrary to USEPA's assertion in the TDD, use of variable speed pumps to reduce flow would decrease the efficiency of the units, not make them more efficient as stated by USEPA. <FN 42> Furthermore, the increased thermal effects on entrained organisms (i.e., longer transit times and higher temperatures increase thermal mortality) should be weighed against the potential reduction in numbers entrained. For example, at Salem a 20% seasonal flow reduction is projected to result in substantially higher losses of spot, opossum shrimp, scud, and Atlantic croaker due to increased thermal mortality. <FN 43> In addition, when a facility is operating below design capacity, particularly in the summer, significant amounts of power production and power capacity are lost. For example, a 45% flow reduction at Salem, which is rated at approximately 1100 MWe per unit, is projected to have a power penalty range from 132 MWe to 340 MWe depending upon the season. This means increased operation of other facilities or bringing inactive facilities on-line that may have other adverse environmental effects such as increased emissions of green house gases and other air pollutants.

The NJDEP analyzed the costs and benefits of reducing intake flows at Salem during the summer months. In conducting this analysis, the Department considered the studies submitted by PSEG <FN 44> and concluded that seasonal flow reductions, with or without the use of variable speed pumps, would produce relatively small environmental benefits at very high costs. <FN 45>

Footnotes

32 67 Fed. Reg. 17142.

33 Lawler, Matusky & Skelly Engineers LLP, Ranking of RIS Vulnerability, prepared for Public Service Enterprise Group (“PSEG”) (2001).

34 Versar, Inc., Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration Impact for the Salem Nuclear Generating Station, Final Revised Report, prepared for New Jersey Department of Environmental Protection (1989).

35 Hanson, B.N., Bason, W.H. Beitz, B.E. and K.E. Charles, A Practical Intake Screen Which Substantially Reduces the Entrainment and Impingement of Early Life Stages of Fish. In: Proceedings of the Fourth National Workshop on Entrainment and Impingement (L.D. Jensen ed.) (1977).

36 PSEG Fossil LLC (PSEG) Mercer Generating Station § 316(b) Demonstration (2001).

37 Salem’s 1999 Renewal Application, Appendix F, Section VIII.

38 TDD, at p. 3-9.

39 LMS 1996 and LMS 1997.

40 For example, PSEG has agreed to install a fixed Gunderboom at its proposed Bethlehem Energy Center (“BEC”) located on the upper tidal reach of the Hudson River near Albany New York. BEC is a 750-MW facility that will withdraw about 8.6 MGD of makeup water to a hybrid cooling tower system. BEC is a re-powering of the existing Albany Steam Station.

41 TDD at p. 3-14.

42 Id.

43 Salem’s 1999 Renewal Application, Appendix F, F-VIII Table 15.

44 Appendix M-1 to PSEG’s January 15, 1994 Phase II Comments on Draft NJPDES Permit No. NJ0005622; Appendix F to Salem’s 1999 Renewal Application.

45 NJDEP’s Response to comments accompanying NJPDES Permit No. NJ0005622, Effective September 1, 1994 at P. 10-11; NJDEP’s Response to Comments accompanying NJPDES Permit No. NJ0005622, Effective August 1, 2001 at P. 63

EPA Response

EPA agrees with the commenter's assertion that there is no single technology or suite of technologies that can be expected to achieve the same results in various waterbody types and at different facilities. Today's rule maintains the flexibility for the permittee and permitting authority to determine the most appropriate and cost-effective strategy for meeting the requirements of the rule. Please see the preamble for a discussion of the compliance alternatives, including the Technology Installation and Operation Plan and its role in meeting the obligations under today's rule.

EPA disagrees that the performance standards are unattainable on a national level and believes the record supports this assertion. EPA recognizes, however, that certain facilities may not be able to achieve the performance standards due to localized factors. For this reason, among others, EPA has included a site-specific alternative in today's rule based on cost-cost or cost-benefit considerations and has authorized compliance demonstrations by means of a TIOP.

a. Modified Ristroph Screens

For a discussion of modified Ristroph screens, please see response to comment 316bEFR.077.023 and Chapter 3 of the Technology Development Document.

b. Wedgewire Screens

EPA notes the inclusion of compliance alternative 4 in today's rule, which designates cylindrical wedgewire screens as Best Technology Available for facilities meeting certain criteria. EPA notes that all technologies, not just wedgewire screens must be evaluated for their potential effectiveness before deployment.

c. Aquatic Filter Barrier

For a discussion of aquatic filter barriers, please see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

d. Variable Speed Pumps

For a discussion of variable speed pumps, please see response to comment 316bEFR.077.033 and Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.075.051

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 7.02

Performance standards

Meeting Proposed Performance Standards for All Life Stages of All Species of Concern May Not Be Accomplished at Some Facilities Using State-of – the Art Technologies

EPA proposed at § 125.94(b)(2)-(4) that Phase II Existing Facilities must meet performance standards to reduce impingement mortality and/or entrainment by specified percentage ranges "of all life stages of fish and shellfish." Requiring percentage reductions of all life stages of fish and shellfish creates unnecessary and unreasonable expectations, creates the potential for unnecessary and unreasonable monitoring requirements, has no basis in the record, and most importantly, may well be impossible to achieve, even at some facilities that have advanced, state of the art controls such as modified "Ristroph" screens with a fish return system. If EPA selects performance standards instead of the site-specific options in the final rule, it should establish performance standards based upon target percentages that apply to the relevant organisms, based upon a representative range of organisms and life cycles, that would allow the State Director flexibility to make determinations that adequately protect the sustainability of the aquatic community.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.075.052

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

USEPA Wisely Did not Propose a Uniform Technology-Based Option for Implementing Section 316(b) as its Preferred Option

Although the Preamble to the Proposed Phase II Rule seeks comments on three alternative regulatory options based on reductions in cooling water flow to levels commensurate with closed cycle cooling, <FN 46> USEPA wisely did not propose one of these as its Preferred Option. These options would have required all, or varying subsets of, in-scope, once-through power plants to be retrofitted to operate with cooling towers and a closed-cycle cooling system. These options would also have allowed permittees to petition for the application of less stringent requirements, which would require a determination by the Director that the costs would have been significantly greater than the costs USEPA considered or that the retrofit would cause significant adverse impacts on local air quality or energy markets. <FN 47>

The first alternative closed-cycle cooling option would have applied to all Phase II in-scope, once-through facilities. This option would have required all Phase II existing facilities having a design intake flow of 50 MGD or greater to reduce the total design intake flow to a level, at a minimum, commensurate with that which could be attained by a closed-cycle recirculating cooling system using minimized makeup and blowdown flow. USEPA estimated the total annualized post tax cost of this alternative to be over $2 billion and expressed serious concerns about the short-term energy implications and the potential for electric supply disruptions. <FN 48>

Footnotes

46 See, 67 Fed. Reg. 17154 - 17159, Section VI.B. "Other Technology Based Options Under Consideration".

47 See Preamble, at 17154.

48 See, 67 Fed. Reg. 17154. This is referred to as Option 4 in USEPA's E&B Analysis and would have applied to 466 existing power plants. See, E&B Analysis at p. B7-9.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.075.053

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.04

Option: Closed-cycle for oceans, tidal rivers or estuaries

The second closed-cycle cooling option would have applied to Phase II in-scope, once- through power plants with capacity utilization factors of 15% or greater and located on tidal rivers, estuaries or oceans. Although the costs of this option have not been estimated, USEPA noted that there is the potential for short-term energy impacts and supply disruptions in coastal areas. <FN 49>

Footnotes

49 See, 67 Fed. Reg. 17155. USEPA estimated that there would be 109 power plants that would have been affected by this alternative.

EPA Response

Please refer to the final rule preamble for EPA's rationale behind rejecting the waterbody/capacity based option.

Comment ID 316bEFR.075.054

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.04.01

Option: Ocean/tidal facilities with large intake vol.

The third closed-cycle cooling option would have applied to an even smaller subset of Phase II facilities, i.e., those with flow withdrawal rates in excess of 1% of source water tidal excursion for tidal river or estuarine plants or 500 MGD for ocean plants. USEPA estimated the incremental cost of this option over its Preferred Option to be $413 million, and estimated the annualized incremental benefits to be $146 million. Despite this huge disparity between costs and benefits, USEPA, nonetheless, indicates it is considering this third option, which would require 51 power plants to be retrofit, <FN 50> for the final rule. <FN 51>

Footnotes

50 See, 67 Fed. Reg. 17158. col. 1.

51 See, 67 Fed. Reg. 17158. col. 3.

EPA Response

Please refer to the final rule preamble for EPA's rationale behind rejecting that option.

Comment ID 316bEFR.075.055

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.04

Option: Closed-cycle for oceans, tidal rivers or estuaries

In addition to the requirements for closed cycle cooling described above, the second and third options would have allowed the imposition of additional requirements to reduce impingement and entrainment, beyond the reductions achieved by virtue of operation with a closed cycle cooling system, if fishery resource managers or permitting agencies had additional concerns about the effects of the CWIS, e.g., impacts on fisheries, threatened or endangered species or their habitats. USEPA asserts that this alternative would be justified based upon the susceptibility of these waters to CWIS operations. <FN 52>

USEPA <FN 53> states, "[i]n general, the more sensitive or biologically productive the waterbody, the more stringent the requirements proposed as reflecting the best technology available for minimizing adverse environmental impact." In addition, USEPA states, " For example, estuaries and tidal rivers have a higher potential for adverse impact because they contain essential fish habitat and nursery areas for the vast majority of commercial and recreational species of shell and fin fish, …Therefore, these areas require a higher level of control that includes both impingement and entrainment…". <FN 54> However, as USEPA correctly states later in the preamble of the Proposed Phase II Rule "…location is an important factor in assessing the impacts of (a) cooling water intake structure…". <FN 55> PSEG agrees that the location of the CWIS and how it operates in relation to the species of concern and their associated life history strategies are critical in assessing impacts and believes that if these aspects are properly considered then estuarine and tidal cooling water intake structures should not have any greater impact than similar structures located on other types of waterbodies. <FN 56> Therefore, PSEG disagrees with EPA's rationale for selecting the subset of facilities that would be required to retrofit to closed-cycle cooling under its second and third closed-cycle options.

Footnotes

52 See, Notice of Data Availability for the Phase I Rule, which sets forth the Agency's rationale for this conclusion.

53 See, 67 Fed. Reg. 17122.

54 See, 67 Fed. Reg. 17122, 17140.

55 Id.

56 By way of analogy, certain chemicals (e.g., copper) can produce adverse effects if the concentrations of the bioavailable forms of the chemical are high and the receptor (e.g., organism, population, community) is exposed to these concentrations for a sufficient period of time. However, no effects may be observed if the chemical is in a different form or if the chemicals and receptors do not interact, or only interact for a short period of time. Similar conclusions are appropriate in regard to whether adverse impacts will occur to fish and/or habitats in estuaries, tidal rivers, or any other waterbody type as a result of cooling water intake structure operation.

EPA Response

In today's final rule, EPA did not select either of the two compliance frameworks described by the commenter. For EPA's rationale for rejecting those frameworks, please refer to the final rule preamble.

Comment ID 316bEFR.075.056

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

As stated in UWAG's and PSEG's comments on the Proposed Phase I Rule, the data and information collected relative to the effects of cooling water intakes on fisheries since the adoption of the Clean Water Act in 1972 does not support requirements for closed-cycle cooling at all new or existing power plants or at subsets of those facilities. <FN 57> Moreover, the costs for retrofitting an existing facility to operate with closed cycle cooling utilizing wet cooling towers are substantially higher than the costs of constructing a new facility to operate as a closed-cycle plant. As discussed in UWAG's, EEI's, and EPRI's comments, the Agency substantially underestimated (1) the costs of these retrofits, (2) the impacts to the nation's energy supply, and (3) the other adverse effects on the environment such as increased emissions of pollutants to the air. Furthermore, as UWAG's and PSEG's comments clearly demonstrate, USEPA overestimated the benefits. <FN 58>

Footnotes

57 See, UWAG Phase I Comments at VII.A; PSEG Phase I Comments at III.B.

58 See Also Appendices 13 and 14 to UWAG's Comments and Attachments 4 and 5 to PSEG's Comments.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.075.057

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

USEPA Substantially Underestimated the Costs of Retrofitting to Closed Cycle Cooling

USEPA cannot justify any of the closed cycle cooling alternatives based on the data and information contained in the Docket. Even though, as shown below, the costs USEPA estimated are substantially lower than estimates based upon site-specific engineering estimates for existing facilities or extrapolations based on such analyses. USEPA, in the Preamble, rightly states that it did not select a nation-wide, closed-cycle requirement (i.e., the first closed-cycle option) "because of the generally high costs of such conversions… and serious concerns about the short term energy implications of a massive concurrent conversion and the potential for supply disruptions that it would entail." <FN 59> This was the right conclusion and PSEG believes it is equally applicable to the second and third closed-cycle options as well.

PSEG endorses USEPA's conclusion that the costs of retrofitting are too high, especially since USEPA substantially underestimated the costs for retrofitting existing facilities to operate with closed cycle cooling. USEPA provides the costs it relied upon to reach this conclusion in the EBA. <FN 60> USEPA estimated the total annualized cost for retrofitting all 426 power plants to be approximately 2.32 billion dollars or on average, approximately 5.45 million dollars per facility (annualized total cost). In connection with Section 316 (b) Demonstrations <FN 61> filed with the New Jersey Department of Environmental Protection ("NJDEP") between 1998 and 2001, PSEG commissioned preliminary engineering analyses and cost estimates for retrofitting three of its power plants located on estuaries or tidal rivers to operate with closed cycle cooling. These analyses were conducted for power plants that would have been within the scope of any of USEPA's three closed-cycle cooling options, and given the mix of fuel types and sizes of these plants, the cost estimates for these plants are likely to bound estimates that would be representative for a considerable range of facilities that would be affected by these options. As discussed below, Shaw Stone & Webster's report for UWAG <FN 62> corroborates PSEG's capital cost estimates for these facilities and echoes the conclusion that USEPA substantially underestimated the costs of retrofitting existing facilities for closed cycle cooling systems.

a. Mercer Generating Station

PSEG's Mercer Generating Station ("Mercer") consists of two coal-fired units withdrawing up to 345.6 MGD of once-through cooling water from the tidal river portion of the Delaware Estuary near Trenton, NJ. <FN 63> The present value capital cost to retrofit Mercer with wet mechanical draft cooling towers was estimated to be 55.74 million dollars. <FN 64> The total capital cost estimate presented in the Mercer C/B Analysis includes the following cost components: capital, labor and materials associated with construction and installation (Table 8-1). The PSEG total cost estimate of 55.74 million is very close to the 58.53 million estimated for Mercer Units 1 and 2 combined by Shaw Stone and Webster, Inc. <FN 65>

b. Hudson Generating Station

PSEG's Hudson Generating Station (“Hudson”) consists of Units 1 and 2 that are natural gas and coal or natural gas fired units respectively. Unit 1 withdraws 388.8 mgd and Unit 2 withdraws 504.0 mgd of once-through cooling water from the estuarine reach of the Hackensack River. The total present value cost to retrofit Hudson with wet mechanical draft cooling towers was estimated to be 104.57 million dollars. <FN 66> The total capital cost estimate presented in the Hudson C/B Analysis includes the following cost components: capital, labor and materials associated with construction and installation (Table 8-1). The PSEG total cost estimate of 104.57 million dollars is the close to the 117.48 million dollars estimated for Hudson Units 1 and 2 combined in Shaw Stone and Webster Report.

c. Salem Generating Station

PSEG's Salem Generating Station (“Salem”), a base-load nuclear facility, consists of two units <FN 67> with a combined intake flow of up to 3,024 MGD of once-through cooling water from the Delaware Estuary. <FN 68> The total present value capital cost estimate to retrofit Salem with wet mechanical draft cooling towers was 576.0 million dollars. <FN 69> The total capital cost estimate presented in Appendix F to Salem’s 1999 Application is comprised of the following cost components: capital, labor and materials associated with construction and installation, (Appendix F IX Table 1). The PSEG total cost estimate of 576.0 million is close to the 593.32 million estimated for Salem Units 1 and 2 combined in Shaw Stone & Webster Report.

The total present value capital cost estimates for Mercer, Hudson and Salem were adjusted to total annualized capital costs so direct comparisons could be made to USEPA’s facility cost estimate. The total annualized costs for retrofitting Mercer, Hudson, and Salem are estimated at $6.31, 8.69, and 51.07 million, respectively. <FN 70> The PSEG estimates for Mercer, Hudson, and Salem are substantially higher than USEPA’s average total annualized cost estimate for an individual facility (i.e., 5.45 million in dollars). The PSEG estimates and the Shaw Stone & Webster estimates are based on preliminary engineering analyses conducted for existing facilities. USEPA, on the other hand, developed its estimates by extrapolating from its estimate of the costs associated with installing cooling towers at a new facility. It clearly stands to reason that the PSEG and UWAG estimates of substantially greater costs are more reliable. Also, the differences between the PSEG and Shaw Stone & Webster’s estimate as compared to USEPA estimates indicate that consideration of site-specific factors are extremely important in providing realistic cost estimates for retrofitting existing facilities with mechanical draft cooling towers.

In short, USEPA has substantially underestimated the costs that would be borne by society if a closed-cycle cooling alternative were adopted. Even using these substantial under-estimates, the Agency rightfully determined that the costs would outweigh any benefits that might result. Even the inclusion of provisions, whereby permittees could have (1) implemented restoration measures in lieu of retrofitting upon a demonstration of comparable performance or (2) petitioned for less stringent requirements if certain tests could be met <FN 71> would be insufficient to overcome the fundamental flaw caused by the substantial underestimation of costs.

Footnotes

59 67 Fed. Reg. 17122, 17155, col. 1 and 2.

60 EBA, p. B7-9.

61 Public Service Electric and Gas Company (PSEG). Hudson Generating Station Supplemental 316(b) Report, Chapter 8, “Costs and Benefits of Alternatives for Modifying Cooling Water Intakes”, November 1998 (“Hudson C/B Analyis”); Public Service Electric and Gas Company (PSEG). Renewal Application Salem Generating Station NJPDES Permit No. NJ0005622. Appendix F: Clean Water Act Section 316(b) Demonstration, Section IX, “Costs and Benefits of Fish Protection Alternatives”, Volume 14 of 36, March 4, 1999; PSEG Fossil LLC (PSEG) (“Appendix F to Salem’s 1999 Application”); Mercer Generating Station 316(b) Demonstration. Chapter 8, “Costs and Benefits”, November 2001 (“Mercer C/B Analysis”).

62 Shaw Stone & Webster, Inc., Engineering Cost Estimate for Retrofitting Closed-Cycle Cooling Systems at Existing Facilities, Appendix 15 to UWAG Phase II comments Prepared for the Utility Water Act Group (“Shaw Stone & Webster Report”) (2002).

63 Mercer C/B Analysis, supra.

64 All Mercer cost estimates are present values as of January 1, 2002, in millions of 2000 dollars.

65 UWAG’s Phase II Comments, Appendix 15, Cost of Retrofitting Cooling Towners at Existing U.S. Power Plants (“UWAG – Appendix 15”).

66 All Hudson cost estimates are present values as of January 1, 2000, in millions of 1997 dollars.

67 Appendix F to Salem’s 1999 Application.

68 PSEG had also commissioned Stone & Webster Engineering Corporation ("SWEC") to perform a preliminary engineering analysis and cost estimate for retrofitting Salem in 1990, which were updated in 1993 and again in 1999. In 1993, at the request of the NJDEP, PSEG hired a second firm, Sargent & Lundy ("S&L") to conduct a validation and verification of SWEC's work product. S&L confirmed that SWEC’s design approach and cost estimates were reasonable and appropriate. S&L concluded that SWEC’s engineering analysis and their cost estimates associated with the closed-cycle cooling retrofit were reasonable and consistent with sound engineering practice (Appendix F to Salem’s 1999 Application, Section VIII). In 1999, SWEC reconfirmed the conclusions reached in 1990 and 1993 that retrofitting Salem with a closed-cycle cooling system would require an unprecedented and complex construction effort (Appendix F to Salem’s 1999 Application, Attachment 7).

69 All Salem cost estimates are present values as of January 1, 2001, in millions of 1998 dollars.

70 The Mercer estimate assumed a 7% discount rate with construction starting in 2002 and costs extending through 2015; the Hudson estimate assumed a 5.78% discount rate with construction starting in 2000 and costs extending through 2022; and the Salem estimate assumed a 6.19% discount rate with construction starting in 2001 and costs extending through 2021(All values are 2001 dollars).

71 See, 67 Fed. Reg. 17154 col. 1 and 2, Section VI.B.

EPA Response

See response to comment 316b.EFR.208.002.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

USEPA's Application of the IPM Model for the Phase II Rulemaking Substantially Underestimated the Impacts of the Closed Cycle Alternatives on Energy Supply and System Reliability

As discussed in the comments submitted by EEI, USEPA's analysis of the economic impacts of USEPA's Preferred Option and the USEPA's Second and Third closed-cycle options using the Integrated Planning Model ("IPM") contained a systematic bias in the assumptions and operation of the model that results in an underestimation of market impacts.

The IPM is an engineering-economic optimization model of the electric power industry. It calculates the optimal solution to an objective function equal to the present value of the sum of all capital costs, fixed and variable O&M costs, and fuel costs. The model generates least-cost resource dispatch decisions based upon user-specified constraints. The model is capable of evaluating new resource investment options (capacity expansion/repowering of existing plants and investment in new plants) in addition to existing capacity during the optimization calculations.

EEI found that the general model assumptions used by USEPA in their analysis were outdated or biased or both. For instance, the IPM modeling analysis was based on the "IPM Base Case 2000." This base case incorporates market assumptions that have significantly changed over the past two years. Also, some of these assumptions used in the IPM runs for the Proposed Phase II Rule do not reflect the assumptions in the Bush Administration's Energy Task Force Recommendations. As a result, the IPM Base Case 2000 underestimates the key parameters of electricity markets (i.e., electricity demand growth, number of generation projects currently underway, and the projected price of natural gas) relative to current projections. Under-representing these electricity market parameters, in turn, leads to underestimates of the impacts of USEPA's closed-cycle options on energy supply and system reliability.

EEI also found that the application of the model was flawed. First, the model was not run for the Preferred Option; instead, the model results for the Preferred Option were extrapolated from the other model runs. This approach does not account for regional differences or interrelationships and requires a combination of analyses that may compound errors and inaccuracies in the original modeling analyses.

Also, USEPA's use of the IPM model did not address the potential impacts on reliability of electricity supplies. The IPM modeling analysis was not conducted in a manner that would address the potential for short-term or transient problems that could occur during the implementation phase of § 316(b) requirements. For example, the model was run only for years beyond 2008, a period when most, if not all, retrofits would already have taken place. Thus, the model did not attempt to analyze near-term market impacts, including reliability, during the transition period leading up to full compliance. In addition, the modeling analysis did not address seasonal effects due to energy penalties or outages.

The IPM runs for the Proposed Phase II Rule modeled the energy penalty associated with retrofit of cooling towers as an annual average penalty, ignoring seasonal impacts that can vary by a factor of at least 2-3 times (i.e., impacts during the summer peak demand season can be 2-3 times higher than annual average). As a result, electricity market impacts in the summer season were not properly characterized.

USEPA also used technical and economic assumptions specific to § 316(b) options that lead to underestimates of market impacts. For instance, EEI describes that EPA's use of EIA and survey data appears to have resulted in an underestimation of the number of facilities subject to the rule and thus the total economic impact of the rule. EEI also notes that EPA has also significantly underestimated the engineering compliance cost for the Preferred Option and waterbody option. For cooling tower retrofits, EPA's estimates are one half or less of the cost cited in reports prepared by Shaw Stone & Webster and the United States Department of Energy as well as PSEG's own analyses that considered site-specific factors. In addition, EPA underestimated the time required to perform a retrofit to closed-cycle cooling.

EEI also discusses concerns and flaws in EPA's assumptions regarding transaction costs, plant closures, temporary plant shutdowns and reliability impacts, the effect of future power plant technologies, and the remaining useful life of power plants retrofitted with closed cycle cooling.

Also, it does not appear that USEPA considered the full spectrum of requirements that power generators will be mandated to implement under other environmental regulatory programs, most notably the Clean Air Act, at the same time the Phase II § 316(b) regulations will go into effect. Most notably, it does not appear that USEPA considered the cost of the Bush Administration's Clear Skies initiative. A plant that may remain economic with either a cooling system retrofit or installation of NOx, SO2 and mercury controls may not remain economic if required to make both sets of modifications. Given the widespread applicability of Clear Skies, this is an important consideration.

To illustrate the effect of two of the more significant model inputs on USEPA's results, EEI modeled two regulatory scenarios with more accurate information regarding the cost of retrofits to closed-cycle cooling and seasonal energy penalties. As discussed in EEI's comments, this modeling effort, using the POEMS model, showed significantly greater economic impacts for the watershed scenario with regard to the number of facility closures, energy penalties, system reliability, wholesale electric prices and total costs to consumers and producers. Correction of the other flawed assumptions would likely result in the identification of even greater economic impacts.

EPA Response

EPA notes that the final Phase II rule does not contain requirements to retrofit cooling towers. For a response to the issues raised in this comment, please refer to the responses to comment 316bEFR.072.101 and 316bEFR.072.209 in subject matter code 9.03.

Comment ID 316bEFR.075.059

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 9.0

Costs

In addition to the points made by EEI, PSEG notes that there is no indication that USEPA considered the availability of real estate to build cooling towers at the in-scope plants; they simply assumed a cost estimate and a timeframe to build. Building in space-constrained areas can greatly increase the construction and operating costs of a cooling system retrofit because of the potential for having to site the cooling towers at a greater distance from the power plant. This would, in turn, require longer piping runs, greater pumping demands, and more extensive excavations. It could also require driving piles in less desirable soils. In some extreme cases, additional property would have to be purchased or leased, if it were even available.

The need to comply with other regulatory requirements could exacerbate problems due to space constraints. Given the real estate that would be needed for the air pollution control equipment under the existing and anticipated air rules (primarily SCRs and scrubbers), this issue has the potential to become even more significant. For example, two of PSEG's in-scope Phase II facilities that would have been required to retrofit under any of USEPA's closed-cycle cooling options are now being required to install additional air pollution control technology (i.e., SCRs and scrubbers). Post-installation of these technologies, siting cooling towers may pose an even greater challenge due to land constraints at the stations.

EPA Response

EPA considered the air pollution impacts of cooling towers and the associated costs of controlling that additional pollution when deciding not to utilize cooling towers as a basis for the final rule.

Comment ID 316bEFR.075.060

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02

Benefit Estimation Methodology

USEPA Overestimated the Benefits Associated with Retrofitting to Operate with Closed Cycle Cooling

Appendix 14 to UWAG's Phase II Comments <FN 72> provides a critique of USEPA's benefit estimates for the Proposed Phase II Rule and states that "the methods EPA employs to estimate benefits of the regulatory options contain serious flaws and inconsistencies." <FN 73> Examples of the major problems with USEPA's benefit estimate methods include: (1) assuming that benefits equal costs in employing the Habitat Replacement Cost ("HRC") method and the Societal Reveal Preference ("SRP") method; (2) overstating commercial fishing benefits because of incorrect benefit timing assumptions and inappropriate benefit transfer; (3) overstating recreational benefits because of several errors (e.g., sampling methodology, trip costs, participation modeling) in USEPA's Random Utility Model ("RUM"); (4) the appropriateness and empirical support for basing nonuse values on a simple 50% (of use values) "rule of thumb"; and (5) extrapolating national benefits for 539 facilities from five nonrandom case studies. <FN 74> After correcting for some of USEPA's most obvious flaws in the benefits analysis for the Preferred Option, Dr. Desvouges concluded that aggregate benefits would be reduced by 82% (from about 735 million dollars to 132 million dollars). These errors in the benefits analysis also affect USEPA's estimates of the benefits associated with retrofitting facilities with closed-cycle cooling option, causing USEPA's estimates to be biased high.

Footnotes

72 UWAG's Phase II Comments, Appendix 14, prepared by W.E. Desvousges et al., EPA Benefits Analyses of Cooling Water Intake Structure ("CWIS") Regulations", August 2002.

73 Id. At 3.

74 Id. At 4-11.

EPA Response

The commenter identifies 5 major problems with EPA's benefits estimation methods, including commercial fishery impacts, recreational fishery benefits, non-use benefits, use of the Habitat Replacement Costs and Societal Revealed preference approaches, and extrapolation of national benefits for 539 facilities from 5 nonrandom cases.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment #316bEFR.005.029.

For EPA's response to comments on the methods used to estimate recreational fishing benefits please see the response to comments #316bEFR.075.504 and #316bEFR041.452.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Instead, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment #316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see comment #316bEFR.005.006.

Finally, EPA does not use case studies of individual facilities in cost benefits analysis of the final 316(b) regulation. Instead, EPA developed a regional approach to estimating national benefits of the 316(b) regulation. See the Notice of Data Availability (67 FR 38752) and the Regional Analysis Document for the Proposed Section 316 (b) Phase II Existing Facilities Rule for details (DCN # 4-0003).

For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish.

For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations.

For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.075.061

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

The Agency Should Adopt a Definition of Adverse Environmental Impact

USEPA has consistently espoused that a population, community, or ecosystem-level assessment of the impacts is required to determine if those impacts are "adverse" in the context of § 316(b). This has been the standard under which compliance with § 316(b) has been judged for almost 30 years. There is nothing in the record, which justifies a radical departure from this standard. Attachment 3 to PSEG's comments provide a summary of the legal and regulatory support for PSEG's position.

USEPA intentionally omits the regulatory definition of Adverse Environmental Impact ("AEI") <FN 75> because the determination of AEI can take a considerable length of time and that determination of AEI imposes a burden on the regulatory agencies. <FN 76> Even in its sample site-specific option, USEPA focuses on reduction in mortality of individual organism due to entrainment and impingement. PSEG believes that establishing a clear definition of AEI would provide for informed, scientifically based decisions. The burden on regulatory agencies would not necessary be increased and cost-effective and appropriate implementation of the Clean Water Act would occur. A recent article describing Maryland's evaluation of Chesapeake Bay power plant effects over a thirty year period concluded:
"The… impact assessment results and the… permitting actions at different categories of generating facilities in Maryland serve as basis for Maryland's perspectives on AEI… .

-Quantification of the effects of water withdrawal (i.e., numbers of organisms lost due to entrainment and impingement) is necessary, but not sufficient to determine whether AEIs are occurring; the key is whether these effects are of consequence to a biological entity of concern (e.g., RIS populations).

-Costs to the living resources and economic costs to the utilities and, ultimately, to the consumers must be taken into account when making permit decisions.

-The extent of impact of cooling-water withdrawal should be evaluated on a site-specific basis.

-In some instances, mitigation of some type may be the best way to ensure that the public's interests are addressed when CWIS decisions are made and permits are issued, approved, and enforced." <FN 77>

Footnotes

75 See e.g., 67 Fed. Reg. 17121, 17159 (April 9, 2002).

76 See e.g., 67 Fed. Reg. 17167.

77 Maryland Power Plant Cooling-Water Intake Regulations and their Application in Evaluation of Adverse Environmental Impact" by Richard McLean, William A. Richkus, Stephen P. Schreiner, and David Fluke – The Scientific World, published March 8, 2002.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.075.062

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.01.04

RFC: Alternative definition of "AEI"

The Alternative Definition of AEI Provided by USEPA Should be Modified

EPA has solicited comment on an alternative definition of Adverse Environmental Impact as follows:

Adverse environmental impact means one or more of the following: entrainment and impingement of significant numbers of a critical aquatic organism or percentages of aquatic populations; adverse impacts to threatened, endangered or other protected species, or their designated critical habitat; significant losses to populations, including reductions in indigenous species populations, commercial fisheries stocks, and recreational fisheries; and stresses to overall communities or ecosystems as evidenced by reductions in diversity or other changes in system structure or function.

The alternative definition of AEI proposed by EPA includes a number of factors that could indicate AEI. The first factor focuses on entrainment and impingement of significant numbers of critical aquatic organisms or percentages of aquatic populations <FN 78> without considering the source and magnitude of the change and its resultant impact on the relevant aquatic populations, communities, and ecosystems, absent consideration of compensatory mechanisms.

"Significant numbers" of aquatic organisms can be impinged or entrained without affecting the community or population of the ecosystem. <FN 79> Changes in populations, habitat, or communities may occur from many natural and anthropogenic conditions not related to the intake structure, such as natural variability in aquatic species density. In the alternative, USEPA's proposed definition would be improved by deleting the first factor, since USEPA's third factor addresses entrainment and impingement losses at biologically relevant endpoints. As noted in UWAG's Phase I comments, the protection of threatened and endangered species is accomplished using the Endangered Species Act. <FN 80>

Footnotes

78 Critical aquatic organisms were defined in EPA's 1977 draft guidance (see 67 Fed. Reg. 17163, Footnote 61).

79 See, e.g., In re Public Service Company of New Hampshire, Permit Application No. NH 0020338, No. 76-7 at 25 n13 (August 4, 1978) (The Administrator found that individual losses of planktonic stages of pollock and mackerel, "while large in absolute numbers, ... [are] extremely small when compared to the enormous mortalities that these ichthyoplankton typically sustain.")

80 16 U.S.C 1531 et seq. (2001). (The Endangered Species Act ("ESA") also involve a population- or community-based analysis of impacts. For example, in Humane Society v. Watt, 551 F. Supp. 1310 (D.D.C. 1982). The court upheld a decision by the FWS to allow sport hunting of black ducks. The Court rejected the plaintiff's argument that the "population" of protected ducks should be interpreted as the specific number of birds and instead defined population as the number of ducks for a required sustainable group.

EPA Response

EPA has rejected this definition of adverse environmental impact and has elected not to define the term in this rulemaking. Please see the response to comment 316bEFR.011.004 for more information.

Comment ID 316bEFR.075.063

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

UWAG's Definition of AEI Has Merit

PSEG also supports substituting the AEI definition UWAG proposed, <FN 81> which provides a foundation for assessing the impacts on a ecosystem, community, or population basis, which are the appropriate considerations under § 316(b). The definition recommended by UWAG provides more components to identify any potential adverse environmental impact and should be considered by USEPA. The UWAG definition of AEI is also consistent with the components considered by PSEG in its Salem 316(b) Demonstration. <FN 82> The comments of PSEG on the New Facility Rule relative to the components of AEI <FN 83> are equally applicable to the Phase II rulemaking.

PSEG also supports UWAG's recommendation that, where operating experience and knowledge of the local fishery provides regulatory authorities with confidence that fish populations are not being harmed by impingement and entrainment, the facility be identified as not causing an adverse environmental impact.

Footnotes

81 67 Fed. Reg. 17163.

82 Public Service Electric & Gas Company (PSEG). 1999. Permit Renewal Application, Appendix F, 316(b) Demonstration. NJPDES Permit No. NJ0005622. Salem Generating Station, Docket Control No. 4-1930.

83 PSEG Phase I Comments.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.1

General: cost tests

The Economic Tests Proposed by USEPA for Evaluating Costs and Benefits Under § 316(b) Should be Consistent with USEPA and OMB Guidelines And Should Reflect Widely Accepted Environmental Economics Methodologies.

USEPA has requested comment on the role of cost and benefit analyses for determining the best technology available for minimizing adverse environmental impact. <FN 84> PSEG supports USEPA's proposal to include a cost-benefit test in both its Preferred Option and its site-specific option and indeed believes it essential to any reasonable rule implementing § 316(b). This is the case whether USEPA ultimately adopts a site-specific approach as urged by PSEG and UWAG or whether the Agency adopts its Preferred Option based upon Performance Standards. Congress clearly mandated that costs must be considered when determining BTA. <FN 85>

Footnotes

84 See, e.g., 67 Fed. Reg. 17122 at 17153 (Col. 2), 17165 (Col. 3), 17166 (Col. 2).

85 § 316(b) uses "best available" to describe the technologies Congress wanted EPA to consider for minimizing AEI. One of the few things the legislative history says about BTA is that it means "best technology available at an economically practicable cost." 118 Cong. Rec. H9130 (daily ed. 33,762, 1972), Leg. Hist. at 264 (remarks of Congressman Clausen, for House Conferees).

EPA Response

The final rule includes a cost-benefit test, as requested by the commenter. In addition, costs have been considered in the analysis of the final rule, as the commenter requests. Therefore, the commenter's concerns have been met. EPA believes it is authorized to consider costs in establishing requirements under 316(b), and it did so for today's rule. Therefore, EPA does not need to reach the question whether Congress required consideration of costs.

Comment ID 316bEFR.075.065

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

USEPA Should Adopt “Maximum Net Benefits” As The Appropriate Economic Test

USEPA requests comment on the "significantly greater" cost test, which would replace the "wholly disproportionate" cost test USEPA has applied since the Seabrook decision. Neither the "significantly greater" nor the "wholly disproportionate" cost tests are the best means for evaluating BTA for minimizing adverse environmental impact.

Both USEPA <FN 86> and OMB <FN 87> have recently issued guidelines for conducting cost benefit analyses. Based on these guidelines issued by USEPA and OMB, the “best” intake structure technology for a given site is the one that maximizes net social benefit.

According to the OMB’s best practices <FN 88> for regulatory actions, determinations should ensure that:

1. the potential benefits to society justify the potential costs;

2. the proposed action will maximize the net benefits to society, including potential economic, environmental, public health and safety, and other advantages, distributional impacts, and equity; and

3. the proposed action will be the most cost-effective.

OMB further provides that decisions should be based on the best reasonably obtainable scientific, technical, economic, and other information. OMB’s direction to “maximize the net benefits to society” is not only appropriate in the promulgation of regulations but in their implementation as well.

EPA has provided no basis for proposing methodologies that deviate from their own economic analysis methodologies in its Guidelines. Furthermore, USEPA should ensure consistency in the application of § 316(b) and reduce the burden on permittees and regulators alike by developing regulations that provide a clear framework for analyzing costs and benefits of alternative BTA compliance measures. USEPA could also achieve this objective by the timely issuance of guidance describing credible methods based on practices that are widely accepted in the environmental economics profession. The USEPA’s own Guidelines for Preparing Economic Analyses <FN 89> could provide the foundation upon which either regulatory language or § 316(b)-specific guidance would be developed.

PSEG supports the use of “maximize net benefits” as the most appropriate criteria for making site-specific BTA determinations. PSEG believes that USEPA should provide the framework for site-specific cost and benefit analyses through regulations or guidance and endorses UWAG’s comments on this issue. <FN 90> This is the test PSEG has applied in its § 316(b) Demonstration for its Salem, Hudson and Mercer stations. Moreover, this is the same method prescribed in EPA's own Guidelines for Preparing Economic Analysis and is used in regulatory impact analysis conducted under

Executive Order 12866.

Footnotes

86 USEPA, Guidelines for Preparing Economic Analyses, Office of the Administrator, EPA 240-R-00-003 (2000).

87 Office of Management and Budget, Economic Analysis of Federal Regulations Under Executive Order 12866, January 11, 1996.

88 Office of Management and Budget, Economic Analysis of Federal Regulations Under Executive Order 12866, January 11, 1996.

89 USEPA, Guidelines for Preparing Economic Analyses, Office of the Administrator, EPA 240-R-00-003 (Sept. 2000).

90 For an analysis of how such site-specific assessments can be developed, see David Harrison, Jr. et al., Economic Evaluation of EPA's Proposed
Rules for Cooling Water Intake Structures for New Facilities. Prepared for the Utility Water Act Group, November 2002.

EPA Response

EPA does not agree that maximizing net benefits is the most appropriate criterion in this case, in which many benefits could not be monetized. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.075.066

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02

Benefit Estimation Methodology

The Accurate Valuation of Benefits is Critical

USEPA requested comment on the appropriate methodology for benefits assessment. The accurate valuation of benefits is critical to make an informed decision regarding whether a technology is BTA for minimizing adverse environmental impact. Without an accurate valuation of benefits, analyses of the maximum net benefit will not allow for informed determinations.

As discussed in Section V.D. below, PSEG conducted a review (Harrison, et al., 2002) of USEPA's methods for valuing I&E reductions at Salem. That review identified several serious errors in USEPA's methods that would lead to substantial overestimates of benefits. Included in Harrison, et al. (2002) are recommendations for improving economic benefit assessments. In response to USEPA's request for comments on appropriate methodologies for benefit assessments, those summary recommendations are reproduced in the following sections. These criticisms of the benefits assessment for the Delaware Estuary CSA are instructive and the recommendations for addressing the deficiencies noted in the CSA should inform USEPA's thinking on the development of guidance for conducting cost-benefit analysis under § 316(b).

EPA Response

EPA agrees that accurate valuation of benefits is critical when applying the benefit-cost test. However, no methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis. EPA disagrees that its methods for valuing benefits of the 316(b) regulation are flawed and thus would lead to substantial overstatement of benefits.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

For EPA's response to comments on the methods used to estimate recreational fishing benefits please see the response to comment 316bEFR.075.504. See also response to comment 316bEFR.041.452.

Comment ID 316bEFR.075.067

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

For commercial fishing benefits, USEPA should review the empirical foundations and revise its estimates

The commercial fishing benefits in the Delaware Case Study are overstated because they exaggerate the likely consumer and producer surplus associated with changes in the commercial catch. The values do not appropriately acknowledge the long-term tendency for producer surplus to be dissipated, which means that most additional gross ex vessel revenues will not constitute long-term benefits.

More important, USEPA uses a “multiplier” to translate changes in producer surplus into total “multi-market” surplus that is not justified. Such a multiplier implies substantial reductions in fish prices, and USEPA has provided no information to support such a claim. Indeed, given the relatively small effect changes in I&E at Salem would have on overall supply, it does not seem likely that consumers would receive any additional consumer surplus gains.

EPA should revise its estimated range of potential commercial fishing benefits from Salem I&E to reflect long-term effects on producer surplus and the lack of any likely effects on fish prices.

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.075.068

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02.01

Recreational Fishing Benefits

For recreational fishing benefits, USEPA should modify its application of the benefit transfer approach and revise (or ignore) its RUM study

EPA's recreational fishing benefits are based on the benefit transfer approach and a Random Utility Model ("RUM") study carried out by EPA. The benefit transfer study should be re-evaluated to consider using a more sophisticated approach that would allow the value per fish to vary with individual circumstances. The RUM study—which is used to value two of the relevant species—either should be ignored or should be revised to eliminate (or explain) apparent methodological problems.

EPA Response

The comment refers to the proposed rule analysis. For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed generally accepted procedures, and has carefully applied benefit transfer methods. Further information on the methods EPA used to estimate recreational fishing benefits for the final Section 316(b) Phase II regulation is provided in the Regional Studies Document for the Final Section 316 (b) Phase II Existing Facilities Rule. See Chapter A11 and Chapter 4 in Parts B through H: RUM Analysis (DCN #6-0003).

For EPA's response to comments on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

The Agency disagrees that its RUM approach suffers from methodological problems and thus is unsuitable for estimating recreational fishing benefits of the 316(b) regulation. For EPA's response to comments on the RUM method, please see responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010.

Comment ID 316bEFR.075.069

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

For nonuse fishing benefits, USEPA should discard the estimates derived from the 50 percent rule of thumb

EPA’s nonuse benefits are based upon a crude rule of thumb that has no validity and no applicability to I&E changes in the Delaware Estuary. Unless USEPA has specific evidence of nonuse benefits associated with changes in I&E in the Delaware Estuary, this category should be eliminated as part of the Delaware Case Study.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.075.070

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

For forage fish, USEPA should discard the replacement cost method and rely exclusively on the production foregone method

Forage fish can provide benefits because of the effects they have on commercial and recreational species. USEPA should base its estimate of benefits on the production foregone method and discard the alternative replacement cost method, which has no conceptual or empirical foundation as a measure of benefits.

EPA Response

EPA agrees that the production forgone method is preferable and has used it in the analysis for the final 316(b) Phase II rule.

For EPA's response to comments on the valuation of forage species, please refer to the response to comment #316bEFR.005.028.

Comment ID 316bEFR.075.071

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

PSEG Supports USEPA's Proposal to Allow for Restoration Measures

PSEG supports USEPA's proposal to include provisions that would allow implementation of restoration measures by a facility in lieu of or in combination with reductions in impingement mortality and entrainment in the Proposed Phase II Rules, including USEPA's Preferred Option, as well as its other options. PSEG firmly believes that at many facilities, implementation of restoration measures can provide increased ecological benefits over a purely technology-based approach.

1. The Use of Restoration Measures is a Tried and Proven Approach for Improving Aquatic Ecosystems and the Benefits of This Approach Have Been Scientifically Demonstrated.

As discussed in this and other (e.g., III.C.1) sections of PSEG's comments, PSEG is responsible for one of the Nation's largest restoration projects implemented to address concerns about potential impacts of I&E losses. Based on the wealth of information the experience from these projects has provided, PSEG offers the following comments in response to USEPA's invitation for comments on "all aspects" of its proposal to allow restoration measures "in lieu of, or in combination with reductions in impingement mortality and entrainment" (67 Fed. Reg. 17146) to satisfy § 316(b) requirements.

The scientific literature is replete with information pertaining to wetland restoration, fish ladders, artificial reefs and land preservation. A significant percentage of the literature discusses specific examples of measures including descriptions of the restoration project, monitoring programs to measure effectiveness in terms of both structure and function, and time frames in which the benefits of conservation measures were recognized. The information summarized in this comment supports the concept that conservation measures are a cost-effective alternative that should be considered alone or in combination with technology improvements as a mechanism for maintaining fish and shellfish populations in a waterbody.

a. Structure and Function Can be Restored at Wetlands

Degraded wetlands can be successfully restored where (1) conditions favoring restoration exist, (2) an appropriate design properly addressing ecological considerations is implemented, and (3) the program is monitored and managed toward the goal of achieving self-sustaining restoration. The scientific literature has many reports reviewing creation and restoration of wetlands. <FN 92> Restored wetlands can provide the same structure and function as naturally occurring wetlands and thereby enhance the health and productivity of aquatic ecosystems. (See also EPRI 2002). It is well known that salt marshes serve as important nurseries for resident and transient fishes. <FN 93> Furthermore, salt marshes function as sites for reproduction, food, and predator refuge for fishes and other animals and therefore promote growth and survival. <FN 94> Recently, fisheries biologists with the National Marine Fisheries Service published a review article titled Catching the Link Between Wetlands and Fisheries Management (Stedman and Brown 2000). The authors point out:

Fish use wetlands as nursery areas, spawning grounds, feeding areas, and refuge from predators. The wetland vegetation, the rich detritus, and the shallow water provide unique functions that benefit many fish. Approximately three–quarters of the commercial fish landings in the United States consists of species that depend on estuaries and their wetlands.

Despite the presence of state and federal wetland protection regulations, wetland losses continue to mount. <FN 95> The Department of the Interior estimated that 1.2 million acres of wetlands were lost during the ten years ending in 1995 (Natural Resource Council 2001).

PSEG's Estuary Enhancement Program ("EEP") includes one of the world's largest wetland restoration projects. The Company undertook the salt marsh restoration to address concerns about losses of certain species (i.e., "Target Species") due to Salem's CWIS operations. PSEG's EEP clearly demonstrates that wetland restoration can be successful and should be considered as an acceptable component of § 316(b) permitting decisions (PSEG 1999). As recognized by the National Oceanic and Atmospheric Administration when it honored PSEG with its Excellence in Business Leadership Award for Coastal and Ocean Resource Management, <FN 96> PSEG's wetland restoration program is an excellent example of society's efforts to balance business interests with environmental needs.

As part of the EEP, PSEG has been conducting studies that demonstrate that the restored marshes function as habitat for reproduction, feeding, and growth for numerous species of fish and other components of the indigenous Delaware Estuary. The goals of these studies are to document finfish utilization of restored wetlands by examining the distribution and seasonal abundance of Target Species, and community composition of the ichthyofauna present; and to compare Target Species' utilization of restored wetlands to Target Species utilization of reference marshes. <FN 97> These studies also characterize the relative movement and feeding habits of Target Species in tidal creeks in restored and reference marshes, thus serving to document the direct role of restored marshes in providing foraging habitats for the Target Species.

i. PSEG's EEP Provides Benefits to Fish Populations

PSEG undertook several comprehensive studies to determine whether, in fact, restored marsh successfully augments the aquatic food web, and provides habitat for reproduction, feeding, growth and refuge for numerous species of fish and other estuarine fauna. These studies conclusively demonstrated that seasonal occurrence, abundance, and size of blue crabs in restored marshes were similar to or greater than those found in natural, reference marshes within two years of the completion of restoration construction activities. Studies at several sites found that the abundance of several fish species, including Atlantic croaker, bay anchovy, spot, striped bass, weakfish, and white perch in large marsh creeks was greater than or equivalent to abundance at the reference site. Detailed analysis of the food habits of young mummichog, bay anchovy, spot, weakfish and white perch, and of adult striped bass and white perch, indicated that individuals in the restored and reference marshes ate equivalent types of food in equivalent amounts. The studies found that fish were using the restored marshes as habitat for reproduction, feeding and growth on the same basis as at the reference marshes. Indices of fish survival indicated similar function between restored and reference marshes (PSEG 1999, Appendix G-3). Thus, PSEG's studies have demonstrated the utilization of restored marshes by Atlantic croaker, weakfish, bay anchovy, striped bass, white perch, and weakfish; the same species subject to I&E at Salem.

PSEG also helped fund state-of-the-art stable isotope studies, which showed that weakfish, bay anchovy, and white perch were using food derived from Spartina marshes. The weakfish specimens included those caught at the mouth of the Delaware Bay during the fall out migration to the coastal waters, confirming that the energy generated by the Spartina marshes in the Estuary accrues to the benefit of higher-level predators in open water.

PSEG's studies also examined the detrital production at the restored marshes, which contribute to the Delaware Estuary. Monitoring of those portions of the restored sites now dominated by Spartina showed levels of biomass production indistinguishable from those at reference marshes and near the high end of the range of peak season biomass reported of Spartina in salt marshes along the Atlantic coast (Mitsch and Gosselink 1992; PSE&G 1999, Appendix G-2).

The studies completed by PSEG have been well-documented and reviewed by recognized experts in the fields of marsh ecology and fisheries management. EEP's Monitoring Advisory Committee, comprised of independent scientists with expertise in marsh-related fisheries, and regulatory scientists from federal, state and interstate resource protection agencies, have reviewed the Biological Monitoring Work Plan for the project and the results of that program since the establishment of the EEP. Furthermore, technical papers have been published and subject to peer review describing the findings of these studies and the methods used to evaluate those findings. <FN 98>

The evidence collected by the PSEG program clearly demonstrates that marsh restoration programs make measurable and demonstrable contributions to the ecological processes that produce fish and invertebrates in the Delaware Bay system, including those species affected by the operation of Salem's CWIS. Almost from the inception of the restoration activities, PSEG restoration sites have been producing benefits for fish production that are equal to or even greater than those provided by nearby natural Spartina wetlands used as reference sites. The studies show that the restored marshes are providing food to important species, including weakfish caught in the open Delaware Estuary. The studies conducted in the restored wetland sites confirm, in the specific context of the Delaware Estuary, the important and widely recognized benefits provided by wetlands, including restored wetlands, to fish production. PSEG's EEP clearly demonstrates that wetland restoration can be successful and should be considered as an acceptable component of Section 316(b) permitting decisions (PSEG 1999, Schoenbaum and Stewart 2000).

Footnotes

91 67 Fed. Reg. 17154 – 17159.

92 Niering, W.A. 1997. Tidal wetlands restoration and creation along the east coast of North America. Pages 259-285 in K.M. Urbanska, N.R. Webb, and P.J. Edwards (eds.) Restoration ecology and sustainable development. Cambridge University Pres, Cambridge, UK. Rozsa, R. 1997. Tidal wetland restoration in Connecticut. Department of Environmental Protection, Tidal Wetland Restoration Program. Burdick, D.M., M. Dionne, R.M. Boumans and F.T. Short. 1997. Ecological responses to tidal restorations of two northern New England salt marshes. Wetlands Ecology and Management 4:129-144. Craft, C.B., J. Reader, J.N. Sacco, and S.W. Broome. 1999. Twenty-five years of ecosystem development of constructed Spartina alterniflora (Loisel) marshes. Ecological Applications 9:1405-1419.

93 Gunter, G. 1956. Some relations of faunal distribution to salinity in estuarine waters. Ecology 37:616-619. Nixon, S.W. and C. Oviatt. 1973. Ecology of a New England salt marsh. Ecol. Mono. 43:463-498. Daiber, F.C. 1977. Salt marsh animals: Distributions related to tidal flooding, salinity, and vegetation. Chapter 5, p. 79-108 In: V.J. Chapman (ed.) Wet Coastal Ecosystems. Elsevier Scientific Publishing Co., Amsterdam, The Netherlands. Weinstein, M.P. 1979. Shallow

marsh habitats as primary nurseries for fishes and shellfish, Cape Fear River, North Carolina. Fish. Bull. 77:339-357. Boesch, D.F. and R.E. Turner. 1984. Dependence of fishery species on salt marshes: the role of food and refuge. Estuaries 7:460-468. Rozsa, L.P., C.C. McIvor, and W.E. Odum. 1988. Intertidal rivulets and creekbanks: corridors between tidal creeks and marshes. Marine Ecology Progress Series. 47:303-307. Rountree, R.A. and K.W. Able. 1992. Fauna of polyhaline subtidal marsh creeks in southern New Jersey: compositions, abundance and biomass. Estuaries 15(2):171-185. Ayvazian, S.G., L.A. Deegan, and J.T. Finn. 1992. comparison of habitat use by estuarine fish assemblages in the Acadian and Virginian zoogeographic provinces. Estuaries 15: 368-383. Minello, T.J. and R.J. Zimmerman. 1992. Utilization of natural and transplanted Texas salt marshes by fish and decapod crustaceans. 90:273-285. Minello, T.J. and J.W. Webb, Jr. 1997. Use of natural and created Spartina alterniflora salt marshes by fishery species and other aquatic fauna in Galveston Bay, Texas, USA. Marine Ecology Program Series 151:165-179. Baltz, D.M., C. Rakocinski and J.W. Fleeger. 1993. Microhabitat use by marsh-edge fishes in a Louisiana estuary. Environmental Biology of Fishes 36:109-126. Kneib, R.T. 1997. The role of tidal marshes in the ecology of estuarine nekton. P. 163-220 In: A.D. Ansell, R.N. Gibson, and Margaret Barnes, (eds.) Oceanography and Marine Biology: an Annual Review 1997, 35 UCL Press.

94 Thayer, G.W., H.H. Stuart, W.J. Kenworthy, J.F. Ustach, and A.B. Hall. 1978. Habitat values of salt marshes, mangroves, and seagrasses for aquatic organisms. Pages 235-257 in P.E. Greeson, J.E. Clark, editors. Wetland Functions and Values: The State of Our Understanding. Proceedings of the National Symposium on Wetlands, American Water Research Association. Boesch, D.F. and R.E. Turner. 1984. Dependence of fishery species on salt marshes: the role of food and refuge. Estuaries 7:460-468. Kneib, R.T. 1987. Predation risk and use of intertidal habitats by young fishes and shrimp. Ecology 68(2): 379-386. Kneib, R.T. 1997. The role of tidal marshes in the ecology of estuarine nekton. P. 163-220 In: A.D. Ansell, R.N. Gibson, and Margaret Barnes, (eds.) Oceanography and Marine Biology: an Annual Review 1997, 35 UCL Press. Desmond, J.S., J.B. Zedler, G.D. Williams. 2000. Fish use of tidal creek habitats in two southern California salt marshes. Ecological Engineering 14: 233-252.

95 Herbert, J.F. Rate of Wetland Destruction slowing. Ramsar Archives, Associated Press (1997); Natural Research Council, Compensating for Wetland Losses Under the Clean Water Act, National Academy Press, Washington, DC (2001).

96 PSEG received NOAA's Excellence in Business Leadership Award for Coastal and Ocean Resource Management in October 3, 2001. The Excellence in Business Leadership award recognizes one business that has made significant contributions to improve or protect the coastal or ocean environment and that demonstrates the ability to balance business interests with environmental needs. PSEG's Estuary Enhancement Program was cited as an innovative solution to an environmental issue that balances the needs of natural resources and the community's need for safe, dependable economic power.

97 Reference marshes are naturally incurring marshes that PSEG selected to use as benchmarks for tracking the return of structure and functions at its restoration sites.

98 Able, K.W., D.M. Nemerson and P.R. Light. 2001. Spatial variation in Delaware Bay (U.S.A.) marsh creek assemblages. Estuaries 24(3):441-452. Miller, M.J. and K.W. Able. 2002. Movements and growth of tagged young-of-the-year Atlantic croaker, Microogonias undulates, in restored and reference marsh creeks in Delaware Bay. J. Exp. Mar. Biol. Ecol. 267:15-38. Smith, K.J., G. Taghon and K.W. Able. 2000. Trophic linkages in marshes; ontogenetic changes in diet for young-of-the-year mummichog, Fundulus heteroclitus. Pp. 221-237. In M.P. Weinstein and D.A. Kreeger (eds.), Concepts and Controversies in Tidal Marsh Ecology. Kluwer Academic Publishing, The Netherlands. Tupper, M. and K.W. Able. 2000. Movements and food habits of striped bass (Morone saxatilis) in Delaware Bay (U.S.A.) salt marshes: comparison of a restored and a reference marsh. Marine Biology 137 (5/6): 1049-1058).

EPA Response

EPA does not believe restoration measures are necessarily more cost-effective than design and construction technologies or operational measures. However, by providing additional options, restoration measures increase the number of potential solutions as permit applicants seek a cost-effective solution.

For a discussion of the benefits from restoration, see EPA’s responses to comments 316bEFR.075.017 and 316bEFR.032.011.

EPA believes that restored wetlands have been shown to match some of the structures and functions of naturally occurring wetlands, but that wetland science has not advanced to the point where it is able to define and measure all structures and functions of either naturally occurring or restored wetlands.

EPA encourages the use of the peer review process to bring current expertise to bear on the design, implementation, and assessment of restoration measures.

For a discussion of existing restoration programs, see EPA's responses to comments 316bEFR.307.046 and 316bEFR.034.032.

Comment ID 316bEFR.075.072

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

PSEG's EEP Provides Other Environmental Benefits

The benefits of wetland restoration are not limited to increased fish and detrital production. Coastal wetlands are enormously valuable for their role in linking aquatic and terrestrial ecosystems. <FN 99> The water quality benefits associated with wetlands are well documented. Coastal wetlands also buffer the coastline from severe storms and intercept nutrients and sediments (USEPA 1998). In the case of PSEG's restoration project, the restored marshes along the Delaware Estuary provide new habitat for bird populations that use the Estuary in the course of their migration between South America and Canada. Among the beneficiaries are a large concentration of shore and wading birds, more than 30 species, which forage in freshwater and salt marshes in the Estuary during their spring migration. In addition, the design of the restoration sites accounted for critical habitat of threatened and endangered species, increasing available habitat which otherwise would not be present. Public access to the waterfront and the restoration sites in the form of boat launches, towers, nature trails, and boardwalks provide educational opportunities for the public at large.

The wetlands restored by PSEG also contribute to an area of significant ecological value, as recognized by "The Convention on Wetlands of International Importance especially as Waterfowl Habitat" (commonly referred to as the Ramsar Convention). Selection for the Ramsar List is based on significance in terms of ecology, botany, zoology, limnology, or hydrology. The Delaware Estuary and all wetlands lying therein comprise one of the seventeen sites that meet the critical and stringent Ramsar Convention guidelines and is designated as an internationally important wetland. All of the PSEG wetland restoration sites are included within the Ramsar Convention Delaware Estuary "List of Wetlands of International Importance" wetland site.

The marshes of the Delaware bayshore are also identified as a "Last Great Place" by The Nature Conservancy's ("TNC") Last Great Places Alliance for People and Nature campaign. The objective of this campaign is the protection, through partnerships, community outreach, and land preservation, of the best remaining examples of important and unique ecosystems. By designating the marshes of the Delaware bayshore, a Last Great Place, TNC also has recognized the value of the ecosystem to which the PSEG wetland restoration sites will contribute for the long term.

Footnotes

99 Montague, C.L. and H. T. Odum, Introduction: The Intertidal Marshes of Florida's Gulf Coast. In: Ecology and Mangement of Tidal Marshes, C.L. Coultas and Y.P. Hsieh (eds.), St. Lucie Press, Delray Beach, FL (1997).

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

Fish Ladders Can be Used to Restore Migratory Runs

Since colonial times, many tributary streams and rivers utilized by river herring and other species have been dammed or otherwise blocked for industrial, irrigation, recreational, and flood control purposes, leading to a decline in anadromous fish stocks (PSE&G 1993; ASMFC 1985). Fish ladders are a proven technology for enabling fish to pass upstream over natural and manmade barriers in rivers and streams (EPRI 2002).

In Delaware, the Wagamons Pond fishway recorded 1,814 river herring ascending the ladder in 1998 (University of Maryland, 1998). <FN 100> Connecticut has an extensive program for enhancing and restoring river herring populations; it includes activities associated with upstream and downstream fish passage, juvenile monitoring, and adult stocking. There are at least 25 fishways installed on Connecticut rivers and streams for the purpose of passing anadromous fish upstream. The Connecticut Department of Environmental Protection ("CDEP") has been pleased with the effectiveness of these types of ladders to pass river herring upstream, given that the ladders are properly installed and operated at appropriate sites (i.e., dams that meet engineering criteria for effective application). <FN 101> The CDEP considers fish ladders to be a proven technique for restoring river herring runs and supports their continued installation at dams where no upstream passages are present.

In Rhode Island, steeppass ladders have been used to restore runs of river herring. In some cases, these ladders have performed so well that they had to be replaced by larger Denil ladders in order to pass the increased number of fish arriving at the ladder sites. <FN 102> Alaska steeppass ladders have been installed at several locations in Maine. Information that was obtained on four steeppass ladders indicates that they are effective. <FN 103> Thousands of adult alewife (more than 10,000 at one ladder) use the ladders each year.

Alaska steeppass ladders also have been constructed for passing river herring at several locations in New Jersey. <FN 104> A ladder at Shenandoah Lake (south branch of the Metedeconk River) has passed alewives into the lake since 1973. On the basis of the success of past and ongoing restoration efforts, it can be concluded that the fish ladder - and specifically the Alaska steeppass ladder - is a demonstrated technology for allowing river herring to migrate past barriers to upstream spawning habitats.

PSEG has installed eight fish ladders in the Delaware Bay area and will install an additional four ladders over the term of its 2001 NJPDES Permit. <FN 105> A total of 733 acres of additional lacustrine habitat and 118 miles of riverine habitat have been made available by the eight already-installed ladders. In addition to producing substantial numbers of additional adult river herring that will return to the Estuary, the newly accessible impoundments will also produce substantial additional forage for the predator species in the Estuary (i.e., weakfish and striped bass). The estimated potential juvenile production ranges from 736,665 to 4,194,959 fish.

PSEG studies and others referenced above have demonstrated a direct link between establishment of fish ladders and benefits to species, which may be impacted by the CWIS. The installation of fish ladders to restore access to spawning habitat is a viable means of enhancing the aquatic productivity of an ecosystem. A number of NPDES permits resolving § 316(b) determinations have included such requirements and PSEG strongly recommends that the Phase II Rule recognizes the installation of fish ladders as a means of achieving compliance with § 316(b).

Footnotes

100 University of Maryland. 1998. Fish Ladder Utilization at Wagamons Pond in Milton, DE.

101 Gephard, S., J. Ravita and B. Williams, Anadromous Fish Enhancement and Restoration. Connecticut Department of Environmental Protection, Federal Aid Performance Report F-50-D-18 (1998).

102 Gibson, M. 1993. Rhode Island Division of Fish & Wildlife. Personal communication.

103 Flagg, L. 1998. Personal communication. Maine Department of Marine Resources.

104 Byrne. 1999. Personal communication. New Jersey Department of Environmental Protection.

105 NJPDES Permit No. NJ0005622, Salem Generating Station. Part IV Custom Requirement G.4.

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

Comment ID 316bEFR.075.074

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

Artificial Reefs Provide Shelter and Increased Forage for Fish Species of Interest

A review of the scientific literature and research indicates that the creation of artificial reefs will result in increased fisheries production in estuaries and help insure the maintenance of balanced, indigenous aquatic populations as well as foster increased production of species, which are associated with the artificial reefs (EPRI 2002).

An artificial reef is defined as the manipulation of natural aquatic habitats through the addition of man-made or natural structures, for the purpose of enhancing specific or selected fisheries resources. Historically, reefs have been constructed to foster a greater, more efficient harvest of commercially and/or recreationally desirable organisms, and more recently, for the enhancement of environmental quality in the areas of water quality and biodiversity. <FN 106> Through physical modification of habitat, artificial reefs increase shelter and cover to protect the fishes of interest and also result in a more diverse and productive forage base for predator fish (Seaman et al. 1991).

In the mid-1980s, as part of the United States Army Corps of Engineers ("USACOE") Wilmington Harbor mitigation project, the Delaware Department of Natural Resources and Environmental Control's ("DNREC") Division of Fish and Wildlife funded several studies, which included an artificial Reef Siting and Design Development Plan for Delaware Bay and Adjoining Coastal Waters. These studies were utilized in the selection of the design specifications and siting for the USACOE's Brown Shoal project. <FN 107> Subsequently, the USACOE (Philadelphia District) placed a series of artificial reefs in lower Delaware Bay as partial, out-of-kind mitigation for the loss of 239 acres of wetlands and subaqueous habitat in Wilmington Harbor South, Delaware, resulting from dredge spoil disposal. The sixteen artificial reefs were placed in four clusters on Brown Shoal in June 1989, approximately 8.5 nautical miles north of Cape Henlopen, on the State of Delaware's reef site #7. The objectives of the Brown Shoal reef were to create a highly productive habitat that would provide food and shelter for endemic species, and to increase feeding efficiency of endemic fish species. <FN 108>

The biological survey of the Brown Shoal reef is one of the more comprehensive studies of an artificial reef in a temperate climate on the East Coast. The results showed that as a result of the placement of new habitat structure, the composition of the fish community changed in response to the new habitat and abundance was potentially greater than that found on the adjacent, unstructured bottom. There also was a significant increase in the epifaunal community attached to the structures as compared to the benthic community of the surrounding bottom.

A five-year study conducted by USACOE on the reef structures measured epifaunal community biomass enhancement, that averaged 486 times the control bottom and organism abundance that averaged 211 times greater than the area without a reef structure. The study concluded that the artificial reefs is likely to have enhanced the benthic forage available to the bay fish community.

PSEG believes that the construction of artificial reefs in the Delaware Bay has and will continue to increase production of fish. When a reef is built, the epifaunal community that develops is more diverse and productive than the community associated with previously existing unstructured bottom habitat, creating a larger forage base. The enhanced forage base found on artificial reefs provides the potential for improved growth and survival of recreationally and commercially important species within the waterbody.

PSEG believes that the construction of artificial reefs, therefore, is another habitat restoration measure that should be available for consideration in § 316(b) determinations.

Footnotes

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108 Foster, K.L., R.K. Kropp, F.W. Steimle, W.C. Muir, B.E. Conlin. 1995a. Fish community and feeding habitats at a pre-fabricated concrete artificial reef in Delaware Bay, U.S.A. Proc. International Conference on Ecological System Enhancement Technology for Aquatic Environments, Japan International Marine Science and Technology Federation, Tokyo.

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

Comment ID 316bEFR.075.075

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

Preservation of Buffer Areas Enhance and Protect Aquatic Ecosystems

Buffers, including both upland and wetland areas adjacent to estuaries, rivers, bays are critical links to the health of these ecosystems. The literature recognizes the importance of such areas, as do many public and private organizations that fund acquisition of critical lands for ecosystem protection. For example, as discussed in Section C.1.a.ii above, TNC's Last Great Places Alliance for People and Nature specifically recognizes the role land preservation plays in ecosystem protection.

Healthy, intact, broad, upland buffers are integral components of healthy wetland landscapes. In fact, upland buffers are absolutely critical to the functional value of wetlands. <FN 109> Lack of such buffers, or lack of quality in buffers that are present, is reflected directly in reduced functional quality of adjoining wetlands (South Florida Water Management District 1997). The buffers serve as physical and biological ecotones, providing habitat diversity and assuring the functional integrity of the ecosystem at the landscape scale. <FN 110> The water quality protection functions provided by upland buffers have been encompassed in riparian and estuarine conservation programs in many places, notably in "critical areas" protection programs in Maryland and New Jersey. Water quality protection values accrue from upland buffers throughout watersheds, but are particularly important in headwaters areas, where streams are smaller, flows are lower, and pristine conditions are more likely to occur.

The benefits associated with protection of buffer areas adjacent to aquatic ecosystems include the following:

-Buffers provide more complete ecosystem mosaics, resulting in a diversity of habitats for a variety of avian and terrestrial species. Buffers provide adjunct habitats to species that depend primarily upon wetlands, link wetlands and terrestrial habitats for species that depend on both, and provide habitats for species that depend on upland forests and agricultural lands (USEPA 1998).

-Buffers provide nutrient and other chemical and physical inputs to marshes. Plant communities in marsh and estuarine systems benefit from diffuse overland flow of nutrients, sediment, organic matter and other material from adjoining lands. <FN 111>

-Upland buffers protect adjoining wetlands from anthropogenic impacts. They provide areas in which human development is controlled and so aid in wetland protection and adjacent waters from the most intrusive human impacts. <FN 112> Impacts related to land use include increased artificial lighting, noise, dust, pollution, odors, vegetation removal, microclimate change. <FN 113>

-Upland and wetland areas provide natural treatment systems that protect the quality of downstream waters. <FN 114> Buffer areas diffuse excess loadings of nutrients or other chemical constituents from plant sources by reducing their concentrations and bioavailability. <FN 115> Improved water and overall habitat qualities generally lead to increase in biodiversity and improvements in ecological functions such as nutrient cycling, trophic relationships, and predator-prey relationships.

-Buffer areas provide hydraulic and hydrologic control and storage of runoff from the upland watershed or storm surge in estuaries. <FN 116>

The importance of upland and tidal marsh preservation to the long-term sustainability of estuarine processes is becoming increasingly widely recognized. The functions of upland buffers are so important that the USACOE has recognized that preserving vegetated buffers may provide more benefits to the local aquatic environments than replacing an impacted wetland.

Given the critical links between buffer lands, wetlands and adjacent surface waters, land preservation can provide long-term contribution to ecological diversity and fish habitat and will provide these services long after the cessation of CWIS operation. Preservation of these sensitive lands through transfers to government, public trusts, or through deed restrictions provides a reliable means of protecting such lands in perpetuity.

PSEG recommends that the preservation of lands in perpetuity, including wetlands, transition areas and uplands, serving as buffers to aquatic habitats, continue to be recognized as appropriate restoration measures under the Phase II Rules.

Footnotes

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114 Vought, L.B.-M., G. Pinay, A. Fuglsang, and C. Ruffinoni. 1995. Structure and function of buffer strips from a water quality perspective in agricultural landscapes. Landscape Urban Planning. 31:323-331.

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116 Horner, R.R. (M. ASCE), D.B. Booth, A. Azous, and C.W. May. 1998. Watershed determinants of ecosystem functioning. In: Effects of watershed development and management on aquatic ecosystems (L.A. Roesner, ed.). American Society of Engineers, New York.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

For a discussion of ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.075.076

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

What is the Role of Restoration Under the Three Demonstration Alternatives of USEPA's Preferred Option?

USEPA has invited comment on whether or not restoration measures should be allowed only as a supplement to technologies or operational measures, or whether restoration measures should also be allowed as stand-alone measures to address potential adverse impacts of cooling water system operations. <FN 117> PSEG believes the role of restoration under the Preferred Option requires clarification and the role may depend on which "Demonstration Alternative" specified in § 125.94 for establishing best technology available is selected by the applicant.

Under Demonstration Alternative I specified in § 125.94(a)(1), the applicant would be required to demonstrate that the existing design and construction technologies, or operational measures would meet the performance standards, and/or that the restoration measures meet that portion of the performance standards not met by the existing design and construction technologies. Under this Demonstration Alternative, whether or not restoration measures are included, as standalone measures or a supplement to technologies or operational measures to satisfy the performance standards would depend on conditions of NPDES Permits in force when the Final Rules are promulgated. The Phase II Rules should recognize existing NPDES permit conditions regarding restoration measures, i.e., restoration measures that are conditions of existing NPDES permits should be considered when determining whether the performance standards are met under Demonstration Alternative I.

An applicant using Demonstration Alternative II as set forth in proposed § 125.94(a)(2) would be required to demonstrate that the proposed design and construction technologies, operational measures, and/or restoration measures would, in combination with any existing design and construction technologies, operational measures, and/or restoration measures meet the requisite performance standards. Demonstration Alternative II would allow implementation of restoration measures by a facility in lieu of or in combination with reductions in impingement mortality and entrainment. Dependent on site-specific circumstances, implementation of restoration measures at many facilities may provide increased ecological benefits over a purely technology-based approach and the Phase II Rules should allow for flexibility on the part of the applicant preparing an Alternative II Demonstration. Given the uncertainty concerning population level effects of an individual facility, the Director may, in fact, prefer the implementation of restoration measures to address other more pressing management needs that are impacting aquatic populations within the source waterbody (e.g., wetland or habitat loss, water quality, and etc.). A restoration plan that addresses other source waterbody problems more directly impacting aquatic populations can provide immediate, long-term benefits to the ecosystem and these benefits will continue regardless of the long-term operational status of the existing CWIS.

Under Demonstration Alternative III specified in § 125.94(a)(3), a site-specific determination of best technology available may be allowed if the Director were to determine that the permittee met the requirements of either the cost-cost or cost-benefit tests. The Director is required to make a site-specific determination based on less costly design and construction technologies, operational measures, and/or restoration measures to the extent justified by the significantly greater costs. PSEG agrees that an Alternative III Demonstration should allow for the use of restoration measures either in lieu of or in combination with reductions in impingement mortality and entrainment.

USEPA's Preferred Option seems to require a cost-benefit analyses regarding any proposed restoration measures to satisfy the regulatory clause, "to the extent justified by the significantly greater cost." USEPA should clarify that the cost-benefit analyses required by § 125.94(c)(2) and (c)(3) would apply only to design and construction technologies. If the applicant chooses, after the cost-cost and cost-benefit analyses, to propose restoration measures for consideration by the Director, a cost benefit analyses for the proposed restoration measures should not be required. Subjecting restoration measures proposed by an applicant to a cost-benefit analyses is not a reasonable approach because a precise and complete quantification of the benefits may not be possible, dependent on the nature of the restoration measures that have been proposed.

The inclusion of restoration measures for any Demonstration Alternative, including an Alternative III Demonstration, should remain voluntary and at the discretion of the applicant as may be necessary to resolve uncertainty concerning potential adverse effects of a particular facility's CWIS.

Footnotes

117 67 Fed. Reg. 17146.

EPA Response

For a discussion of the role of existing restoration measures, see EPA's response to comment 316bEFR.032.011.

EPA believes the requirements for restoration measures in the final rule provide permit applicants with a significant amount of flexibility.

EPA believes there are uncertainties associated with the implementation, assessment, and design of restoration measures as well. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

For a discussion of the role of state program priorities in the choice of restoration measures, see EPA's response to comment 316bEFR.099.029.

For a discussion of ancillary benefits from restoration measures, see EPA's response to comment 316bEFR.032.011.

As described in the final rule, restoration measures must be considered, as are design and construction technologies and operational measures, in any site-specific determination of performance standards.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.075.077

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

USEPA Should Allow Permitting Agencies and Permittees to Determine the Spatial Scale Under Which Restoration Efforts Should be Allowed

USEPA has invited comment on the most appropriate scale under which restoration efforts would be allowed. <FN 118> As proposed by § 125.95(b)(5)(iv) of the Preferred Option, any proposed restoration measures must first be discussed with the appropriate Federal, State and Tribal fish and wildlife agencies before they are included as a provision of the restoration plan. One component of this consultation would logically include a discussion of the species populations intended to be enhanced through restoration measures. Therefore, USEPA does not need to specify a spatial scale under which restoration efforts should be allowed in the Proposed Phase II Rules.

Furthermore, as noted in the USEPA's Case Study Analysis, Chapter F5, <FN 119> restoration measures may not equally benefit all species of concern at a particular CWIS and the spatial scale for restoration measures must depend on the species to be addressed and the type of restoration measures to be implemented. The appropriate spatial restoration scale will vary between anadromous, resident, and seasonally resident populations. It will also vary between various types of restoration measures that may include restoration of submerged aquatic vegetation, restoration of tidal wetlands, the creation of artificial reefs, installation of fish ladders, or water quality improvements. Determining the best course of action, and the spatial scale, for restoring habitat to offset losses requires an understanding of the specific habitat requirements for each species. Habitat requirements may include physical habitats, water quality needs and food sources in various geographic locations. Under these conditions, the Director on a site-specific basis must make any decision regarding the appropriate spatial scale for restoration measures.

Footnotes

118 67 Fed. Reg. 17148, col. 2-3, § VI.

119 PSEG does not intend that this reference to Chapter F5 of USEPA’s CSA in any way be deemed an endorsement of the use of the Habitat Replacement Cost (“HRC”) Methodology for estimating benefits. PSEG fully endorses UWAG’s comments on the HRC as well as Dr. Devousges’s Report included as Appendix 14 to UWAG’s comments.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's responses to comments 316bEFR.212.001 and 316bEFR.059.008.

Comment ID 316bEFR.075.078

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

The Nature and Extent of Consultations with State, Tribal, and Federal Agencies Should be Dictated by the Nature and Scale of the Restoration Measures Under Consideration

USEPA seeks comment on the type of information that would be appropriate to include in a written request for consultation with State, Tribal, and Federal agencies. <FN 120> The required consultation with appropriate Federal, State and Tribal fish and wildlife management agencies described in proposed § 125.94(d) of USEPA's Preferred Option would provide important input to the Director to assist in determining the best course of action, the appropriate spatial scale, and the necessary margin of safety to be applied to restoration proposals. To achieve these consultation objectives, any written request for consultation by an applicant needs to include essentially the same information that the Proposed Phase II Rules (§ 125.95(b)(5)) specify for inclusion in the Restoration Plan that applicants must submit to the Director for review and approval. Information included in the consultation request, however, would be of a conceptual nature with sufficient detail to focus the consultation discussions, but without site-specific plans.

While PSEG supports the need for, and value of, consultations with Federal, State and Tribal fish and wildlife management agencies; PSEG has concerns about the timing and schedule for preparation and submission of the required components of NPDES permit renewal applications. Consultations with fish and wildlife management agencies to identify the current status of species of concern, discuss potential threats to species of concern, identify appropriate restoration measures, and determine monitoring requirements for assessing the effectiveness of the proposed restoration project will require numerous and extensive meetings with agency personnel and it would likely take from six months to a year to reach consensus among the interested parties. In order for an applicant to meet the statutory deadline for filing of the NPDES renewal application six months prior to expiration of an existing NPDES permit, this consultation process must occur prior to preparation of the Comprehensive Demonstration Study proposed in § 125.95(b) of the USEPA's Preferred Option because the Comprehensive Demonstration Study must include the necessary information to support the proposed restoration measures. <FN 121>

Footnotes

120 67 Fed. Reg. 17146.

121 See PSEG Comments section IV. The schedule for preparation of Comprehensive Demonstration Studies and § 316(b) applications should be site-specific and subject to approval by the applicable state regulator (see § III.F).

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

The final rule contains provisions that EPA believes will provide facilities with sufficient time to develop the materials associated with restoration measures.

Comment ID 316bEFR.075.079

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

There are Valid Means of Demonstrating the “Substantially Similar Performance” of Restoration Measures

USEPA has correctly recognized that although restoration measures can provide benefits to aquatic ecosystems that are commensurate with benefits from technological alternative, it may not be feasible to quantify those benefits:

If it is not possible to demonstrate quantitatively that restoration measures such as creation of new habitats to serve as spawning or nursery areas or establishment of riparian buffers will achieve comparable performance, you may make a qualitative demonstration that such measures will maintain fish and shellfish in the waterbody at a level substantially similar to that which would be achieved under Sec. 125.94. <FN 122>

PSEG wholeheartedly endorses this provision in USEPA’s Preferred Option and offers the following comments in response to USEPA’s request for comments on how to measure “substantially similar.”

USEPA should allow flexibility in the Final Phase II Rules for application of multiple approaches to demonstrate "substantial similar performance" of restoration measures <FN 123> and should allow the Director to determine on a case-by-case basis what data and methodologies are sufficient to demonstrate that restoration measures will maintain fish and shellfish at a level comparable to that which would be achieved through satisfaction of the performance standards through the implementation of technologies. (§ 125.95(b)(5)).

Demonstrating "substantially similar performance" for habitat restoration measures where it is not scientifically possible to fully quantify the number or biomass of aquatic organisms expected to be produced, through implementation of the restoration measures can be difficult, but should not preclude application of these restoration measures. Fully quantifying the increased aquatic production from habitat restoration measures that result in water quality improvements, provide new aquatic habitat (e.g. opening impounded tidal marsh), or improve existing aquatic habitat (e.g. wetland restoration, artificial reef construction, re-establishment of submerged aquatic vegetation, wetland buffer conservation, and etc.) may not be possible, but suitable techniques are available to demonstrate "substantially similar performance."

Efforts to demonstrate "substantially similar performance" for restoration measures must address the potential conflicts between the species-specific approach used to calculate CWIS losses and the habitat-based benefits resulting from restoration measures. The final Phase II Rules should allow for an ecosystem approach to demonstrating the general ecological benefits provided by restoration measures. Habitat restoration measures may not be species-specific and, although the particular restoration measures proposed are designed to benefit certain species of interest, the restoration measures will benefit all species that use the particular type of habitat undergoing restoration. Dependent on the type of restoration measures proposed, applicants will be able to demonstrate to the

Director that the reduction in I&E due to CWIS technologies combined with restoration efforts will maintain the fish and shellfish in the waterbody at a comparable or substantially similar level to that which would be achieved through proposed § 125.94(b) and (c).

Although USEPA has rightly recognized the difficulties in quantifying benefits associated with restoration measures, this does not mean that permittees would be unable to quantify portions of the benefits derived from restoration measures. There are a number of methods of varying sophistication that can be applied, including bioenergetics and ECOPATH modeling. Mathematical modeling techniques can be used to quantify a portion of the fishery benefits that will result from implementation of most restoration measures. For restoration measures involving the stocking of hatchery-reared species, numbers or biomass of CWIS losses can be compared to the numbers or biomass of hatchery-reared organisms to be stocked. If the primary concern relates to the potential secondary effects on predator species of recreational or commercial fishery importance due to CWIS losses of a forage species (e.g. bay anchovies, Atlantic silverside, Atlantic menhaden, alewife, blueback herring); the level of stocking of predator species required can be determined through bioenergetic models which calculate the predator biomass that would be expected to result from consumption of the lost forage. <FN 124>

Similarly, the increased biomass of predator species of recreational or commercial importance attributable to the production of forage fish that results from restoration measures can be quantified through use of bio-energetic modeling. PSEG has applied this approach to estimate the increased biomass of striped bass and weakfish in the Delaware Estuary from the production of river herring in the new habitat created through the installation of fish ladders on impoundments within the Delaware Estuary. <FN 125>

Mathematical modeling techniques such as bioenergetics modeling can be used for most restoration measures for which the number or biomass of forage or predator species expected to result from implementation of the restoration measures can be estimated. It is not necessary to conduct extensive monitoring to determine precisely the number of organisms or biomass produced as a result of the restoration measures. In most instances, sufficient scientific literature exists upon which to base credible estimates. The appropriate margin of safety for particular restoration measures can be determined by the Director on a case-by-case basis; and the required consultation with appropriate Federal, State and Tribal fish and wildlife management agencies specified by § 125.94(d) of the Preferred Option would provide sufficient input to the regulatory authority to ensure that an appropriate safety margin is applied.

Comprehensive ecosystem modeling using ECOPATH, or a similar type of model that tracks energy flow through an ecosystem is an approach that may be available in some instances (Christensen and Pauly, 1992; 1993; ECOPATH 2000). The ECOPATH model presents a mass balance of trophic exchanges for an entire ecosystem. It works by using estimates of biomass for each major species or their aggregation in functional groups representing trophic levels, then uses principles of energetics and trophic transfer to estimate the flux of energy from one level to another. This creates a steady-state solution that requires an input-output budget to balance for the ecosystem as a whole, and then calculates the rate of energy transfer required to balance that budget. ECOPATH has been used to describe the structure of food webs in 56 different ecosystems (Pauly and Christensen, 1995), and its applications have grown rapidly in the recent past to the point that there are now ECOPATH models for more than 90 different ecosystems (ECOPATH, 2000). However, for most ecosystems subject to proposed or ongoing restoration measures, the data and scientific understanding of ecosystem processes necessary to quantify the subtle shifts in ecosystem energy flow resulting from restoration measures may not presently exist.

PSEG has explored various approaches for quantifying the increased fisheries production resulting from the extensive and ongoing salt marsh restoration program in Delaware Bay (PSEG 1999, Appendix G-4) that have application for other types of habitat restoration efforts. PSEG's efforts indicate that biomass should be the common metric of assessment because biomass can be directly measured and compared across all levels of the food chain. <FN 126> Biomass can also be aggregated by trophic level for comparison to CWIS losses to capture the habitat-based benefits to multiple species resulting from restoration measures. Biomass is also the most suitable metric when the age or length-class of organisms lost at a CWIS are different than the age or length-class of organisms benefiting from a habitat restoration effort.

In the case of PSEG's marsh restoration, field data from monitoring studies on fish abundance in weirs (marsh plain habitat) and otter trawls and push trawls (marsh channel habitat) have been used to estimate the abundance and biomass of fish in the restored and reference marshes and to quantify a portion of the production in these marshes (PSEG 1999, Appendix G-4). Production estimates based upon the capture of organisms in the marshes tend to be underestimates of true production because they only account for fish actually captured within the marshes or produced by predators feeding on fish produced in the salt marsh, and do not include production from detrital food webs associated with export of organic matter from the restored salt marshes; however, these type of production estimates can be used to demonstrate "substantially similar performance."

Footnotes

122 67 Fed. Reg. 17223, Proposed § 125.95(b)(5)(ii).

123 67 Fed. Reg. 17147.

124 Attachment G-4 to Salem's 1999 Renewal Application.

125 Id.

126 As discussed in PSEG's comments at section III.D, biomass of the dominant species and life stages of fish and shellfish can also be used for "trading" of impingement and entrainment loss credits.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule, including the requirements for quantification under section 125.95(b)(5). For a discussion of the need to perform quantitative analysis, see EPA's response to comment 316bEFR.202.035.

EPA believes restoration measures will be well suited for some sites, and not well suited for others.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule are written with a significant amount of flexibility.

Comment ID 316bEFR.075.080

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

PSEG's Wetland Restoration Process Provides a Model for Addressing Uncertainty in Restoration Projects

USEPA expressed concern regarding uncertainties that can affect restoration projects and reduce benefits from those projects (67 Fed. Reg. 17147):

"Under today's Preferred Option, restoration planners would take care to incorporate allowances in their plans for the uncertainties stemming from incomplete knowledge of the dynamics underlying aquatic organism survival and habitat creation. Plans would include provisions for monitoring and evaluating the performance of restoration measures over the lifetime of the measures. Provisions would also be made for mid-course corrections as necessary."

In this regard, USEPA invited comments on "methods that can be used to reduce the uncertainty of restoration activities" (67 Fed Reg. 17147). PSEG believes this wetland restoration process it has developed and implemented provides a model for addressing uncertainty in restoration projects, and offers the following comments.

As noted in Section IV.A below, PSEG has successfully implemented large scale wetlands restoration measures in the Delaware Estuary pursuant to the NJPDES permit for Salem. In planning and implementing these restoration measures, PSEG and the NJDEP were well aware of the presence of uncertainties that could affect the performance of the restoration measures. Accordingly, PSEG and NJDEP put in place a process that explicitly addressed uncertainties to ensure that the benefits from the restoration measures would address any potential adverse impacts caused by the I&E losses at Salem. The process included the involvement of the necessary Federal, State and local stakeholders; the definition of appropriate conservation measures; the definition of acceptable safety margins; the determination of the necessary monitoring requirements; and the implementation of the agreed upon conservation measures. <FN 127>

Salem Station's 1994 NJPDES Permit required the formation of two advisory committees comprised of Federal and State resource managers, academic scientists with relevant expertise in wetlands science and restoration, marsh fisheries and fisheries science, and local community representatives who assisted with the development and implementation of the restoration and monitoring programs. These advisory committees further assisted with reviewing monitoring results on an annual basis to ensure that the restoration measures were performing as intended. USEPA's Final Phase II Rules should provide sufficient flexibility with regard to the required "consultation with Federal, State and Tribal management agencies" to allow for advisory committees of this type to serve similar purposes.

PSEG's restoration measure plans included provisions for monitoring and evaluation of the performance of the restoration measures consistent with USEPA's Preferred Option. <FN 128> Well-designed monitoring and, as appropriate, modeling programs, provide strong assurance regarding the benefits of conservation measures consistent with USEPA's Preferred Options.

Furthermore, PSEG's conservation plans included provisions for mid-course corrections to the restoration actions if natural forces altered the direction of a restoration project. The "adaptive management" process has been followed to monitor, guide, and respond to the temporal process of restoration for habitat restoration sites (PSEG 1999, Attachment G-2). Adaptive management is a framework for identifying and meeting environmental management goals by an iterative process of monitoring and engineering response. <FN 129> Given the level of complexity in the ecology of tidal wetlands and other types of potential restoration projects, and the inability to completely understand the details of the functioning of these systems; adaptive management is an appropriate framework under which a successful large-scale environmental restoration can be conducted. <FN 130>

Well-designed monitoring programs and adaptive management provisions help to reduce the uncertainty of restoration activities. PSEG concurs with USEPA's recommendation that restoration planners further reduce uncertainty by creating habitat that replicates as closely as possible the natural habitats in which the aquatic organisms of interest naturally occur (67 Fed. Reg. 17148, col.2, § VI). This is exactly what PSEG did in designing and implementing its restoration program. Monitoring programs that compare the ecological functioning of restored habitats to naturally occurring habitat for the aquatic species of interest, can provide strong assurances that the restored habitats are serving the intended function. <FN 131>

These types of monitoring programs are particularly important where the current state of ecological understanding precludes the absolute monitoring of increased aquatic production necessary for quantitative comparisons with cooling water intake losses. PSEG has demonstrated the value of these types of comparative monitoring programs for its tidal marsh restoration program in the Delaware Estuary (PSEG 1999, Attachment G-2, Attachment G-3). PSEG's monitoring programs have compared vegetative cover, macrophyte production, and geomorphological features to demonstrate that the restored wetlands have the appropriate habitat structure to support the naturally occurring aquatic populations of interest. Monitoring programs focused on the abundance of aquatic organisms, feeding habitats, movement, and reproduction of fish species have demonstrated that these restored habitats are performing as intended. <FN 132> Similar types of monitoring programs can be designed for other types of restoration programs to satisfy regulatory agencies that restoration plans are providing "substantially similar performance" without a requirement for a purely quantitative demonstration.

Regulatory agencies can further assure the performance of conservation measures by requiring the inclusion of safety margins within the restoration plans submitted by operators of cooling water intakes pursuant to § 125.95(5), of the Preferred Option. In determining the scale of PSEG's wetlands restoration, PSEG and the NJDEP took into account the need for a margin of safety and increased the planned acreage of wetlands to be restored to exceed what modeling studies indicated would be needed. The appropriate margin of safety for particular conservation measures should be determined by the Director on a site-specific basis. The margin of safety appropriate for a particular restoration measure should depend on the circumstances under which they are proposed. Factors such as: the degree of uncertainty concerning the adverse impact of CWIS operations (e.g., whether or not the aquatic populations demonstrate long-term trends of increasing abundance); the scientific understanding of the ecological benefits of the proposed conservation measures; the ability to monitor and quantify the ecological benefits of the proposed conservation measures; and the intended lifetime duration of CWIS should all be factored into decisions concerning the appropriate margin of safety to be applied. The required consultation <FN 133> with appropriate Federal, State and Tribal fish and wildlife management agencies specified by § 125.94(d) of USEPA's Preferred Option would provide sufficient input to the regulatory authority to ensure that an appropriate margin of safety is defined.

Footnotes

127 Attachment G-2 to Salem's 1999 Renewal Application.

128 67 Fed. Reg. 17147

129 Holling, C.S. 1978. Adaptive environmental assessment and management. pp 1-139. In: International series on applied systems analysis. John Wiley, New York.

130 Thom, R. 1996. Goal setting and adaptive management. pp. 4-1-4-20. In: Planning and evaluating restoration of aquatic habitats from an ecological perspective. D. Yozzo, J. Titre and J. Sexton (eds), U.S. Army Corps of Engineers, Vicksburg, MS.

131 Attachment G-3 to Salem's 1999 Renewal Application.

132 Able, K.W., D.M. Nemerson, P.R. Light and R.O. Bush. 2000. Initial response of fishes to marsh restoration at a former salt hay farm bordering Delaware Bay. pp. 749-773. In M.P. Weinstein and D.A. Kreeger (eds.), Concepts and Controversies in Tidal Marsh Ecology. Kluwar Academic Publishers , The Netherlands. Tupper, M. and K.W. Able. 2000. Movements and food habits of striped bass (Morone saxatilis) in Delaware Bay (U.S.A.) salt marshes: comparison of a restored and a reference marsh. Marine Biology 137 (5/6): 1049-1058). Tupper, M. and K.W. Able. 2000. Movements and food habits of striped bass (Morone saxatilis) in Delaware Bay (U.S.A.) salt marshes: comparison of a restored and a reference marsh. Marine Biology 137 (5/6): 1049-1058). Miller, M.J. and K.W. Able. 2002. Movements and growth of tagged young-of-the-year Atlantic croaker, Microogonias undulates, in restored and reference marsh creeks in Delaware Bay. J. Exp. Mar. Biol. Ecol. 267:15-38.

133 The conservation measures proposed by operators of the CWIS may also likely require the issuance of permits involving these same Federal, State and Tribal fish and wildlife management agencies. The Director or NPDES permitting authority can facilitate the necessary dialog between the interested regulatory parties who all become stakeholders in any proposed conservation measures to ensure that the outcome satisfies the differing objectives and requirements of all involved parties.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes well-designed monitoring and adaptive management is important and has included requirements for these activities in the final rule.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures in the final rule are written with a significant amount of flexibility.

Comment ID 316bEFR.075.081

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Alternative Restoration Approaches Considered by USEPA

USEPA's Preferred Option proposes use of restoration measures as one means for satisfying the compliance requirements for any of the three demonstration alternatives described in proposed § 125.94(a). USEPA has also invited comment on three other restoration approaches it is considering: discretionary restoration approaches, mandatory restoration approaches, and restoration banking. PSEG supports allowing voluntary implementation of restoration measures by a facility in lieu of or in combination with implementation of technological measures which reduce impingement mortality and entrainment, concurs with UWAG's comments regarding mandatory implementation of restoration and endorses the banking of restoration credits for purposes if § 316(b) compliance.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.075.082

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

The Discretionary Approach

As Proposed by USEPA, 67 Fed. Reg. 17169, col. 3, § VI, a discretionary restoration approach would allow the Director to specify appropriate restoration measures under § 316(b), but would not require that he or she do so. USEPA cites several NPDES permits that include restoration measures as being consistent with this alternate approach (e.g., John Sevier, Crystal River, Chalk Point, Salem). In each of these permit proceedings, the permittee volunteered the restoration measure to resolve a then-ongoing controversy with the Director. The Director incorporated as terms and conditions requiring the implementation of the restoration measures into the facilities' NPDES permits, but only after the permittees volunteered to implement these measures.

The Discretionary Restoration Approach being considered by USEPA appears to authorize the Director to mandate the implementation of restoration measures; however, this calls into question the use of the word “Discretionary”. As stated in the Preamble, <FN 134> "EPA would provide the Director with the discretion to specify appropriate restoration under § 316(b)." If the intent is to authorize the Director to mandate implementation of restoration measures, the CWA gives no statutory authority for requiring restoration. <FN 135> USEPA should clarify its intent with regard to Discretionary Restoration Approaches before further consideration of this regulatory approach. The approach outlined in USEPA’s Preferred Option for restoration measures is already discretionary in that the permittee can volunteer to implement restoration measures if he or she so choose. PSEG supports this approach. PSEG also supports the approach to restoration measures in the various site-specific options. (See Section II.A above.)

Footnotes

134 67 Fed. Reg. 17169, § VI.

135 (See discussion on mandatory restoration approaches below).

EPA Response

For a discussion of the extent to which restoration measures are voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.075.083

Subject Matter Code 11.11

RFC: Mandatory restoration approach

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

The Mandatory Approach

Under USEPA's Mandatory Restoration Approach, restoration would be required to compensate for organisms that were not protected following a facility's installation of control technologies. Phase II existing facilities would be required to implement some form of restoration measures in addition to implementing direct control technologies. <FN 136> As stated by UWAG, § 316(b) does not authorize mandatory restoration, and restoration measures can not be required as part of intake structure "design", according to USEPA's own interpretation of that statutory term. USEPA should eliminate the "Mandatory Restoration Approach" from further consideration and promulgate final Phase II Rules that allow regulators to include restoration measures a part of a § 316(b) compliance demonstration if volunteered by the permittee.

Footnotes

136 67 Fed Reg. 17170, col. 1 sec. VI.

EPA Response

For a discussion of the extent to which restoration is voluntary under the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.075.084

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 11.12

RFC: Restoration banking

Restoration Banking

USEPA indicates that it is also considering an alternate restoration approach that could include provisions for banking of restoration credits similar to the approach used under the § 404 program. <FN 137> PSEG supports inclusion of a restoration banking program § 316(b). Banking would facilitate using restoration measures, since restoration credits could then be purchased. PSEG's experience indicates that using restoration measure requires long-lead times to develop and implement an appropriate plan for each type of "restoration" and also requires a substantial commitment of specially trained and highly qualified personnel.

PSEG assumes that the reference to a § 404 banking program was not intended to limit the banking program to wetlands restoration credits. A Restoration Banking Approach should not be limited to use of wetland mitigation banks. Other types of habitat restoration can potentially be implemented to create "CWIS mitigation credits" and any USEPA CWIS restoration banking program should be flexible enough to allow for their implementation and use.

The use of wetland mitigation banks under CWA § 404 is well established and the use of banking under section § 316(b) would provide similar enhancements for fish populations and their invertebrate food base, and result in effective compensation of losses from CWIS impacts. The restoration of a large area of degraded wetlands, as through a wetland bank, may result in greater success than small, individual wetland restoration projects. Following successful project completion, and approvals for use by applicable state and federal agencies, areas of the wetland bank become available as "credits." Credits in an existing wetland bank could be purchased to provide the wetland area required to compensate for CWIS impacts. Similarly, wetlands restoration projects for § 316(b) compliance, if relatively small, could be more efficiently accomplished in combination with other wetland restoration efforts.

CWIS mitigation banks for other types of credits could easily be established in the future once a market for this type of service would be created. A CWIS facility that is proposing to raise fish in a hatchery may have extra capacity to create CWIS mitigation credits. Facilities that are proposing other types of habitat restoration, such as eel grass beds, artificial reefs, or enhancements to migratory runs by installing fish ladders may choose to enlarge the size of a particular project to create banking credits.

As rightly indicated by USEPA, a § 316(b) restoration banking program could effectively facilitate compliance, reduce the burden on permit applicants, allow for rapid fulfillment of compensation requirements for CWIS impacts, and potentially enhance the ecological effectiveness of restoration activities.

Footnotes

137 U.S. Environmental Protection Agency, "Federal Guidance for the Establishment, Use and Operation of Mitigation

Banks", 60 Fed. Reg. 58605 – 58614 (Nov. 28, 1995).

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.075.085

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

USEPA Wisely Identified that Trading may be Applicable to a § 316(B) Determination

PSEG agrees with USEPA's promotion of the voluntary use of trading as an innovative way to develop common sense and cost-effective solution for a variety of environmental issues. <FN 138> USEPA is continuing its efforts to develop and implement market-based trading programs under the Clean Water Act. For example, EPA issued an Effluent Trading in Watersheds Policy <FN 139> and Draft Framework for Watershed-Based Trading in 1996. <FN 140> On May 15, 2002, USEPA proposed for comment a policy for trading water quality credits <FN 141> as an "incentive based approach to more efficiently protect and restore the nations waters" [emphasis supplied] that could save the public hundreds of millions of dollars by advancing more effective, efficient partnerships to clean up and protect watersheds. <FN 142> USEPA also stated that the trading policy would encourage "incentives to maintain high water quality where it exists as well as restoring impaired waters. <FN 143> USEPA can, likewise, achieve the objective protecting aquatic life by authorizing trading under § 316(b).

Footnotes

138 Experience with emissions trading provides ample evidence of the advantages of providing trading flexibility. These advantages include reduced costs of meeting environmental objectives and greater assurance that environmental objectives are achieved. For a discussion of relevant experience and lessons, see David Harrison, Jr., "Tradable Permit Programs for Air Quality and Climate Change," in International Yearbook of Environmental and Resource Economics, Volume VI, Thomas Tietenberg and Henk Folmer (Eds.). London: Edward Elgar, 2002.

139 Effluent Trading in Watersheds Policy, (hereinafter "1996 Policy Statement").

140 Draft Framework for Watershed-Based Trading (hereinafter "1996 Framework").

141 67 Fed.Reg. 34709 (May 15, 2002)

142 EPA Press Release, EPA Proposes Enhanced Approach to Cleaning up America's Waters, May 15, 2002.

143 ID.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.075.086

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Limiting the Scope of Trading to Entrainment Losses in Unnecessarily Restrictive.

PSEG strongly supports the voluntary use of trading as an alternative for meeting the I&E performance standards proposed in USEPA's Preferred Option trading should also be included if USEPA were to promulgate Final Phase II Rules based on a site-specific option.

USEPA proposes that trading be limited to entrainment <FN 144> because "impingement reduction technologies are relatively inexpensive compared to entrainment reduction alternatives". <FN 145> PSEG believes that any trading program should include both impingement and entrainment losses because this would afford maximum flexibility and provide enhanced environmental benefits under § 316(b) – two critical aspects of trading programs. <FN 146> USEPA states that "impingement reduction technologies are relatively inexpensive compared to entrainment reduction alternatives". <FN 147> However, the impingement reduction technologies can cost millions of dollars per facility since all Phase II facilities, including "peaking" and "load-following" facilities are required to meet the performance standard for impingement under the USEPA's Preferred Option, costs such as these could result in a substantial economic burden on the permittee, with potentially minimal benefits to the fishery. USEPA has not provided adequate justification for limiting a trading program to entrainment losses.

From the perspective of maintaining the health of aquatic populations, PSEG believes that CWIS effects on post-compensation life history stages such as juvenile and adult fish (i.e., reducing fish potentially affected by impingement) as well as eggs and larvae (i.e., fish potentially affected by entrainment) need to be considered. Natural mortality rates are very high for entrained organisms (pre-compensation early life history stages), <FN 148> therefore, protecting the more mature fish is also important to maintaining and propagating aquatic populations. The impingeable sized fish have a much greater chance of reaching maturity and reproducing.

In summary, the resource that is being protected by the Proposed Phase II Rules are entrained and impinged organisms and, thus, the trading program should not be unnecessarily limited to entrainment; it should allow trading to occur for entrainment, for impingement or for both.

Footnotes

144 67 Fed. Reg. 17170-17173, § VI.

145 67 Fed. Reg. 17121, 17170, § VI. USEPA, however, wisely sought comment on this unnecessary limitation.

146 1996 Framework.

147 67 Fed. Reg. 17170.

148 PSEG 1999 Appendix I Compensation.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.075.087

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.04

RFC: Potential trading units/ credits

Establishing the Appropriate Trading Units of Measure is Critical to the Success of the Program.

USEPA correctly states that a trading option requires a definition of the trading commodity and the unit, or credit that would be traded <FN 149> and requested comment on the appropriate unit. <FN 150> USEPA's preferred approach for trading is based on the density of entrained species life stages per unit of flow. <FN 151> First, as discussed above, PSEG believes it is unwise to limit the trading program to entrainable organisms. Therefore, PSEG believes that the Agency is being too prescriptive; it is inappropriate to prescribe the commodity for trading on a national basis, since the factors that should determine the appropriate commodity differ from site to site (e.g., waterbody types, fish species and life stages).

USEPA suggests establishing as the trading commodity, the density of entrained species life stages (eggs, larvae, juvenile and small fish for all fish and shellfish species) per unit of flow through a facility. <FN 152> USEPA does not favor the use of species counts because of the significant expenditure of time and resources to identify entrained organisms by life stage and size classes. <FN 153> USEPA also rejects species counts because the number of species entrained by a facility can vary substantially each year for many reasons, including facility outages, or extreme weather events. PSEG's experience suggests that any of the trading units (i.e., density, counts, biomass) suggested by USEPA will be subject to seasonal and inter-annual variability because the naturally occurring temporal variability in organism abundance in the source water directly affects density, counts and biomass at a facility's intake.

USEPA should provide that trading units be decided on a site-specific basis via a trading plan that would be submitted to the appropriate regulatory agencies for review and approval. PSEG, however, believes that in most instances biomass would be the most appropriate and workable "commodity" because it is a metric that can be easily measured in regard to I&E losses and then can be directly compared to biomass produced from other power plants. Biomass would also be applicable to the benefits associated with various restoration measures and may be a more appropriate commodity for evaluating community structure and function as proposed in §125.95(b)(5)(iii) of the Preferred Option. However, there may be other circumstances where trading would be applicable and another metric would be more appropriate. For example, if a stocking program were being used, a metric based on counts of the specific species being stocked species-specific may be a more appropriate metric.

Footnotes

149 67 Fed. Reg. 17171.

150 67 Fed. Reg. 17171 (Col. 2).

151 67 Fed. Reg. 17171.

152 Compare or contrast this with the base line calculation and the approaches USEPA is considering for this component.

153 67 Fed. Reg. 17171.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion on the appropriate unit for trading. EPA disagrees that trading units should be decided on a site-specific basis via a trading plan submitted to regulatory agencies. In order for trading to occur in compliance with today's rule, the requirements of § 125.90(c) must be met. EPA expects that the units of trade from different facilities would need to be equivalent; thus, a trading unit selected needs to be decided for an entire State or Tribe by the permit director. For waterbodies that cross political boundaries, there will need to be coordination between permit directors.

Comment ID 316bEFR.075.088

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.08

RFC: Challenges of implementation of trading

In Establishing a Trading Program USEPA Must Provide Clear Direction Requiring Interstate Cooperation Since the Waterbodies and Organisms Are Often Subject to Regulation by Multiple Jurisdictions.

PSEG agrees with USEPA that instituting a national trading program may be difficult because of the inherent natural variability that exists between sites located through out the United States. <FN 154> In addition, from a regulatory implementation perspective, most major lakes, rivers, estuaries and the oceans border multiple states. Unique or conflicting state regulations for trading could thwart any trading program from being implemented.

USEPA has authorized and sought to encourage trading of effluent discharges among point sources of water pollution and between point and non-point dischargers as a means of achieving ambient water quality standards. To this end, the Agency has developed strong policies, <FN 155> frameworks, <FN 156> and incentives <FN 157> for states to develop consistent trading policies for pollutants under the Clean Water Act. These have allowed the states to implement relatively consistent pollutant trading programs. Similar policies, frameworks, and incentives will be required to make voluntary trading viable under § 316(b).

USEPA should also provide guidance on how to insure the enforceability of any “trades” under § 316(b). Since entrainment and impingement credits will probably not be traded on a public market, trades will normally occur between two facilities. Unlike the sulfur trading program under the Clean Air Act, trades under § 316(b) must, to be of any value, extend for the term of each facility’s NPDES permit. This will require what will amount to long-term contracts between the trading facilities. The USEPA framework must provide that States acknowledge and accept these contractual provisions within their permitting process. Moreover, these contracts must account for the likelihood that the trading facilities will have NPDES permits with differing terms, e.g., facility A’s permit is under review and will have a five year term; facility B’s permit is in the second year of its five year term.

Footnotes

154 67 Fed. Reg. 17172. PSEG notes, however, that USEPA relied on just such an approach for the calculation of the benefits associated with this rule.

155 See, e.g., Effluent Trading in Watersheds Policy, (hereinafter “1996 Policy Statement”).

156 See, e.g., Draft Framework for Watershed-Based Trading (hereinafter “1996 Framework”).

157 For example, the TMDL program provides incentives for states to develop and implement alternative means of achieving the TMDL, including the trading of pollutants.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.075.089

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

EPA's Determination to Allow Permittees to Consider Improvements Associated with Prior Station-Specific CWIS Improvements Should Also Apply to the Trading Component of the Rule

Under USEPA's Preferred Option, permittees would be allowed to "capture" reductions associated with prior CWIS improvements in determining compliance with the performance standards. <FN 158> Site-specific improvements that exceed the performance standards or surpass the best technology available to minimize adverse environmental impact should be available for trading credit. The trading program can not operate if states "ratchet down" impingement and entrainment limitations on facilities that are able to achieve a reduction that exceeds those required by the regulations, effectively taking back the opportunity to recover some of the costs of that reduction. The USEPA framework should discourage affected states from imposing I&E requirements, which exceeds the minimum performance standards.

For example, if a facility were to install dry cooling and a state then adopted performance standard commensurate with that technology, it would be impossible to establish a trading market. Similarly, if a facility has been retrofitted to operate with a closed cycle system with wet towers, but does not have a CWIS (i.e., the facility uses an alternate source for cooling tower make-up, such as ground water or reclaimed water), the utility should be able to capture and trade the reductions in I&E losses. These reductions would be the difference between the maximum I&E losses that would meet the performance standard (based on the baseline calculation for the original once-through system) and the actual I&E losses at the facility (in this example no I&E losses). The excess between the baseline calculation and the performance standard for the dry cooling facility should be available to trade.

To increase opportunities for trading and allow flexibility in the program, PSEG suggests that trading not be limited to just the Phase II existing facilities <FN 159> but be applicable to Phase I and Phase III facilities as well as other types of programs that could affect the aquatic species at issue.

Footnotes

158 67 Fed. Reg. 17141 (Col. 3).

159 EPA requested comment on this issue at 67 Fed. Reg.17172 (Col. 3).

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule. Please see response to comment 316bEFR.005.045 regarding trading and new facilities. The phase III rule has not yet been proposed.

Comment ID 316bEFR.075.090

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.03

Spatial scale for entrainment trading

The Spatial Range for Trading Should be the Ecosystem Which Supports the Organisms

USEPA has requested comment on the appropriate spatial range for trading and suggested limiting trading to a watershed. <FN 160> PSEG concurs with USEPA in advocating trades between facilities sited in waterbodies that share similar ecological characteristics (i.e., potentially affect similar species and life stages, but not necessarily the same). PSEG, however, believes that trading should not be limited to the watershed level because of the relatively small areas encompassed by specific watersheds as compared to the large spatial areas covered by the natural distribution of a number of potentially affected species (e.g., striped bass, weakfish, herrings). Moreover, there may be instances for which trading may be appropriate on a much broader scale, e.g., a coastally migrant, single-stock species such as weakfish. For instance, a purchase fish excluder devices for shrimp boats to protect over-wintering age 1 weakfish instead of installing costly technological measures at the CWIS.

If the USEPA adopts PSEG's recommendation and allows the specifics of trading to be established by the local Director, then issues such as spatial scale, based on ecological facts, should also be resolved by the Director. PSEG supports trading because it allows the regulated facilities to meet the goals of the Clean Water Act while providing flexibility to the regulated community in maximizing ecological improvements.

Footnotes

160 See, e.g., 67 Fed. Reg. 17151 (Col. 3), 17171 (Col. 1).

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the spatial scale of trading.

Comment ID 316bEFR.075.091

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Examples of How Trading Could be Implemented

The PSEG system provides examples of situations where trading could be successfully implemented. For example, the Bergen Generating Station ("Bergen") located adjacent to the Hackensack River had operated as a steam electric facility with a once through cooling system for many years prior to the Company's decision to repower Bergen to operate as a combined cycle facility. These units withdrew up to 633.6 MGD for cooling purposes. To address environmental issues associated with the withdrawal and discharge of non-contact cooling water, PSEG decided in 1994 to modify the design for the repowered units to include a closed-cycle cooling system, and entered into a contract with the local sewerage authority to purchase reclaimed water for cooling tower make-up, thereby eliminating any withdrawal of surface water. Similarly, PSEG is presently building a new1100 MWe combined cycle plant at its Linden Generating Station. Like the repowered Bergen units, the new Linden units will use reclaimed water, again completely eliminating the withdrawal of water from the Arthur Kill. PSEG believes these conversions equate to 100% reductions in I&E losses and provides "credits" that should be available for trading by other facilities (e.g., Hudson or Sewaren).

Several PSEG's stations on the Delaware River may also have "credits" that could be traded. PSEG's Hope Creek Generating Station ("Hope Creek") operates with a closed cycle system. When PSEG built a new combined cycle unit at its Burlington Generating Station ("Burlington") site, it designed Unit 10 with closed cycle cooling. In addition, PSEG improved the Salem CWIS with modified Ristroph screens that increased the survival of various species of impinged fish and shellfish and it operates under a NJPDES permit restriction on the amount of cooling water it can withdraw. Similarly, PSEG will have installed 12 fish ladders on tributaries to the Delaware to increase production of river herring. Salem's I&E losses of river herring are very small. Depending upon how PSEG and NJDEP apply the increased production fromthese fish ladder sites, trading "credits" may be available. The difference between the performance standard applicable to that waterbody and the reductions in entrainment and impingement losses compared to the baseline calculation should be available for trading among estuarine facilities impacting similar species of concern.

PSEG believes these examples at its Bergen, Linden, Burlington, Hope Creek and Salem Stations present the types of reductions in entrainment and/or impingement losses that would produce "credits" under a § 316(b) trading program. If such a program were in existence, it would provide added incentives for other companies to implement similar measures at Phase II facilities and would be protective of the resource while providing flexibility to permittees to achieve compliance in a cost-effective manner.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule. Please see response to comment 316bEFR.018.029 regarding trading restoration.

Comment ID 316bEFR.075.092

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

USEPA's Final Rule Should Specify That Prior §316(b) Determinations Meet the Performance Standards

USEPA has requested comment on whether the final rule should allow permittees to rely on previous § 316(b) demonstrations for determining whether there is an adverse environmental impact and the best technology for minimizing adverse environmental impact. <FN 161> PSEG strongly believes USEPA's final rule should provide that if a facility had received a reasoned BTA determination based on still valid scientific, technical and engineering information, no additional actions should be required. For example, if the BTA determination had been based on a prior demonstration that had been conducted in accordance with USEPA's prior guidance, then that determination should be renewed. <FN 162>

USEPA and delegated state NPDES permitting authorities have been interpreting and implementing the requirements of § 316(b) for almost 30 years. Many facilities have developed comprehensive § 316(b) demonstration studies, installed expensive intake technology, and demonstrated that their specific intake provides the best technology available for minimizing adverse environmental impact. <FN 163> These studies and technologies have been implemented in conjunction with the permitting agencies, and frequently with other resource agencies, to ensure the intake structures reflect the BTA for minimizing adverse environmental impact. Absent substantial justification, these permit determinations should stand.

USEPA has expressed concern with the burden on permitting agency to comply with § 316(b) throughout the preamble. <FN 164> Requiring the permitting agencies that have already expended the resources to make § 316(b) determinations for a facility to start all over again would create the exact type of drain on the resources that USEPA states it is trying to eliminate.

In summary, facilities should be able to rely on and permitting agencies should be able to base decisions under the Final Phase II Rules on prior BTA decisions, assuming no changes in operating conditions that would affect entrainment and impingement, changes in available technologies or the costs associated with their implementation, or adverse changes in the affected fisheries that are attributable to the facility's CWIS operation.

Footnotes

161 67 Fed. Reg. 17165.

162 As PSEG suggested in sample regulatory language submitted to USEPA in January 2002, permittees could be required to submit information verifying that there have been no material changes that could require an alternative finding.

163 See, e.g., Public Service Co. of New Hampshire Seabrook Station, Permit No. NH 0020338, New York State Electric and Gas, Goudey Generating Station, Permit No. NY0003875; Carolina Power and Light Co., Permit No. NC0007064; Florida Power Co., Crystal River Permit No. FL0000159; Tennessee Valley Authority, John Sevier Station, Permit No. TN0005436; PG&E; Pittsburg Station, Permit No. CA0004880; PG&E Contra Costa, Permit No. CA0004863 ; Boston Edison, Pilgrim Station, Permit No. MA0003557; PEPCo, Chalk Point, Permit No. MD0002658B; PASNY, Fitzpatrick

Station, Permit No. NY0020109; PSEG Nuclear, Salem Generating Station, Permit No. NJ0005622; NPPD, Gerald Gentleman, Permit No. NE0111546; Niagara Mohawk Power Corp., Dunkirk, Permit No. NY0002321.

164 67 Fed. Reg. 17167.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

See response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.075.093

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Permit Requirements Must Allow for the Time Needed to Collect, Analyze, and Report the Data, Needed for a Comprehensive Demonstration Study.

USEPA (67 Fed. Reg. 171, Col 2) has requested comments on whether it should specify a particular time frame for the collection, analysis, and reporting of data required for a Comprehensive Demonstration Study. Based on its experience at a number of facilities, PSEG believes that the design, implementation, and completion of a Comprehensive Demonstration Study that is scientifically credible, that reflects sound engineering and economics, and that has had appropriate stakeholder (e.g., regulatory agency <FN 165>) input will take a minimum of four years to complete.

For example, relatively straightforward § 316(b) Demonstrations for PSEG's Mercer and Hudson stations started with the development and submission of work plans for regulatory review, which took approximately six months to complete. The performance of impingement, entrainment and river survey programs took two years, drafting, reviewing, and submission of final reports required approximately six months to complete. Analysis of the results of the monitoring and preparation of a comprehensive demonstration could take up to 12 months. A more complex § 316(b) Demonstration, as was required by the NJPDES permit for Salem <FN 166> took five years to perform the same tasks.

PSEG believes that adequate time must be allowed to perform the study properly and endorses UWAG comments on this issue. However, PSEG believes that each site is unique and that the actual schedule should be determined on a case-by-case basis by the applicable state regulatory agency.

USEPA has also requested comment on the role of fish and wildlife management agencies in a site-specific approach. PSEG realizes that involving these agencies in § 316(b) could create potential burdens to fish and wildlife management agencies. However, it is these very agencies that are looked to by the general public and other third party groups as the stewards of the resources. As such, these agencies can provide valuable insight into the status of the resources and provide guidance with respect to what constitutes adequate levels of protection.

Footnotes

165 Fish and wildlife agencies should have an interest in the § 316(b) proceedings in that the agencies will be direct beneficiaries of the waterbody studies that will be conducted as part of the demonstration and any restoration-related monitoring.

166 The September 1994 NJPDES Permit for Salem required, among other matters, a comprehensive biological monitoring program, the development of work plans, the installation of the CWIS technologies, the implementation of post- installation verification monitoring programs, the review and assessment of all of this data, and the submission of a comprehensive Section 316(b) Demonstration with the 1999 renewal application. PSEG proceeded at risk to develop the initial work and monitoring plans based on the draft permit prior to the September/ effective date in order to be in a position to complete all of the work.

EPA Response

EPA recognizes that in some cases, the Comprehensive Demonstration Study may take longer than one year to complete. If a facility foresees that he or she will need additional time to complete the studies, he or she should immediately bring this issue to the attention of the permitting Director.

Comment ID 316bEFR.075.094

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.08

Burden on permitting agencies (general)

The Burden On Permitting Agencies For Implementing § 316(B) Is Reasonable And Recoverable By The Agencies And Can Be Reduced By USEPA Action

EPA has invited comment on the burden associated with implementing § 316(b) on a site-specific basis. <FN 167> As the Agency, itself, has stated in the very context of the instant rulemaking, expedience should not be valued above quality and accuracy. Moreover, PSEG believes the burden on permitting agencies is not, in the vast majority of permitting proceedings, unreasonable. In any event, the costs associated with such reviews are recoverable, and the time required for decision-making can be reduced if USEPA establishes clear Phase II rules and provides definitive guidance for assessing § 316(b) demonstrations, and, as PSEG and UWAG have urged, if USEPA accepts the re-validation of prior § 316(b) determinations.

The costs to permitting agencies to evaluate adverse environmental impact and to determine if the best technology available for minimizing that impact are not trivial. However, permitting agencies have the ability to fund their NPDES permitting program through general revenues or through permit fee structures. For example, the New Jersey CWA statute provides for fees that are based on the NJDEP's costs for administering the program. <FN 168> PSEG's Slaem Generating Station has been assessed a fee to defray the cost of technical reviews performed by NJDEP's consultant. <FN 169> Permitting agencies could enact regulatory provisions to authorize the imppositon of fees to defray some of the additional burden experienced for application review.

Furthermore, there are steps within USEPA's sole control that would reduce the burden on and costs to permitting agencies. Clear, accurate, and concise regulations that provide guidance to the permitting agencies would minimize the uncertainty associated with § 316(b) determinations, especially for the "high profile" permits. When dealing with "high profile permits" permittees and regulators a like, are, in the absence of regulations or guidance, forced to prepare and review each aspect of a demonstration under the threat of litigation. Among other topics, USEPA should provide further clarification on: methodologies for assessing impacts on fisheries, the suite of generally accepted analytical methods or models; the types of technologies generally available; and how to conducteconomic analysis. Such regulations and/or guidance would facilitate efficient evaluations of § 316(b) compliance while allowing for the necessary and appropriate consideration of the unique characteristics of each facility and the ecosystem with which it interacts.

USEPA cites the backlog of NPDES permit issuance as a concern regarding the burden on permitting agencies. <FN 170> Since the implementation of the NPDES permitting program, there has been a backlog in issuing permits. This backlog does not consist solely of permits for facilities operating with a CWIS. The USEPA Fact Sheet on NPDES Permit Backlog Reduction <FN 171> indicates the backlog is primarily attributable to a reduction in resources at permitting agencies and a shift in the focus of the agencies. Moreover, the actual NPDES permit backlog was reduced approximately 50% between November 1998 and January 2002, <FN 172> a significant accomplishment in these resource-limited times.

Footnotes

167 67 Fed. Reg. 17167 (Col 1) and 67 Fed. Reg. 17153 (Col 1).

168 N.J.S.A. 58:10A-9. ("The commissioner shall, in accordance with a fee schedule adopted by regulation, establish and charge reasonable annual administrative fees, which fees shall be based upon, and shall not exceed, the estimated cost of processing, monitoring and administering the NJPDES permits.")

169 PSEG, Salem Generating Station, NJPDES Permit NJ 0005622, Draft Permit Issued Dec. 2000, Fact Sheet at 6.

170 67 Fed. Reg. 17167.

171 EPA, Fact Sheet on NPDES Permit Backlog Reduction.

172 EPA, National Trend Charts for Individual NPDES Permits, available at http://www.epa.gov/npdes/pubs/natall.pdf (last viewed July 18, 2002)

EPA Response

In today's final rule, EPA has preserved the site-specific determination of BTA option for facilities whose costs of compliance with the final rule may be significantly greater than the costs estimated by EPA, or whose costs may be significantly greater than the benefits of complying with the national performance requirements in 125.94(a). In addition, EPA has added four other compliance alternatives to provide flexibility for streamlining the permitting process (e.g., the pre-approved technology alternative at 125.94(b)(4) and compliance using a Technology Installation and Operation Plan at 125.94(e)). EPA believes that this approach will provide the combined benefit of addressing site-specific concerns and also ensuring that permits are finalized in a timely manner.

EPA plans to provide guidance for implementing requirements of the final rule; Directors have been given discretion to determine parameters for all required studies.

Today's final rule allows for the use of historical data provided it is reflective of current conditions at the facility. However, EPA is not allowing the use of historical BTA determinations as discussed in the response to comment 316bEFR.040.001.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.06.01

Implications for nuclear facilities

Unique Issues Associated with Existing Nuclear Power Plants Must be Considered

As USEPA has correctly noted, implementation of § 316(b) at existing nuclear power plants must be conducted in a manner that does not jeopardize the safety of the nuclear power plant. <FN 173> PSEG supports the comments submitted by NEI. <FN 174> Since 20% of the nation's electricity is generated by nuclear power plants, specific considerations related to nuclear safety and the requirements of the USNRC must be considered in this rulemaking.

The additional costs associated with implementation of the various alternatives proposed by USEPA for nuclear power plants can be significant. The analyses used by the USEPA when drafting the proposed Phase II rule significantly underestimates the time and capital outlays required to retrofit an existing nuclear unit with impingement/entrainment reduction technologies, particularly a closed-cycle cooling system. As discussed in § II.C above, PSEG has analyzed in considerable detail the engineering for and costs of retrofitting Salem to operate with closed cycle cooling. Detailed risk assessments and multi-system harmonization studies must be conducted during the design stage of such a retrofit, and these analyses are unique to or significantly more rigorous for a nuclear plant. This process would increase design costs and lead times. After the analysis is complete, the nuclear industry estimates it would take two prolonged outages to retrofit a closed-cycle system. Because of their length, these outages could overlap either winter or summer peak electricity demand seasons, which could put electricity reliability at risk and increase costs to consumers.

The Palisades Nuclear Generating Plant was used by USEPA to evaluate costs at a nuclear plant. As NEI identifies, <FN 175> this case study is not a valid representation of a closed-cycle retrofit at a nuclear plant today, nor does it appear to support USEPA's conclusions about the extent of a likely outage associated with retrofitting a nuclear plant. For example, in calculating the capital cost of adding closed-cycle cooling systems to nuclear units with once-through cooling in the EBA, USEPA used estimates below all actual cost estimates of the Palisades retrofit in the early 1970's without considering the subsequent significant regulatory changes imposed on the nuclear energy industry in the 1970's and 1980's. For example, Appendix B quality assurance requirements, which require safety-grade equipment for systems critical to reactor safety, like service water flow, went into effect in 1970. Similarly, the emergency core cooling system regulation (10 CFR 50.46), which the CWIS changes would affect, was implemented in 1974. Neither of these regulations affected Palisades, which was granted its construction permit in 1967. Because of the significant changes in USNRC regulations that have been implemented since, it would be much more costly to make changes to an existing nuclear unit today than it was in 1973 when Palisades built and connected its closed-cycle cooling system. In addition, USEPA's EBA also misrepresents the outage time required to retrofit a closed-cycle system. The EBA suggests a plant would require a four-month outage to tie in a new cooling system, less than half that experienced at Palisades. Also, NEI notes that the capital and operating costs of retrofitting a closed-cycle cooling system on an existing nuclear facility have been underestimated and the average mean annual and summer peak energy penalties calculated by USEPA for use in estimating future operating costs are lower than those USEPA calculated for Palisades and significantly lower than those USNRC and Consumers Energy (owner of Palisades) calculated.

Nuclear plants are required to evaluate design changes against existing plant configurations under 10 CFR 50.59 and assess any potential impact on nuclear safety. Prior approval of the USNRC is required for certain changes in the plant. Significant changes to balance-of-plant systems could trigger technical considerations as yet unknown to the nuclear plant operators, USNRC or USEPA. Specifically, the USEPA should be sensitive to the unintended consequences of prescribing any retrofit technology, especially new or immature technology that would be imposed on a proven integrated power generation system. Circumstances could exist under which the USEPA rule would unintentionally reduce the margin of reactor safety. The USEPA can obviate this consequence by providing flexibility in the rule for nuclear plant operators.

Although PSEG supports USEPA's acknowledgement that the USNRC must be involved in assuring nuclear safety is not compromised for installation of any § 316(b) technology, USEPA must consider the unique requirements that nuclear power plants must address, which would result in significant increases in estimated costs of retrofitting nuclear plants.

Footnotes

173 67 Fed. Reg. 17222, § 125.94(f).

174 Nuclear Energy Institute, "Comments on Part II 40 CFR Parts 9, et al., Phase II proposed rule for cooling water intake structures under the Clean Water Act § 316(b); 67 Fed. Reg. 17,122; April 9, 2002", (August 7, 2002).

175 Id. At 4.

EPA Response

Today's final rule allows for a site-specific determination of best technology available if requirements conflict with Nuclear Regulatory Commission safety requirements (see § 125.94(f)). The five compliance alternatives are also available to these facilities.

See response to comment 316b.EFR.029.027.

The Agency does not base the requirements of the final rule on cooling tower retrofit technology.

The Agency extended the assumption for cooling tower connection outages for nuclear facilities in the NODA in response to the late-received data from the Palisades case noted by the commenter. The Agency recognizes that lengthy connection outages due to cooling tower retrofit activities are possible. The uncertainty related to their reliable prediction influenced, in part, the Agency's decision to not include the technology as a basis of the final rule.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04

EPA's legal authority to:

Under § 316(b) of the Clean Water Act USEPA Cannot Require Operational Modificiations

USEPA in the preamble states that the cost benefit estimates use one or more of the seven technologies with operational controls in some cases. PSEG interprets the term operational controls to mean cooling water withdrawal flow reduction (and the possible resulting reduction in electrical output). Flow reduction does not fall within any of the CIWS characteristic location, design, construction or capacity regulated pursuant to §.316(b).

When there is substantial reduction in the amount of cooling water flowing through a power plant's condenser, less steam is condensed and backpressure in the turbine increases. As the backpressure increases, the power plant produces less electricity until the backpressure becomes so great that the power plant must be shut down.

In addition, reduced cooling water flow results in a higher temperature of the cooling water that is discharged from the power plant. This has the potential of causing an exceedance of a permit thermal effluent limit. Moreover, it can also result in substantial increases in entrainment mortality due to the higher temperatures and longer transit times through the cooling water system. Finally, PSEG has evaluated the costs and benefits that would be associated with various flow reduction scenarios at Salem. Estimates ranged from $33.7 million for a 10% flow reduction to $864.8 million for a 45% flow reduction scenario that retained effluent temperatures within NJPDES permit limits by reducing power levels at the Station.

EPA Response

See response to 316bEFR.041.079.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.01.02.02

Fish Population Modeling

USEPA Has Failed To Properly Account for the Effects of Density-Dependent Compensation

As noted in Chapter A6 of the EBA, USEPA chose to ignore the effects of density-dependent compensation on fish populations in its estimates of the benefits from reductions in I&E losses (EBA, page A6-7):

"EPA has implemented several density independent models to conservatively estimate potential consequences for fishery harvests and ecosystem production, as described in detail in Chapter A5. These density independent models do not assume any compensatory response to CWIS losses. While relationships between CWIS losses, fish stocks, and fishery yields are unlikely to be strictly linear, as these models assume, EPA believes that the many uncertainties associated with modeling stock-recruitment relationships and potential compensation justify this approach, in keeping with a precautionary approach to environmental decision-making."

USEPA justified its decision to ignore the effects of density-dependent compensation in its loss estimates for all fish species in all locations as being a response to its perception that many fish stocks are at risk (EBA, page A6-6):

"A recent report by the National Marine Fisheries Service concludes that nearly a third of the 283 fish stocks under U.S. jurisdiction are currently below their maximum sustainable yield (NMFS, 1999b). For another third, the maximum sustainable yield remains uncertain. EPA notes that many of these stocks are also subject to impingement and entrainment losses. Given that many fish stocks are at risk, EPA has adopted a "precautionary approach" in evaluating CWIS impacts because of the many uncertainties associated with modeling compensation and stock-recruitment relationships."

Based on this statement, it appears that USEPA had no basis for ignoring the effects of density-dependent compensation in over one third of the managed stocks it cited. PSEG agrees that for some stocks (e.g. stocks in jeopardy of being unable to sustain themselves), a "precautionary approach" may be warranted; however, that does not justify the application of such an approach to all species in all locations. USEPA's refusal to account for the effects of density-dependent compensation in any stocks is unjustified scientifically and ignores relevant data on affected stocks.

PSEG believes that the selection of methods for assessing CWIS effects on fish populations (including whether or not to account for the effects of density-dependent compensation) should be made on a species-specific and site-specific basis, based on the current state of knowledge for the species and site. For example (as discussed below), there is ample evidence that density-dependent compensation affects the stock-recruitment relationships of striped bass and weakfish, two important species subject to I&E at Salem.

In its discussion of uncertainty in stock-recruitment models (another part of USEPA's argument to ignore density-dependent compensation), USEPA claimed (EBA Chapter A6, page A6-6) that two major sources of uncertainty in stock-recruitment relationships are:

“variation in the physical environment due to fluctuations in climate and other natural conditions (Cushing, 1982; Fogarty et al., 1991) and interactions with other species (Boreman, 2000).”

And that:

“Competition and predation can interact in complex ways with other sources of mortality to alter stock-recruitment relationships.”

PSEG acknowledges that uncertainty exists in stock-recruitment relationships that may introduce errors into stock-recruitment models. However, most of these sources of uncertainty affect USEPA’s linear stock-recruitment models as well as density-dependent stock-recruitment models. Accordingly, PSEG questions the validity of USEPA’s argument that due to these uncertainties, it is better to use a linear stock-recruitment model.

Another part of USEPA’s argument to ignore the effects of density-dependent compensation was USEPA’s assertion that estimating compensatory responses of fish stock can be problematic (EBA Chapter A6, page A6-5):

“Although many fish species appear to show the potential for a compensatory response to changes in population size, in other cased a statistically significant density dependent relationship cannot be detected because of significant variability in the available population data (Shepherd and Cushing, 1990; Fogarty et al., 1991).”

However, as noted in Appendix I of the Application, recent developments in Meta-analysis methods provide a means for quantifying compensation based on historical fisheries data:

“Meta-analysis refers to the process of combining and assessing the findings from several separate research studies that bear upon a common scientific problem (Hedges and Olkin 1985; Hedges 1989). The use of statistical methods of meta-analysis for research synthesis is now the standard accepted method for making crucial decisions in medical treatment, drug evaluations, and issues in public health and social policy (Peto 1987; Louis et al. 1985). Recently, it has become a standard approach used to evaluate the critical population parameters needed to understand fisheries dynamics (Mace and Sissenwine 1993; Myers and Barrowman 1996; Liermann and Hilborn 1997; Punt and Hilborn 1997; Myers 1997; Myers et al. 1997 and Myers and Mertz 1998).”

Table 1 of Appendix I of Salem’s 1999 Renewal Application contained estimates (derived using Meta-analysis) of compensatory reserve for 55 species of fish, includinge alewife, American shad, Atlantic menhaden, blueback herring, and striped bass (species affected by I&E at Salem). Therefore, the difficulties with estimation that USEPA cited are not sufficient to prevent the use of stock-recruitment models that account for density-dependent compensation.

In summary, PSEG believes that USEPA did not provide a reasoned basis for ignoring the effects of density-dependent compensation in its assessment of the potential benefits of reducing I&E losses. In this regard, PSEG supports the critique by Barnthouse (2002) of USEPA’s rationale for assuming no biological compensation. PSEG agrees with the critique’s conclusion that USEPA’s estimates contain a consistent bias toward overestimation of benefits because USEPA ignored the effects of density-dependent compensation in all of its estimates of the benefits of reducing I&E losses. Furthermore, PSEG believes that the decision of whether or not to account for the potential effects of density-dependent mortality should be made on a species- and site-specific basis using up-to-date information.

The following sections describe current species- and site-specific information that provide strong support for the hypothesis that density-dependent compensation helps to ameliorate I&E losses of striped bass and weakfish at Salem.

1. Compensation in Delaware Estuary Striped Bass Population

According to the ASMFC stock assessment for striped bass (ASMFC, 1999), the abundance of the east-coast stock of striped bass has increased since 1989 (Figure IV.A-1). During this period of increasing abundance, the first-year survival rate of striped bass has been decreasing. The decrease in first-year survival rate is indicated by a pronounced decline in the ratio of the number of recruits (i.e., age 1 fish) to the spawning stock biomass ("SSB") (i.e., the total weight of spawning-aged fish in the population). This decline in first year survival rate in response to the increase in SSB (Figure IV.A-2) is characteristic of the presence of strong density-dependent mortality. At the current level of female SSB (15,000 tons), the survival index is at its minimum level. With a female SSB below 9,000 tons, the index of survival about doubles, compensating for the reduced SSB.

The Hudson River striped bass population has been studied intensively for over two decades by the Hudson River utility companies and the New York State Department of Environmental Conservation ("NYSDEC"). These studies were synthesized in a Draft Environmental Impact Statement ("DEIS") prepared to support renewal of the State Pollutant Discharge Elimination System Permits for the Indian Point, Bowline Point, and Roseton generating stations (Central Hudson Gas & Electric Corp, et al., 1999). The data summarized in the DEIS reflect 24 consecutive years of sampling, covering the entire estuary from the Battery to the Federal Dam at Troy, using methods that sample every life stage of striped bass from egg to adult. In addition to data collected by the utility companies, the DEIS synthesizes information obtained from several monitoring programs conducted by the NYSDEC.

These studies indicate that the abundance of the adult component of the Hudson River striped bass population has grown substantially since 1980, while the operation of three large power plants located in the principal nursery area utilized by early life stages continued. The large year classes produced since 1980 were not heavily fished, resulting in a large increase in the size of the spawning stock by the early 1990's. As the size of the spawning stock increased (due to controls on fishing mortality), the densities of striped bass early life stages in the estuary also increased. However, the average abundance of juvenile striped bass, as reflected in the annual NYSDEC beach seine index, did not increase. This is because the relative productivity or index of pre-recruit survival (recruits, "r", divided by spawning stock biomass, "ssb", that produced it) decreases as the spawning stock biomass increases. The lack of correlation between early life stage abundance and subsequent year-class strength was noted previously (Pace et al. 1993).

Data for recent years, presented in the DEIS, confirm this pattern. The abundance of early life stages of striped bass in the Hudson River estuary has continued to increase with spawning stock size, but juvenile abundance has not increased. Recruitment production is equal to the relative productivity multiplied by the spawning stock biomass. When recruitment remains stable as spawning stock biomass increases then the decrease in relative productivity just offsets the increase in spawning stock biomass. The increase in abundance of adults, eggs, and larvae, coupled with stable production of juveniles, provides strong evidence for density-dependent mortality of early life stages of striped bass in the Hudson River estuary.

The above data were used to develop a stock-recruitment model of the Hudson River striped bass population (Appendix VI-4 of the DEIS). Analysis of the model indicated that reproductive success in striped bass is highly density-dependent or compensatory in nature. Density-dependent mortality is so strong that annual conditional mortality rates as high as 20% on fish less than age 1 would result in only an approximate 1% reduction in average annual recruitment (assuming a fishing mortality rate of $F<0.5$, and a 28 inch size limit).

Based on an assessment of available data on striped bass in the Delaware Estuary, the Delaware Department of Natural Resources and Environmental Control (Kahn, et.al., 1998) concluded that:

“[F]rom 1980 through 1995, the Delaware River YOY index followed a trajectory very similar to a classic exponential rate of increase. Since 1993, the index has fluctuated without trend.”

This result is similar to the result presented in the Report of the 26th Northeast Regional Stock Assessment Workshop (NMFS 1998), the Stock Assessment Review Committee (“SARC”), which stated that the Delaware River striped bass population had “grown exponentially” from the mid-1980s through the mid-1990s, and grew faster than the coastal stock as a whole.

In reference to striped bass population trends in Delaware Estuary during the late 1990’s, Kahn, et.al. (1998) further concluded that:

“The failure to maintain an upward trajectory suggests the possibility that the stock may have reached a rough upper bound.”

This interpretation is in agreement with the position of the ASMFC, which in 1998 concluded that the Delaware striped bass stock was restored to “historical population levels” (ASMFC, 1998).

The combination of (1) the strong evidence for density-dependent compensation in the east coast stock as a whole and in the Hudson River population striped bass, and (2) the resource agencies’ conclusions that Delaware River population of striped bass has reached a “rough upper bound” and has been restored to “historical population levels”, and (3) the fact that the Delaware stock rebuilt during a period in which Salem was fully operational, support the hypothesis that compensatory mechanisms in the Delaware Estuary striped bass population have largely ameliorated the effects of I&E at Salem. Therefore, by ignoring the effects of density-dependent compensation, USEPA has greatly overestimated the benefits of reductions in I&E losses of striped bass at Salem.

2. Compensation in Weakfish Population Inhabiting Delaware Bay

The 30th Stock Assessment Review Committee (“SARC”) Report (NMFS, 2000) documents increases in the abundance of the east coast stock of weakfish since the early 1990’s (Figure IV.A-3). The abundance of juvenile weakfish within Delaware estuary increased during that period also (see Appendices J and H of Salem’s 1999 Renewal Application). As was the case for striped bass, the first-year survival rate of weakfish (as measured by the ratio of the number of recruits to the spawning stock biomass) declined sharply while the spawning stock biomass increased (Figure IV.A-4). Again, this pattern is characteristic of the presence of strong density-dependent mortality. In the 30th SARC report, the authors stated that “the rapid rebuilding of the stock reflected high estimated compensatory reserve.”

Fishery management measures reduced fishing mortality on adult fish (NMFS 2000), and the stock responded with increases in spawning stock biomass. In response to the increased abundance of fish, first-year survival has declined, as would be expected in stocks that regulate their abundance through compensatory mortality. For weakfish the first-year survival rate in earlier years (again, when the stock had lower and more stable abundance) was over two times higher that it is under current conditions.

The combination of (1) the strong evidence for density-dependent compensation in the east coast stock of weakfish as a whole, and (2) the fact that the weakfish stock in the Delaware Estuary has increased in abundance concurrently with the east coast stock, and (3) the fact that the Delaware stock rebuilt during a period in which Salem was fully operational, support the hypothesis that compensatory mechanisms in the population of weakfish that inhabit Delaware Estuary have largely ameliorated the effects of I&E at Salem. Therefore (as is the case with striped bass), by ignoring the effects of density-dependent compensation, USEPA has greatly overestimated the benefits of reductions in I&E losses of weakfish at Salem.

Figure IV.A-1. Trend in spawning stock biomass of the east-coast stock of striped bass, showing increasing abundance since 1989. Data are from the Virtual Population Analysis presented in the August 1999 stock assessment report on striped bass prepared by the Atlantic States Marine Fisheries Commission (ASMFC, 1999).

Figure IV.A-2. Ratio of number of striped bass recruits (age-1 fish in January) to the spawning stock biomass (SSB) of striped bass that generated the recruits (i.e., SSB from the previous calendar year) as an index of first-year survival. Data are from the Virtual Population Analysis presented in the August 1999 stock assessment report on striped bass prepared by the Atlantic States Marine Fisheries Commission (ASMFC, 1999).

Figure IV.A-3. Trend in spawning stock biomass of the east-coast stock of weakfish, showing increasing abundance since the early 1990’s. Data are from the Virtual Population Analysis presented in the 30th Stock Assessment Review Committee report (NMFS, 2000).

Figure IV.A-4. Ratio of number of weakfish recruits (age-1 fish in January) to the spawning stock biomass (SSB) of weakfish that generated the recruits (i.e., SSB from the previous calendar year) as an index of first-year survival. Data are from the Virtual Population Analysis presented in the 30th Stock Assessment Review Committee report (NMFS, 2000)

[see hard copy for figures]

EPA Response

This comment refers to Chapter A6 of the Case Study Document (DCN #6-0003) presented at proposal. This material was not included in EPA's final analysis. Nonetheless, EPA has responded to respond to the issues raised by the commenter in responses to Comment 316bEFR.005.009 on fish population modeling, Comment 316bEFR.025.015 on compensation, and Comment 316bEFR.005.026 on the term "precautionary approach." EPA notes that even if there is indisputable evidence for compensation in striped bass and weakfish stocks, these are only two of the hundreds of species that are impinged and entrained nation-wide. EPA reminds the commenter that the goal of EPA's analysis was to develop an estimate of the magnitude of I&E throughout the country, not just for a few managed fish stocks. Moreover, EPA notes that managed fish stocks account for less than 2 percent of impinged and entrained species.

Comment ID 316bEFR.075.098

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.03

Monitoring requirements

USEPA Has Substantially Underestimated The Costs Associated With Its Proposed Monitoring And Application Requirements Based On Site-Specific Work PSEG Has Conducted

Under USEPA's Preferred Option, an owner/operator of a Phase II existing facility would be required to provide substantial information when applying for renewal of a NPDES permit. <FN 176> USEPA provides estimated costs for the sequence of requirements in its "Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Rule". The stated "costs of initial post-promulgation NPDES Permit application activities" for estuaries and tidal rivers is $1,363,863 (Table B1-2); the "cost of NPDES renewal application activities" is $51,054 (Table B1-3); and, the stated "cost of annual monitoring, record keeping, and reporting activities" is $109,734 (Table B1-4) or $78,300. <FN 177> While USEPA has made laudable attempts to revise program cost elements from its initial estimates in the "National Pollution Discharge Elimination System; Cooling Water Intake Structures for New Facilities; Proposed Rules" <FN 178> the above costs should be considered a minimum. Moreover, if there is a potential that the permit would be adjudicated, it is certain that the costs would be substantially higher.

Footnotes

176 67 Fed. Reg. 17222 §X

177 TDD Section 2.3

178 65 Fed. Reg. 49060

EPA Response

EPA believes that the cost estimates are representative and have not been "substantially underestimated." Cost details and assumptions have been provided with all estimates. EPA recognizes that overall actual costs may be higher or lower that those estimates presented based on particular local circumstances, and also recognizes that adjudication of a permit may result in cost increases.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.03

Monitoring requirements

The applicant, under proposed Section 125.95 would be required to provide a “comprehensive demonstration study” which “…must be appropriate for a quantitative survey…” for impingement, entrainment, and the source waterbody. In addition, the study must include the “…collection of a sufficient number of years of data to characterize annual, seasonal, and diel variations…”. Also, the studies would have to be designed to compile data for eggs, larvae, post larvae, juveniles, and adults for both fish and shellfish. Finally, USEPA stresses throughout the preamble the need for adequate QA/QC for permit-associated programs. <FN 179> Implementation of these program requirements can be quite costly but are necessary if one wants to have a scientifically credible and defensible program.

USEPA appropriately acknowledges the site-specific nature of Section 316(b) studies as detailed in the “facility examples” <FN 180> and the Case Studies. However, difficulties in trying to utilize data from studies conducted in the 1970s and 1980s (due to inconsistencies among sites) for developing a national rule are also discussed. Regardless, it is stated that “…[r]ecent advances in environmental assessment techniques provide new and in some cases better tools for monitoring impingement and entrainment and detecting impacts associated with the operation of cooling water intake structures…” <FN 181>. These very “advances” contribute greatly to the program costs.

In circumstances where existing data are not sufficient and new or additional sampling must be done, the sampling program must be tailored to the site. In tidal rivers and estuaries complex hydrodynamics and water quality conditions might require more intensive sampling to characterize aquatic organisms likely to be in the vicinity of the intake. USEPA, of course, could promote a consistent process for such studies through guidance.

Footnotes

179 67 Fed. Reg. 17149 § VI

180 67 Fed. Reg. 17137 § V

181 67 Fed. Reg. 17137 § V

EPA Response

Please see EPA’s response to comment 316bEFR.041.119.

Comment ID 316bEFR.075.100

Subject Matter Code 21.01.01
Source water physical data

Author Name Maureen F. Vaskis & Mark F. Strickland
Organization PSEG Services Corporation, Ofc of Environmental Counsel

Considerations Regarding Source Water Sampling in the Vicinity of the Facility

According to the Proposed Rule, information on occurrence, abundance, and types of organisms in the vicinity of the facility must be provided on (1) fish eggs, larvae, and post-larvae; (2) juvenile and adult fish; and (3) shellfish. This section discusses complexities and difficulties of collecting such data by life stage.

a. Eggs, Larvae and Post-Larvae

As acknowledged in the Preamble <FN 182> any assessment of the vulnerability of eggs, larvae, or post-larvae will depend on the duration of occurrence (i.e., how long are they at risk) and their abundance in the intake area (i.e., how many are at risk). Thus, to cover the duration of occurrence for most estuarine and freshwater species ichthyoplankton studies would need to last a minimum of three months (often May, June, and July), and more likely five (April through August).

The Proposed Rule suggests that sampling be performed in the vicinity of the CWIS without providing any perspective on what "in the vicinity of the CWIS" means. <FN 183> In circumstances where there is significant spatial variability of aquatic organisms, however, such an approach is shortsighted. The applicant and the permitting agency need to know whether the data collected near the CWIS are representative and whether any post-operational changes in abundance are due to the intake and not other factors. In fact, eggs and larvae at a particular location may have originated a considerable distance away and been transported to the intake by the flow of the river, or by near-shore currents or tides in estuarine and marine environments (PSEG 1999, Attachments C-1 to C-14). This transport of eggs and larvae must also be assessed if the desire is to accurately predict entrainment impacts. For example, the Empirical Transport Model ("ETM"), often used in CWIS impact assessments, employs this approach. In any case, it is clear that multiple locations are needed, not a single location near the intake as USEPA suggests. Larval abundance varies tremendously, with multiple peaks (usually corresponding to different species or cohorts) occurring over the course of the spawning period. Frequent sampling is necessary lest these peaks be missed and the abundance of key species (taxa) being seriously under- or over-estimated.

Finally, egg and larval density often vary horizontally (e.g., from one bank to the other or upstream and downstream), vertically (i.e., by depth in the water column), and on a diel (day/night) basis. If sampling is not stratified to account for these variables, the estimates of abundance, occurrence, and distribution may be erroneous.

b. Juvenile and Adult Fish

Movement of fish into or within a waterbody is common. Much of this movement is associated with spawning (e.g., striped bass, American shad, blueback herring), but movement related to water fluctuations, salinity, temperature preferences, and/or to overwintering locations is also common (e.g., white perch, Atlantic croaker, salmonids, shiners). Thus, any survey designed to assess the vulnerability of fishes to impingement must be conducted at least seasonally. Multiple sets of sampling gear would be needed to sample the target fish populations adequately.

The Proposed Rule would require that quantitative data be collected. However, information about species population size is rarely available. Without such estimates, it would be difficult to assess AEI or design well-calibrated BTA technologies that are not simply over-conservative. Thus, intensive sampling programs may be necessary to estimate population size and the level of effort would increase considerably above what USEPA has estimated.

c. Shellfish

In the Delaware Estuary, decapods (e.g., blue crabs) and other shellfish have seasonal migrations that can bring them near cooling water intakes. Thus sampling may need to be expanded to include appropriate methods for capturing adult or larval movements.

Footnotes

182 67 Fed. Reg. 17148-17149 § VI

183 67 Fed. Reg. 17175 § VII A

EPA Response

EPA recognizes the inherent complexities of source water sampling. Specific study parameters may be proposed by the facility in the Proposal for Information Collection for review and approval by the Director. However, the Director will have the final determination on all study parameters including defining the phrases "in the vicinity of" and "the hydrological zone of influence" as necessary to ensure that potentially impacted species are adequately represented.

Today's final rule requires that monitoring be conducted in accordance with the verification monitoring plan (125.95(b)(7), the Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.03

Monitoring requirements

USEPA's Proposed Minimum Sampling Frequencies and Spatio-Temporal Extents of Monitoring Are Likely To Be Unacceptable And Suggest Unrealistically Low Monitoring Costs

The accuracy of the data will be critical, since they will be used to determine compliance with performance standards under USEPA's Preferred Option or to calculate the potential for AEI and whether further mitigative measures or technologies must be used. The data will also be the benchmark against which future performance is measured, and they may serve as the mechanism for approving or denying a permit, either initially or during a later renewal period. The need for increased precision and accuracy will lead to significant costs.

USEPA has expressed concern with the review of applications being too burdensome for regulatory staff <FN 184> and the cost of litigation being too high. <FN 185> However, PSEG believes that any proposed "Comprehensive Demonstration Study" that does not adequately sample impingement, entrainment, and the populations of fish and shellfish in the source water will result in increased regulatory burden and increased costs associated with litigation.

Given the importance of the data in determining initial and potentially future permit requirements, facility owners will likely feel that a bare minimum program would not be adequate to protect against an erroneous decision regarding adverse environmental impact. Biological populations do not exist in a time and space vacuum. USEPA's approach of looking at a single location near the proposed CWIS will be, in most cases, inadequate to establish a proper baseline. Because of the need to assess more locations, often at greater frequency than suggested, the cost of doing a NPDES Phase II I&E Study that characterizes the "species of fish and shellfish and life stages, including a description of the abundance and temporal /spatial characteristics in the vicinity of the CWIS…" <FN 186> could be much larger than USEPA supposes.

It is important when setting monitoring requirements that the monitoring study be intensive enough to provide useful information, yet not so intensive that the program is unnecessarily costly or time-consuming. The sampling frequencies of once monthly for impingement and biweekly for entrainment during specified periods (Section B1-1.3.c. - EBA) may not, in certain locations, provide enough data for comparing entrainment and impingement levels across years or for determining whether AEI is occurring under a site-specific approach. For example, at the Salem Station the minimum program required to produce useful data for a Comprehensive Demonstration Study <FN 187> is weekly (with seasonally variable within-week frequencies, i.e. number of days/week and number of samples/day) for both entrainment and impingement monitoring. Thus the USEPA estimate of the cost to conduct monitoring of entrainment and impingement is extremely low for estuaries based on PSEG's experience in the Delaware, Arthur Kill, and Hackensack River.

An accurate estimate for costs to conduct the proposed monitoring can be obtained by reviewing costs for on-going monitoring programs. PSEG has conducted monitoring on estuaries for more than 30 years. PSEG believes that the proposed costs and scope of monitoring severely underestimate the effort necessary to adequately represent the potential losses and the associated portions of the populations within an estuary. Two recently completed Section 316(b) Demonstrations for two fossil-powered facilities cost about $650,000 to $750,000 for the development, implementation, and reporting associated with the reports. The following table is a summary of the scope of different monitoring components and associated costs for estuarine monitoring conducted between 1998 and 2000:

SUMMARY OF PSEG'S ESTUARINE MONITORING COSTS <FN 188>
[see hard copy for table]

PSEG believes that the data quality objectives and the nature of the monitoring programs, as well as application requirements, will be highly site-specific based on the experience of performing similar programs in the Delaware Estuary, the Arthur Kill, and Hackensack River over the past 30 years. To adequately characterize the uncertainty associated with the cost of monitoring, PSEG suggests that USEPA consider a range of costs in assessing this component of the Proposed Phase II Rule.

Footnotes

184 67 Fed. Reg. 17152 § VI

185 67 Fed. Reg. 17153 § VI

186 67 Fed. Reg. 17175 § VII

187 67 Fed. Reg. 17174 –17178 § VII

188 Does not include costs of a comprehensive impact assessment analysis or report

EPA Response

In the Comprehensive Demonstration Study, the facility owner or operator will: characterize the impingement mortality and entrainment due to the cooling water intake structure; describe the nature and operation of the intake structure; and describe the nature and performance levels of the existing technologies, operational measures, and restoration measures for mitigating impingement and entrainment impacts.
For a discussion of monitoring and compliance, see EPA's response to comment 316b.EFR.074.023. EPA
recognizes that increased frequencies and duration of sampling may be necessary in some regions to fulfill the data requirements of the demonstration study. EPA agrees with the comment that, "It is important when setting monitoring requirements that the monitoring study be intensive enough to provide useful information, yet not so intensive that the program is unnecessarily costly or time-consuming." EPA does not agree that the cost estimates presented for monitoring are "unrealistically low." The cost estimates are representative, and cost details and assumptions have been provided with all estimates. EPA recognizes that overall actual costs may be higher or lower that those estimates presented based on particular local circumstances, and the availability of existing data (i.e., existing data that adequately reflects current conditions at the facility and in the source waterbody).

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 21.01.01

Source water physical data

The Need For Source-Water Monitoring Is Inconsistent With USEPA's Proposed Performance Standards

USEPA has proposed to rely on criteria utilizing percentage reductions of impingement survival and numbers of entrained organisms. If this is the benchmark to be met to receive a determination that an intake qualifies as BTA, permittees should only be required to conduct those studies that directly measure the efficiencies of any intake modification. There is no reason therefore to provide a comprehensive demonstration study that would characterize the source waterbody. The permittee would only need to characterize the base case I&E losses and those losses that result from improved intake technology. In fact, if one wished to follow this through to conclusion, once a demonstration of the efficiency of the reduction of impingement mortality and numbers of entrained organisms has been made, no further monitoring should be required.

EPA Response

EPA disagrees that there is no need to characterize the source waterbody, conduct monitoring, and prepare a comprehensive demonstration study (CDS). These data are needed by the Director to evaluate the type of waterbody and species potentially affected by the cooling water intake structure and determine the appropriate performance requirements. Certainly, not all facilities will need to conduct all components of the CDS (e.g., the approved technology option only requires that the verification monitoring plan be submitted and facilities that have reduced flow commensurate with closed cycle cooling systems are exempt from CDS requirements entirely). Monitoring is required to ensure that the installed design and construction technology, operational measure, and/or restoration measure is (are) effective. Monitoring requirements may be reduced at the discretion of the Director as well as CDS requirements based on the use of existing relevant data. In some cases, the Director may deem that no further monitoring is required if a demonstration has been made that the technology is effective and successfully reducing impingement mortality and entrainment.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

USEPA's Preamble Includes Errors or Inaccuracies Concerning PSEG'S Salem Station

PSEG believes the USEPA should correct the following errors or inaccuracies in the Proposed Phase II Rule as it relates to PSEG facilities.

1. The Information Concerning Modifications to the Salem CWIS are Inaccurate and Should be Corrected

The preamble of the Proposed Phase II Rule describes PSEG's Salem Generating Station as follows:

Salem Generating Station. A 2381 MW facility (nameplate, nuclear), Salem is located on the Delaware River in Lower Alloways Creek Township, New Jersey. The facility has two generating units, both of which use once-through cooling and began operations in 1977. In 1995, the facility installed modified Ristroph screens and a low-pressure spray wash with a fish return system. The facility also redesigned the fish return troughs to reduce fish trauma. <FN 189>

The Salem Units 1 and 2 each have a nameplate rating of 1162 MW for a total of 2324 MW. Salem Unit 1 began operation in 1977 and Salem Unit 2 began operation in 1981. Unit 1 was retrofitted to incorporate Ristroph vertical traveling screens in 1979 and Unit 2 became operational with Ristroph vertical traveling screens installed. These Ristroph vertical traveling screens were supported by a low-pressure spray wash system and a fish return system. In 1995, the CWIS was improved with redesigned Ristroph vertical traveling screens and an enhanced spray wash system, and the fish return troughs were redesigned to improve fish survivability. PSEG requests USEPA note the corrected information in its Response to Comments.

2. The Information Concerning the Timeline for Salem's Permit Renewal are Inaccurate and Should be Corrected and the NJDEP Burden was not Disproportionate for Reviewing the Salem Permit Application

The preamble states that PSEG's Salem Generating Station filed its application for a CWA permit in 1994 and the NJDEP made its decision in 2001. <FN 190> This information is inaccurate. PSEG filed a supplemental application for the renewal of Salem's NJPDES Permit in March 1993. NJDEP issued as draft permit in June of that year. At the request of interested third parties, including an affected state, the comment period was extended until mid-January of 1994. The NJDEP issued a permit effective September 1, 1994 to Salem Generating Station. On March 4, 1999, PSEG filed a renewal application for the 1994 permit as required. The NJDEP hired a consultant to review the application and issued a draft permit on December 8, 2000, with a public comment period extending through mid-March 2001. On June 29, 2001, NJDEP issued a renewal permit with an effective date of August 1, 2001.

USEPA did not provide a burden estimate for the NJDEP to review the 1999 application but requested comment. In addition to the normal fees paid in accordance with the NJDEP regulations, <FN 191> PSEG paid an additional $200,000 to defray the costs of the contractor NJDEP hired. The activities conducted by PSEG during the permit period (1994 - 1999) and the results of those activities were explained in the application that was reviewed by NJDEP and their contractor. Those activities and the monitoring of their results were performed by PSEG at a cost in excess of $100 million dollars. The burden on NJDEP to review those activities and the results of those activities, to ensure the societal and environmental needs were being met, could only be a small fraction of the burden on PSEG.

Footnotes

189 67 Fed. Reg. 17144, Col. 3.

190 67 Fed. Reg. 17153, Col. 1.

191 N.J.A.C. 7:14A-3.1 et seq.

EPA Response

EPA has updated and corrected the information pertaining to the Salem Generation Station. Please see the final rule preamble section entitled, Meeting National Performance Standards Through the Use of Design and Construction Technologies, Operational Measures, And/or Restoration Measures.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.03.01.01

Salem

PSEG COMMENTS ON USEPA'S DELAWARE ESTUARY CASE STUDY ANALYSIS

A. Introduction

PSEG's comments on USEPA's Delaware Estuary Case Study Analysis ("CSA") focuses on information regarding PSEG's Salem Generating Station ("Salem"), which formed the bases for the CSA. The loss portion of the CSA was prepared by Stratus Consulting ("Stratus") and the economic evaluation of these losses was prepared by ABT Associates, Inc. ("ABT") (collectively, the "CSA Consultants"). PSEG's comments are organized into seven sections. Section B addresses PSEG's concern that the CSA Chapter B3 contains misleading information on Salem's I&E estimates. Section C contains a summary of PSEG's critique (see Attachment 3, report by D.G. Heimbuch, Ph.D.) of the CSA Consultants' I&E loss estimates for Salem. Section D contains a summary of PSEG's critique (see Attachment 4, report by D. Harrison, Ph.D.) of the CSA Consultants' estimates of the economic value of Salem's I&E losses. Section E addresses PSEG's concern that the CSA Consultants' characterization of biases and uncertainties (in the CSA Consultants' estimates of benefits from reducing I&E losses) is biased and misleading. Section F identifies some factual errors regarding Salem in the CSA. Section G addresses PSEG's concern that the CSA ignored critical information. Section H addresses PSEG's concern that comments made by the CSA Consultants in the CSA and EBA regarding I&E loss estimates in general are not applicable to Salem.

B. USEPA's Discussion of Salem's I&E Data (CSA Chapter B3) is Misleading

In Sections B3-3.1 and B3-3.2, CSA Consultants provided objective summaries of Salem I&E loss estimation methods. However, the CSA Consultants' comments on the quality of PSEG's I&E estimates, which are presented in section B3-3.3, are inaccurate, misleading and one-sided.

In section B3-3.3 ("Potential Biases and Uncertainties in PSEG's I&E Estimates") of CSA, the CSA Consultants alleged that PSEG's I&E loss estimates for Salem were biased. The CSA Consultants supported their claim by referring to the review of the 1999 Application that was conducted by ESSA Technologies LTD ("ESSA") under contract to NJDEP. PSEG refutes the CSA Consultants claim that PSEG's I&E estimates are biased, and notes that the CSA Consultants presented one-sided and misleading summaries of parts of ESSA's report and chose not to refer to PSEG's response to ESSA's report on several important topics, although PSEG provided it to USEPA in April 2001.

On page B3-25, the CSA Consultants stated that:

"ESSA Technologies (2000) identified several aspects of PSEG's sampling program that increased data uncertainties and introduced bias in PSEG's I&E estimates, and USEPA shares these concerns." (page B3-25)

This statement is incomplete and therefore very misleading. The CSA Consultants failed to acknowledge ESSA's general conclusion regarding PSEG's use of the data from its sampling programs (which, as the CSA Consultants did correctly note on page B3-21, have created "one of the most comprehensive I&E data sets in the nation"):

"The methods employed for interpolation / extrapolation of data are reasonable and generally conservative. Weaknesses in the data are explicitly acknowledged and various adjustments or correction coefficients have been developed and applied to attempt to correct for known biases." (ESSA 2000, Section 2.1.1. Sampling and Estimation of Entrainment Losses).

On page B3-26, the CSA Consultants continued the misleading characterizations of PSEG's I&E loss estimates:

"ESSA Technologies (2000) expressed concern that the sampling changes necessitated the use of numerous adjustment factors that may have biased I&E estimates. Many adjustments appeared to be biased low, which would result in an underestimate of losses. For example, ESSA Technologies argued that PSEG may have underestimated the latent screen mortality of impinged organisms because they did not consider the high velocity and turbulence of exit flume waters in their estimate."

ESSA did not argue that flume turbulence and velocity caused estimates of latent impingement mortality to be underestimated. Rather, ESSA concluded that it could not determine whether PSEG's estimates were too high, accurate or too low:

"The central issue here is that the initial and latent mortality rates estimated via the sampling pool and holding tanks are quite likely not representative of the actual mortality rates of fish after they have been returned to the Delaware River. It is possible that the mortality rates measured using the sampling pool overestimate actual impingement mortality. It is also possible that actual mortality rates of fish after returning to the Delaware River are equivalent or even higher than those estimated via the sampling pool." (ESSA, 2000, Section 2.2.2.3 Impingement Mortality).

Therefore using USEPA's definitions of uncertainty and bias ("Bias refers to a potential error in which the direction of error is known (i.e., an under- or overestimate), whereas uncertainty refers to a potential error with no known directional bias"), ESSA's conclusion was that PSEG's impingement mortality rate estimates contained uncertainty, not that the impingement mortality rates were biased.

The CSA Consultants continued their misleading references to the ESSA report when on page B3-26 they addressed entrainment survival rates used in the PSEG entrainment estimates:

"ESSA Technologies (2000) also found that PSEG may have substantially underestimated entrainment mortality by assuming only moderate rates of mortality as organisms pass through the plant."

and on page B3-33 it stated:

"As discussed in Section B3-3.3, an independent review of Salem's 1999 Application by scientists with ESSA Technologies, Ltd (2000) concluded that Salem's entrainment rates were most likely underestimated by PSEG because their entrainment calculations assumed substantial through-plant survival of entrained organisms. USEPA concurs with ESSA that Salem's 1999 Applications provides inadequate justification of PSEG's assumptions about through-plant survival, and therefore, USEPA recalculated Salem's entrainment without the thermal and mechanical mortality factors used by PSEG for its calculations (see Appendix B1 for the species-specific thermal and mechanical mortality factors used by PSEG)."

As shown in the following quote, ESSA did not conclude that "Salem's entrainment rates were most likely underestimated by PSEG", nor did ESSA conclude that "Salem's 1999 Applications provides inadequate justification" as alleged by the CSA Consultants. Rather ESSA recommended that a 100% entrainment mortality rate be used as an upper bound together with PSEG's estimates in an uncertainty analysis:

"The approach taken to the estimation of losses separates through-station mortality into thermal, chemical and mechanical components. Estimates of mechanical mortality are based on studies in which larvae were held either in jars or aquaria. The detailed description of the protocol is given in Appendix F Attachment 1 Section II.C Survival. While the study protocol provides information on the survival of larvae due to mechanical damage alone, i.e., the physical damage, which alone is sufficient to cause death, the in vitro environment does not reflect the rigors faced by the larvae on exiting the discharge. Consequently it is difficult, if not impossible, to know if the station has an incremental effect on post-discharge mortality beyond that strictly attributable to death from direct mechanical damage observed in the in vitro study environment. A conservative approach to addressing this uncertainty would be to conduct the analysis with an assumed 100% mortality rate for all life stages and use this as an upper bound together with the current estimates in an uncertainty analysis of station effects." (ESSA 2.1.1 Sampling and Estimation of Entrainment Losses).

The CSA Consultants also cited (page B3-26) an untested hypothesis from ESSA (which, as noted below PSEG has completely refuted) as being additional support for the CSA Consultants claim that PSEG's entrainment estimates are biased:

"In addition, certain geographic features near Salem may have caused a large back eddy which would cause different flow dynamics depending on tidal cycle, and result in episodic entrainment patterns that might not have been captured by the sampling program."

PSEG refuted this speculation by ESSA in PSEG's response to ESSA's report (PSEG, 2001). In its response, PSEG cited four hydrodynamic studies, the data and analyses from which disproved ESSA's hypothesis. It is not clear why the CSA Consultants ignored this information in their discussion of the ESSA hypothesis, since USEPA was aware of this information. In fact, USEPA listed PSEG's response to ESSA's report in its list of references to the CSA reports, and cites portions of PSEG's response to the ESSA report elsewhere in Chapter B3 of the CSA.

In addition, PSEG recently submitted to NJDEP (as part of its 2001 Permit requirements) a report entitled "Study of the Hydrodynamics at the Intake of the Station" (PSEG, 2002) which concluded:

"In summary, PSEG has completed extensive field data collection and modeling related to hydrodynamics in the vicinity of the Station, including the intake basin and Sunken Ship Cove. PSEG has found that the circulation patterns in this region are highly complex, including large-scale, dynamic, eddy-type motions during the change of the tide as well as small-scale turbulent fluctuations. Analysis has shown that the concept of a strong back eddy being formed within Sunken

Ship Cove on the ebb tide is not possible. The prevailing tidal conditions in the Estuary are too dynamic, and they cause a near constant change in the flow patterns. Finally, the larger scale eddies that can occur during the change of the tides south of the Station are generally swept offshore, and do not interact directly with the CWIS."

In reference to the natural mortality rates used by PSEG in its estimates of age-1 equivalents and yield-per-recruit, the CSA Consultants incorrectly stated (page B3-26) that:

"Relative to published values, PSEG's adjusted rates are higher for 10 species, lower for 11 species, and within the range of measured values for 7 species (PSEG, 2001 b, c)."

In fact, in PSEG's response to the ESSA report (PSEG, 2001) it was noted that of 28 natural mortality rates (for multiple life stages of 9 species, not 28 species) 11 rates were lower, 10 were higher and 7 were within the reported range. Furthermore, in the next sentence of PSEG's report, it is noted that ESSA conducted a sensitivity analysis and concluded that in most cases substituting the un-adjusted rates for PSEG's adjusted rates decreased the estimates of yield lost to the fishery.

In section B3-5 (Salem's Annual Entrainment), the CSA Consultants commented on the degree of inter-annual variability in entrainment losses at Salem, and by innuendo, speculated that high CWIS flow rates at Salem in 1998 were the likely cause of unusually high entrainment losses (page B3-33):

"In 1998, exceptionally high numbers of alewife were entrained, over 16 million, compared to a mean of about 1.2 million for the period. In 1995 and 1998, unusually high entrainment of Atlantic menhaden occurred, reaching about 180 million compared to a mean of 20.8 million. Similarly, in 1998 blueback herring entrainment was over 66 million compared to a mean of about 5.2 million, striped bass entrainment was about 537 million compared to a mean of 39.7 million, and white perch entrainment was nearly 416 million compared to at mean of 42.6 million. Of note is that Salem's intake flow in 1998 was substantially higher than other years and close to the level of use projected by the facility over the next permit cycle."

The CSA Consultants failed to mention that freshwater flow in the Delaware River in May and June of 1998 was unusually high. The U.S. Geological Survey (http://waterdata.usgs.gov/nwis/) reported the average (over 89 years of data) daily flow rate for the Delaware River at Trenton, N.J. for days in May to range from 12,400 cfs to 15,930 cfs, and for days in June to range from 7,255 cfs to 12,200 cfs. In contrast, reported daily flow rates for 1998 exceeded 65,000 cfs in May, and exceeded 35,000 cfs in June.

High freshwater flow rates in the Delaware River have the potential to increase the entrainment vulnerability of some fish species that spawn upriver of Salem. As noted in Appendices C and H of the Application (listed in USEPA's references) alewife, blueback herring, striped bass, and white perch all spawn upriver of Salem (typically in May and June). Furthermore, entrainment of eggs and larvae of these species at Salem in 1998 occurred between late April and late June. Therefore, the unusually high freshwater flow events in late spring of 1998 likely transported entrainable life stages of alewife, blueback herring, striped bass, and white perch downriver towards Salem.

If the CSA Consultants needed to identify a cause for the unusually high entrainment losses in 1998, they should have considered a range of plausible alternatives (e.g., including hydrodynamic conditions) and discussed each. Instead, by mentioning only one possibility (i.e., Salem intake flows), the CSA Consultants implied that Salem intake flows were the cause of the unusually high entrainment losses in 1998. This assertion has no scientific basis and ignores the relevant facts.

C. USEPA's I&E Loss Estimates for Salem are Flawed

This section of PSEG's comments contains a summary of PSEG's report (prepared by D.G. Heimbuch, Ph.D.) that critiques the CSA Consultants' estimates of I&E losses at Salem (see Attachment 3). Because the CSA Consultants attributed over 98% of the estimate of economic losses due to I&E losses at Salem to the effects of entrainment, PSEG's critique of the CSA Consultants I&E loss estimates for Salem focuses on entrainment losses.

1. Background

Estimates of economic losses due to entrainment that are presented in CSA Table B4-16 are the sum of estimates of economic losses to the commercial fishery, the recreational fishery, and estimates of economic losses attributable to the loss of non-use values and to lost forage (see CSA Table B4-15). The CSA Consultants estimates of the economic losses to the commercial fishery are based on these estimates of the yield lost to the commercial fishery (in pounds) and the commercial value of a pound of fish (see CSA Table B4-9). The CSA Consultants estimates of the economic losses to the recreational fishery are based on their estimates of the reduction in recreational catch and the recreational value of the catch of an additional fish (see CSA Table B4-7). The CSA Consultants' estimates of the loss of non-use values are based on their estimates of the economic losses to the recreational fishery (and hence on its estimates of the reduction in recreational catch). The CSA Consultants' estimates of the economic losses attributable to lost forage are based on their estimates of (1) forage production foregone (in pounds) and (2) the economic value ($ per pound) of forage(see CSA Table B4-12 and B4-14). <FN 192>

The biological parameters that the CSA Consultants used as direct inputs to its economic assessment for Salem were its estimates of yield lost to the fishery (see CSA Table B4-3 and Table B3-16, reduction in catch (see CSA Table B4-3), and production foregone (see CSA Table B3-17). based its estimates of reduction in catch on its estimates of yield lost to the fishery and the average weight of fish caught by the fishery. The CSA Consultants' estimates of yield lost to the fishery are the product of its estimates of age-1 equivalents (see CSA Table B3-15) and its estimates of yield per recruit (i.e., yield per age-1 fish).

For these reasons, PSEG's review of Stratus' loss estimates focused on Stratus' methods and estimates of age-1 equivalents, yield per recruit, and production foregone.

2. Summary of Findings from PSEG's Review

This review of Stratus' methods for estimating yield foregone and production foregone due to entrainment at Salem identified several serious errors in these methods that cause USEPA's estimates to be biased high.

a. USEPA's Estimates of Yield Lost to the Fishery are Biased High

Stratus' estimates of yield foregone (which is the product of the number of age-1 equivalent fish and the yield per recruit) are flawed because they (1) incorrectly omitted the effects of entrainment survival on life stage-specific loss estimates and (2) used overestimates of juvenile survival (from the date of entrainment to the end of the juvenile life stage) in its estimates of age-1 equivalents.

Stratus' justification for omitting the effects of entrainment survival was that: "Salem's entrainment survival factors were eliminated for all analyses (Tables B37 through B3-10) because USEPA found insufficient justification in Salem's 1999 Application for their use." (CSA page B3-27) By incorrectly assuming no entrained fish survive (see EPRI [2000] for a review of many studies that demonstrated the presence of entrainment survival), Stratus overestimated entrainment losses at Salem. Stratus also incorrectly assumed that juvenile entrainment occurs in the middle of the juvenile lifestage; whereas entrainment data indicate that juvenile entrainment generally occurs at the beginning of the lifestage. By assuming entrainment occurs later than it actually does, Stratus overestimated the survival rate from the date of entrainment to age-1, and thereby overestimated the number of age-1 equivalents.

The cumulative effect of these errors generally was to cause Stratus' estimates of age-1 equivalents (and hence yield foregone) to be biased high. For weakfish, striped bass, Atlantic croaker and spot (the four species examined in the Application that had the highest estimates of yield foregone), Stratus' estimates were 54%, 119%, 454% and 536%, respectively, higher than PSEG's estimates (which accounted for entrainment survival and the fact that juvenile entrainment generally occurs early in the life stage <FN 193>).

b. USEPA's Estimates of Production Foregone are Biased High

Stratus' estimates of production foregone are flawed because their (1) incorrectly applied the formula for computing production foregone (from Rago, 1984), (2) used invalid estimates (based on its extrapolation method) of average life stage–specific weights of age-0 fish, (3) incorrectly applied the formula for computing growth rates from initial weights of fish in successive life stages, and (4) derived invalid estimates of growth rates based on its invalid estimates of average lifestage-specific weights of age-0 fish.

Stratus attempted to use the method developed by Rago (1984) to estimate production foregone. However, Stratusmisapplied Rago's mathematical formulations (by using the average weight for each lifestage rather than the initial weight of each lifestage) which caused its estimates to be biased high. Stratus also extrapolated the average weight of fish at age-1 to produce its lifestage-specific estimates of average weight of age-0 fish. Its extrapolation method was not biologically meaningful and produced estimates of average fish weights that were unrealistically high. Then they estimated lifestage-specific growth rates for age-0 fish (required inputs to the production foregone model) based on its invalid extrapolated average weight estimates. The resulting growth rate estimates were invalid because (1) initial weights for each lifestage were required (rather than average weights) for the method Stratus employed and (2) Stratus used its invalid extrapolated average weights as inputs.

The cumulative effect of these errors for bay anchovy and non-RIS forage species was to cause Stratus' estimates of production foregone to be biased high. For bay anchovy, Stratus' estimate was 1016% higher that it would have been without these errors, and for non-RIS forage, USEPA's estimate was 1297% higher than it would have been.

D. USEPA's Assessment of the Economic Value of I&E Losses at Salem is Flawed

This section of PSEG's comments contains a summary of PSEG's report (prepared by D. Harrison, Ph.D.) that critiques USEPA's estimates of the economic value of I&E losses (see Attachment 4). Section 1 below provides an overview of PSEG's review. Sections 2 through 5 address the methods the CSA Consultants used in the economic assessment of losses to the commercial fishery, losses to the recreational fishery, non-use value, and production foregone, respectively. Section 6 provides summary recommendations.

1. Overview

Although the CSA Consultants' overall economic approach to benefit estimation is sound - they use an "effect by effect" approach that develops total benefits as the sum of individual components - many of the methodologies and data the CSA Consultants uses to develop the individual components have major flaws that make them inadequate bases for national benefit estimates and inadequate guides for evaluating individual benefit-cost assessments. Many of the methodologies and applications are inconsistent with USEPA's recent guidelines for preparing economic analyses (USEPA 2000), with the Office of Management and Budget's ("OMB") guidelines for economic assessments (OMB 2000), and with basic economic textbooks on environmental benefit assessment (e.g., Freeman 1993).

To summarize, we find the following:

1. The CSA Consultants' commercial benefit estimates are substantially overstated because of mischaracterizations of the empirical studies used in the assessment.

2. The CSA Consultants' recreational benefit estimates are suspect because of use of an overly simple benefit transfer method and a flawed Random Utility Model ("RUM") study.

3. The CSA Consultants' nonuse benefits have no conceptual or empirical support.

4. The CSA Consultants' forage fish benefits are overstated by including a flawed methodology - the replacement cost approach - as one of the two methods.

The CSA Consultants' estimate of commercial losses account for a substantial majority of the overall estimated economic losses from I&E, representing about 64 percent of the total. Recreational losses are the next largest category, at 24 percent. Forage fish losses account for a very small percentage (0.1 percent) of total losses, and nonuse losses account for the remainder of the CSA Consultants' estimate.

2. USEPA's Commercial Benefit Estimates Are Substantially Overstated Because of Mischaracterizations of the Empirical Studies Used in the Assessment

Benefits due to projected increases in commercial catch represent the largest of the four categories, accounting for about 64 percent of overall benefits in the Delaware Case Study. The CSA Consultants' calculates commercial benefits by first using ex vessel prices and added catch for the various commercial species to determine the added gross revenues to commercial fishermen. Citing various empirical studies, the CSA Consultants then argue that the added producer surplus represents 40 percent to 70 percent of gross revenues; using this approach, the mid-range value is 55 percent (i.e., gross revenues are multiplied by 0.55). Citing two other studies as well as a personal communication, the CSA Consultants claim that producer surplus represents 22 percent of the total "multi-market" welfare - including producers, wholesalers, processors, retailers and consumers - and thus that the producer surplus estimates should be multiplied by 4.5 to obtain an estimate of "total surplus." The net result is that the CSA Consultants' estimate of commercial fishing benefits is equal to about 2.5 times the added gross revenues to commercial fishermen (0.55 x 4.5 = 2.48).

a. USEPA's ex vessel commercial fish values can be confirmed

The CSA Consultants' estimates of the ex vessel values appear to be reliable. The values, which range from $0.11 per pound for Alewife to $3.18 per pound for Striped Bass, appear to be accurate estimates of the average values for ex vessel prices in New Jersey and Delaware. Although the range of certain species suggests that affected fish would be caught in other areas, these state values are representative. Note that this use of prevailing ex vessel prices assumes that I&E at Salem - and the other in-scope facilities - does not affect the market prices of commercial fish. This assumption seems sensible in light of the large overall market for fish; note however, that the CSA Consultants' use of the 4.5 multiplier contradicts this assumption by implying a substantial change in price.

b. USEPA's estimates of producer surplus benefits (mid-range equal to 55 percent of gross fishing revenues) are not supported in the literature that USEPA cites; this literature suggests a mid-range value of at most 15 percent of gross fishing revenues and likely one that would "tend toward zero"

The literature that the CSA Consultants cites does not support its estimates that Delaware fishermen would gain between 40 percent and 70 percent of the gross fishing revenues as additional producer surplus in the long run. It is well established in the economic literature (see, e.g., Freeman 1993) that in open access fisheries, there is a tendency for producer surplus to be driven to zero. This "tragedy of the commons" means that commercial fishermen would not receive any additional producer surplus from reduced I&E at Salem; all of the potential gains would be dissipated by additional fishing effort.

The studies that the CSA Consultants cites show substantial gains to fishermen, but these studies relate primarily to short-term gains that do not take into account the long-term factors that operate in commercial fisheries. Moreover, to the extent that the studies indicate some special circumstances that might mitigate these effects - such as entry restrictions - they relate to West Coast and Great Lakes fisheries rather than the East Coast. Indeed, the study that USEPA relies on for the "4.5 multiplier" (Norton et al. 1983) points out that producer surplus was in fact zero for fishermen in the southern part of the Atlantic fishery - net costs were equal to net revenues. Strand (2002), who is also one of the co-authors of Norton et al. (1983), notes that the study found the overall producer surplus for East Coast striped bass fishermen to be about 15 percent of gross revenues.

c. The studies cited by USEPA do not support the "multi-market" multiplier (4.5) used by USEPA to translate changes in producer surplus to fishermen into changes in total producer and consumer surplus

The "multi-market" multiplier of 4.5 is not supported in the studies cited. The only East Coast study cited is Norton et al. (1983), which reports information on the total surplus to retailers and consumers as well as the total surplus to commercial fishermen in the striped bass fishery. Although the ratio of these two values is 4.5, there is no indication in the report that it would be valid to use that ratio to estimate additional consumer and retailer surplus for changes in the fishery. Indeed, as Strand - one of the authors of the study - notes, this is "an extraordinarily odd procedure indeed," (Strand 2002).

The CSA Consultants claims that the multiplier of 4.5 also is derived from empirical work by Richard Bishop and others on the Great Lakes, including a draft report that is not available for distribution. The study that is available does not appear to include the specific empirical results cited by the CSA Consultants. In any event, these studies relate to the Great Lakes and thus are not relevant to the East Coast.

d. USEPA provides no evidence to support a claim that consumers would benefit from the changes in commercial catch through lower prices

Consumers could in theory gain from additional commercial fish made available through reduced I&E at Salem, but only if the changes were sufficient to affect the market price. The CSA Consultants has presented no information on the relevant market for commercial fish and the relative importance of I&E losses. Changes in I&E at Salem seem small relative to the volume of commercial fish in the East Coast fish markets, suggesting that there will not be a change in the market price and thus no consumer surplus gains from I&E changes.

e. Overall, the evidence suggests that mid-range commercial benefits are equal to 15 percent or less of gross fishing revenues, indicating that USEPA overstates the likely long-run economic benefits by at least a factor of 16

The available evidence on conditions in the East Coast suggests that the economic benefits - measured as producer and consumer surplus gains - will be small due to reduced I&E at Salem. Certainly, there is no conceptual or substantial empirical support for the claim that benefits would be equal to almost 2.5 times the value of the gross increase in revenues to fishermen. If gains to fishermen were 15 percent of the gross increase - as suggested by the one East Coast study noted by the CSA Consultants in their discussion of commercial benefits - the long-run benefits would be less than one-sixteenth of the value reported by USEPA in the Delaware Case Study.

3. USEPA's Recreational Benefit Estimates Are Suspect Because They Rely on an Overly Simple Benefit Transfer Method and a Flawed RUM Study

The CSA Consultants applied a benefit transfer approach to estimate recreational losses from several "representative important species" due to I&E at Salem and other in-scope and out-of-scope facilities in the Delaware Estuary. The CSA Consultants also developed a random utility model ("RUM") analysis of recreational fishing benefits from reduced I&E to estimate recreational losses associated with two species - weakfish and striped bass. The CSA Consultants comprehensive benefit estimate adopts the RUM estimates for weakfish and striped bass and the benefit transfer estimates for the other species.

a. USEPA's use of benefit transfer to value recreational fishing benefits is sound

Benefit transfer is an appropriate methodology for developing estimates of the potential recreational fishing benefits from changes in I&E at Salem or any other CWIS. As the USEPA Guidelines note,

"[t]he advantages of benefit transfer are clear. Original studies are time consuming and expensive; benefit transfer can reduce both the time and financial resources needed to develop benefit estimates" (U.S. USEPA 2000, p. 86).

Although the Delaware Case Study is not clear on precisely why the studies used for the benefit transfer were chosen or why others were not used, the four studies provide values for similar areas and species; all four studies relate to species affected by Salem I&E and to recreational fishing along the Atlantic coast.

b. USEPA uses an overly simple application of the benefit transfer method

Although the CSA Consultants' decision to use benefit transfer itself is sound, the technique the CSA Consultants' uses to transfer the benefits is not one that is recommended by USEPA Guidelines. The CSA Consultants' analysis for the Delaware Estuary Case Study applies a point estimation approach to transfer a range of values developed in the studies used in the policy case. The CSA Consultants uses this approach to develop a low and high estimate for each fish species.

The point estimation approach is not recommended by USEPA's Guidelines. As noted above, the Guidelines state, "As it is rare that a policy case and study case will be identical, this approach is not generally recommended." Despite the fact that this approach is not recommended, theDelaware Estuary Case Study fails to explain why it was selected, and whether other approaches were considered.

c. USEPA's RUM study has major flaws

The RUM method is well established as a methodology for evaluating recreational fishing benefits. Such models allow one to estimate the benefits of improving conditions in one fishery relative to other alternatives. It is important, however, that the studies use valid data on the nature of the choices, particularly on the differences in the travel costs to the alternative sites anglers might choose.

The RUM model developed by the CSA Consultants for the Delaware Case Study has substantial inadequacies that suggest that its results are not reliable estimates of the willingness to pay of recreational anglers for I&E changes at Salem. These inadequacies include the following:

-Employing unweighted intercept (angler) data. Over-representation of avid anglers results in biased estimates of the average value of improved fishing opportunities.

-Incorrectly calculating trip costs. Several assumptions bias trip costs upward and thus bias estimates of the value of improved fishing opportunities.

-Inappropriate modeling decisions. Modeling trips in a sequential manner - first the decision to recreate and then the selection of the recreation site - is inferior to modeling these as simultaneous choices.

4. USEPA's Nonuse Benefits Have No Conceptual or Empirical Support

Nonuse benefits represent potential benefits not associated with any direct use by individuals or humankind of the Delaware Estuary resources affected by Salem I&E. These benefits are sometimes referred to as passive use values or bequest values if they relate to future generations.

The CSA does not include an independent assessment of the potential nonuse benefits affected by Salem I&E. Instead, the CSA Consultants applied a "rule of thumb" that nonuse benefits would be equivalent to 50 percent of estimated recreational benefits. The CSA Consultants claims that this is a "long-standing" benefit transfer approach.

a. USEPA's 50 percent "rule of thumb" has no basis in the USEPA Guidelines or in the economic literature

This rule of thumb has neither conceptual nor empirical support as a valid measure of the willingness to pay of individuals for nonuse effects of I&E at Salem.

-The author of the original article discussing the "rule of thumb" refers to it as a "tenuous empirical basis from which to estimate national nonuser benefits" (Freeman 1979, p. 171). This author does not include the method in his comprehensive treatise on benefit assessment (Freeman 1993).

-Other authors have voiced similar criticisms. Fisher and Raucher (1984), for example, note that "[t]he proportional relationship [the 50 percent rule] is not in the least robust." (p. 47).

-Although some studies have calculated both use and nonuse values and compared the totals, these studies do not evaluate situations that are at all comparable to I&E in the Delaware.

Thus, the 50 percent rule is not appropriate as a benefit transfer approach to evaluating nonuser benefits for the CSA. <FN 194>

b. USEPA provides no empirical basis for a claim that changes in I&E at Delaware facilities would lead to any nonuse benefits

The CSA Consultants provides no information whatsoever on nonuser benefits that might be relevant for I&E on the Delaware. Indeed, the total discussion of nonuser benefits in the CSA (p. B4-11) is only one paragraph. This one-paragraph description is used to explain and justify annual benefits ranging from about $800,000 to $2.7 million per year.

c. Extensive empirical information on the status of the Delaware fishery suggests that there are no nonuse benefits

Although the CSA Consultants do not present any information related to nonuse benefits, there is extensive information on the environmental status of the Delaware Estuary that provides insight into the likely importance of this category. The existing literature on nonuse benefits suggests that nonuse values are likely to be significant under two conditions:

1. The resource is unique (e.g., the Grand Canyon); and

2. The losses to the resource are substantial and irreversible (e.g., damming the Grand Canyon).

Detailed studies on the status of the Delaware Estuary and the effects of I&E at Salem indicate that these conditions are not likely to be met for I&E at Salem:

-Historical data indicate a consistent and significant improving trend for growth in the stock of the major species affected by Salem I&E.

-Salem I&E has a negligible effect on the few fish species whose stocks have been declining recently.

-Even the declining stocks are not threatened to fall below key biological reference points.

-Any effects of Salem I&E could be reversed by various measures (e.g., curtailing commercial or recreational fishing).

This information suggests that the nonuse benefits associated with I&E at Salem are not significant. Any positive estimate for nonuse benefits should be based on an acceptable study of nonuse effects, consistent with USEPA's Guidelines (2000) and on current economic methods (e.g. Freeman 1993), rather than on a crude and inappropriate rule of thumb.

5. USEPA's Forage Fish Benefits are Overstated by Including a Flawed Methodology—the Replacement Cost Approach—as One of Two Methods

Forage fish refer to species that are not commercially or recreationally fished. These fish represent prey for other species that are commercially or recreationally fished, and thus provide potential indirect benefits if they increase the numbers of those fish. The CSA Consultants developed values for forage fish losses at Salem based on two approaches:

1. Production foregone value. The CSA Consultants estimated the value of the recreational and commercial species whose production would be changed as a result of changes in forage fish populations.

2. Replacement cost. The CSA Consultants estimated the cost of raising fish for stocking to replace the forage fish affected by I&E.

The values are somewhat higher using the replacement cost approach.

a. Additional forage fish lead to benefits to the extent that they increase commercial and recreational catch

Changes in forage fish populations can lead to benefits - in the form of additional consumer and producer surplus - if they increase the numbers of commercial and recreational fish. Thus, this is a valid benefit category for the Delaware Case Study. Forage fish represent an example of indirect ecosystem benefits - they provide services that do not directly benefit individuals but rather provide biological services required for services that do benefit individuals.

b. The production foregone method in theory could lead to valid benefit estimates

The production foregone method provides a valid methodology for evaluating the potential indirect benefits of forage fish changes. The validity of the calculations of course depends upon the accuracy of the scientific assessments of the linkages between changes in forage fish and changes in the populations of commercial and recreational species.

c. In contrast, the replacement cost method is not an economically valid benefit methodology

Replacement cost is not a valid method of assessing the benefits of changes in I&E at Salem (or anywhere else). The USEPA Guidelines provide an extensive list of acceptable benefit assessment methodologies; replacement cost is not among these methodologies, and for good reason.

Hatchery costs provide a measure of the costs of one potential alternative for improving fish populations - stocking additional forage fish. Such stocking may be a worthwhile exercise. But the costs do not provide a measure of the benefits. Indeed, accepting such an approach would make a mockery of benefit-cost analysis. If costs were used as a measure of benefits, the benefit-cost analysis would suggest all projects had a net benefit of zero.

E. USEPA's Characterization of Omissions, Biases and Uncertainties Contains Omissions and Is Biased

In CSA Chapter B7 (page B7-2) the CSA Consultants concluded that:

"Thus, on the whole, USEPA believes the estimates developed here underestimate the economic benefits of reducing I&E."

PSEG categorically disagrees with this conclusion and contends (as discussed below) that the CSA Consultants have not provided the justification for this conclusion. Rather, the CSA Consultants apparently selectively chose and interpreted factors (that could have introduced bias or uncertainty) in a manner that supported the CSA Consultants' belief that it underestimated benefits.

1. USEPA's Summary

In section Chapter B6, B6-3, the CSA Consultants presented a summary (Table B6-7) of what it considered to be the omissions, biases and uncertainties in PSEG's estimates of the economic value of I&E losses (referred to by USEPA as benefit estimates). For each identified issue, the CSA Consultants decided whether the effect of the issue was to overestimate benefits, or to underestimate benefits, or whether USEPA could not determine the direction of the potential error (i.e., the issue introduced uncertainty but not bias).

The CSA Consultants identified eight issues. Surprisingly, of the eight issues identified, the CSA Consultants concluded that four would have caused underestimation and four would have simply introduced uncertainty. PSEG disagrees with the CSA Consultants' conclusions that four of the issues have resulted in underestimates. Furthermore, PSEG notes that USEPA's list is very incomplete, and that many issues USEPA failed to consider or chose to ignore have caused USEPA's estimates to be biased high.

a. Unjustified Claims of Underestimation of Benefits

EPA claimed that if the “(e)ffect of interaction with other environmental stressors” (Table B6-7) had been considered, benefits would have been greater than those estimated. The Agency justified its conclusion by claiming that “yearly reductions in fish may make the stock more vulnerable to other stressors.” USEPA provided no scientific evidence for this speculation. The Agency also claimed that “as water quality improves over time due to other watershed activities, the number of fish impacted by I&E may increase.” Although the number of fish lost to I&E may increase as populations of fish increase in abundance due to improvements in water quality, it is also likely that the value per fish will decrease as fish abundance increases. USEPA’s determination regarding this issue appears to be one-sided speculation without any documented scientific basis.

EPA claimed that because “(b)oating, bird-watching, and other in-stream or near-water activities are omitted” benefits were underestimated. However, USEPA provided no evidence that I&E losses at Salem would in any way affect boating, bird-watching or other activities, nor did it demonstrate any likely linkages between I&E losses and those activities. Furthermore, as noted in Appendices J and H of the 1999 Salem Application, almost all (RIS) fish stocks in Delaware Estuary have shown increases in abundance during the period of Salem operation. Therefore, it is not reasonable to hypothesize that I&E losses lead to declines in fish abundance which somehow affected boating, bird-watching and related activities. USEPA’s claim appears to be another example of USEPA ignoring the facts in favor of biased speculation.

b. Omitted and Ignored Issues That Cause Overestimates

As discussed above, USEPA omitted the following issues (all of which caused USEPA’s estimates to be biased high) that were identified in PSEG’s reviews of USEPA’s methods and estimates of biological and economic losses (see Attachments 3 and 4):

-EPA’s erroneous assumption that juvenile entrainment occurs in the middle of the juvenile lifestage

-EPA’s misuse of the production foregone formulation from Rago (1984)

-EPA’s erroneous method for estimating weights of age-0 fish by extrapolation from weight at age-1

-EPA’s erroneous estimates of economic value of commercial landings

-EPA’s flawed RUM estimates for recreational value

-EPA’s erroneous application of its “50% rule of thumb” for non-use values.

In addition, USEPA chose to ignore, as issues that could introduce bias or uncertainty, the following (all of which caused USEPA’s estimates to be biased high):

-EPA’s decision to ignore the effects of density-dependent mortality and growth

-EPA’s assumption of no entrainment survival

-Alternative energy pathways that allow food not eaten by fish lost to I&E to be available for new growth by other species (e.g. see Section VII.B.2.b in PSEG's response to the ESSA report (PSEG, 2001)).

2. USEPA's Characterization of Bias in Valuation of Fish Not Caught by the Fishery is Misleading

In CSA Chapter B6, USEPA presented two pie charts: one that depicts the "Salem: Distribution of Impingement Losses by Species Category and Associated Economic Values" (Figure B6-2), and one that depicts "Salem: Distribution of Entrainment Losses by Species Category and Associated Economic Values" (Figure B6-3). Each chart shows the proportion of the total number of age-1 equivalents (the sum of individual fish, regardless of species) that are in each of three categories: (1) forage fish, (2) commercial and recreational fish that are harvested, and (3) commercial and recreational fish that are not harvested.

These charts are highly misleading. Despite USEPA's characterization, the age-1 equivalents of different species are not equivalent (in terms of biomass, ecologic function, economic value or otherwise) and the sum of individual fish with different ecological and economic values is not a meaningful quantity. For example, the CSA Consultants' estimate of the average weight of an age-1 bay anchovy is 0.00381 pounds (CSA, Appendix B2, Table B2-5), whereas the CSA Consultants' estimate of the average weight of an age-1 striped bass is 0.485 pounds (CSA, Appendix B2, Table B2-5), over 125 times the weight of a bay anchovy. Furthermore, bay anchovy are forage (consumed by the billions by predatory fish) and striped bass are predatory fish. Although the CSA Consultants apportions these losses into categories, implicit in the use of a pie chart is the assumption that what is being compared is in equal units. The CSA Consultants' chart therefore cannot account for these differences and erroneously implies that an individual bay anchovy is just as important as an individual striped bass, which is clearly not the case (ecologically or economically). Since the sum of individual fish (over all species) is not a meaningful quantity, the apportionment of that sum into categories (defined by the ultimate fate of each fish) does not produce meaningful percentages.

Furthermore, the CSA Consultants' characterization of commercial and recreational fish that are not harvested as being "UNVALUED" is extremely misleading. The difference between commercial and recreational fish that are harvested and those that are not harvested (based on the methods of estimation as described in CSA, Chapter A5) is that fish that don't get harvested die from natural causes. Apparently this is the reason the CSA Consultants originally decided to assign an economic value of $0 to the commercial and recreational fish that are not harvested, i.e., those fish die from natural causes. If the CSA Consultants believed an economic value other than $0 should have been applied, then the CSA Consultants should have used that alternative value from the start of its analysis. At the end of its case study, to claim those fish were "UNVALUED" creates the misleading impression that its benefit estimates are biased low.

Similarly, the CSA Consultants' characterization of forage fish as being "UNDERVALUED" is extremely misleading. The CSA Consultants presented no scientific justification for the conclusion that its method for assessing the economic value of forage production foregone would lead to underestimates. To the contrary, it is likely that the presence of alternative energy pathways in the Delaware Estuary ecosystem allow surviving fish to grow faster by consuming the food left behind by the forage fish lost to I&E (e.g., see PSEG's response to the ESSA report (PSEG, 2001)). the CSA

Consultants' methods for estimating production foregone do not account for such alternative energy pathways. Therefore, the CSA Consultants estimates of the value of forage production foregone are likely to be biased high.

Simply put, these charts are not scientifically valid and are extremely misleading. One can only surmise that the purpose of these charts is to create the erroneous impression the CSA Consultants benefit estimates for Salem are biased low.

F. USEPA's Delaware Estuary Case Study Contains Factual Errors Regarding Salem

In section B3-7, the CSA Consultants incorrectly stated that the modified Ristroph intake screens at Salem have been in service since 1995:

"Current impingement at Salem was estimated by considering only the years since 1995, when Salem's Ristroph screens were modified with improved fish handling systems that increased the survival of impinged organisms." (CSA, Chapter B3, page B3-40).

And, the CSA Consultants incorrectly averaged impingement loss data from the years 1995, 1997 and 1998 to represent current conditions with the modified Ristroph screens in place, when in fact, the modified screens were not fully in place until the beginning of 1997.

G. USEPA Ignored Substantial Amounts of Information Provided by PSEG

The Case Study Analysis of the Delaware Estuary Watershed ("Delaware Case Study", EPA-821-R-02-002, Part B) does not consider all relevant information in the record concerning the effects of Salem on fisheries resources, does not consider prior analyses on the long-term trends of key species in the Delaware; and does not consider the cumulative assessment of Salem's effect on the key fisheries populations in the Delaware.

The CSA Consultants discuss thermal discharges and associated environmental impacts (CSA Chapter B1, page B1-10) but never references the Salem § 316(a) variance determination by NJDEP or the independent review by Versar (1989). Both of these independent reviews discuss the small and localized nature of Salem's thermal plume. In addition, PSEG's § 316(a) Demonstration (1999, Appendix E, Volume 10) provides evidence from both retrospective and predictive studies that support the position that the balanced indigenous populations/communities ("BIP"/"BIC") in the Delaware are protected and not adversely impacted by Salem's thermal discharge.

On page B3-1 the CSA Consultants stated that: "[b]ecause of the lack of I&E data on these species, the CSA Consultants was unable to evaluate potential CWIS impacts on them." In this instance, the CSA Consultants are discussing several threatened and endangered ("T&E") species that are occasionally impinged at Salem and other facilities. However, Salem's Section 316(b) Demonstration (PSEG 1999, Appendix F, Volume 14) Section V.B.2.c.v does address threatened and endangered species and states that Salem's operations are not having adverse effects on these T&E species and the conclusion is confirmed by numerous NMFS-issued "no jeopardy" decisions under the Endangered Species Act. NMFS is the federal agency charged with making these decisions for the T&E species potentially involved at Salem. Therefore, PSEG believes that very definitive statements have been made and are supported by regulatory agency documentation that Salem is not jeopardizing nor will not jeopardize the continued existence of these T&E species or result in the destruction or adverse modification of their habitat (USNRC 1980, NMFS 1991, 1992, 1993, 1999). USEPA should accept these decisions by its sister Agency and not erroneously state that CWIS impacts on T&E species cannot be addressed.

Section VII.B of the Salem § 316(b) Demonstration (PSEG 1999, Appendix F, Volume14) presented a summary of PSEG's analysis of trends of relative abundance of RIS of fish and blue crab. One of the first signs of a continuing decline in population abundance is a downward trend in recruitment. Thus, the trend analyses are important and relevant in evaluating CWIS impacts. The summarized results presented in the Salem § 316(b) Demonstration and the detailed discussion presented in Appendix J of the Salem § 316(b) Demonstration (PSEG 1999, Volume 34) were not fully and properly acknowledged by the CSA Consultants in theCSA. The results of these rigorous statistical analyses are important in evaluating CWIS impacts and clearly demonstrate that there is no evidence of continuing decline in the abundance of finfish RIS and blue crab in the Delaware attributable to Salem operations. Page B3-28 of the Delaware Case Study, states "…Blueback herring and spot impingement has declined in the past decade at the same time populations of these have shown significant declines within the estuary (see Appendix J in PSEG, 1999d). However, in the case of spot the decline is in part attributable to an exceptionally strong year class in 1988, a year that showed exceptionally high spot impingement." What the CSA Consultants did not state is that the declining trend for blueback herring mirrors the coastwise decline in abundance that started in the late 1960s, which is well before Salem started operating (PSEG 1999, Appendix F, page VII-25). PSEG questions how the CSA Consultants can either ignore or mischaracterize these relevant findings in reaching its conclusions in the CSA.

The focus of the CSA Consultants' cumulative impact assessment is on the total I&E in terms of age 1 equivalents, yield lost to the fishery (in pounds) and production foregone (in pounds; Delaware Case Study, Section B3-8). However, the CSA Consultants' does not place these losses into perspective by comparing them to appropriate aquatic population and community benchmarks, even though they acknowledged the importance of providing such a context (CSA, Chapter B7, page B7-1):

"…[I]t is important to consider how I&E rates relate to the relative abundance of species in the source waterbody. Thus, low I&E does not necessarily imply low impact since it may reflect low population abundance, which can result from numerous natural and anthropogenic factors, including long-term I&E impacts of multiple CWIS. On the other hand, high population abundance in the source waterbody and associated high I&E may reflect waterbody improvements that are independent of impacts from or improvements in CWIS technologies. Or, high levels of I&E impacts on a species may indicate a high susceptibility of that given species to CWIS effects"

In contrast to the CSA approach (which raised and then ignored these considerations), PSEG performed an overall assessment of the cumulative effects of Salem on the aquatic environment (PSEG 1999, Appendix H, Volume 34) that put the I&E losses into the context of the abundance of affected species in the source waterbody. The assessment employed multiple lines of evidence from both predictive and retrospective studies. The studies showed that the Salem CWIS and other sources of stress on the relevant aquatic populations are not having an adverse environmental effect and that Salem's operations as a whole are not adversely affecting the biotic community of the Delaware Estuary. PSEG believes this approach is scientifically credible, addresses the issue of adverse environmental impact ("AEI") rather than ignoring it, and results in cost-effective solutions to complex resource issues.

The CSA Consultants incorrectly assumes AEI is occurring in the Delaware Case Study and then proceeds to economically value the losses and the benefits that would potentially accrue as a result of the proposed regulations. As noted in the proposed rules PSEG and the UWAG have offered definitions of AEI and approaches to address these issues.

H. USEPA's Claim That In General I&E Loss Estimates are Biased Low Is Not Applicable to Salem

In the Economic and Benefits Analysis (EBA; USEPA –821-R-02-001, Section C1-5, <FN 196> USEPA states that data uncertainties lead to underestimates of Case Study benefits and cite the following factors: data limitations, estimated technology effectiveness, potential cumulative impacts, recreational benefits, secondary (indirect) economic impacts, commercial benefits, forage species, nonuse benefits, and incidental benefits. PSEG believes these general statements are not valid in regard to Salem's § 316(b) Demonstration (PSEG 1999) and, in fact, believes that the USEPA's Case Study of the Delaware Estuary has ignored site-specific information and overestimated the benefits that would be attributable to I&E reductions at Salem. The following paragraphs address each of the listed uncertainties for Salem.

In regard to data limitations, the CSA Consultants state that facility-furnished data typically focus on a subset of the fish species impacted by impingement and entrainment (I&E), resulting in an underestimate of the total magnitude of losses (EBA, Section C1-5.1). In addition, the CSA Consultants state that facility-derived biological monitoring data often pertain to conditions existing many years ago <FN 197> and often is of very limited duration. <FN 198> PSEG believes these uncertainties have been adequately addressed in the Salem Section 316(b) Demonstration and inappropriately considered by the CSA Consultants in the Delaware Estuary Case Study. The Salem § 316(b) Demonstration focused on 12 RIS of fish and finfish and four T&E species (i.e., shortnose sturgeon, loggerhead turtle, Kemp's Ridley turtle, and the green sea turtle), in accordance with available § 316(b) Guidance (EPA 1977). However, PSEG provided I&E loss estimates for fish species and blue crab with data being collected almost yearly in the 1977 through 1998 time period.

The CSA Consultants states that potential losses of T&E species were not considered in Salem's 1999 Application and, therefore they were unable to evaluate potential CWIS impacts on them (Delaware Case Study, B3-1). This statement is not true because the Salem Section 316(b) Demonstration (PSEG 1999, Volume 14, Appendix F, V.B.2.c.v.) addressed T&E species and noted that PSEG had consulted with the appropriate regulatory agencies (USNRC and NMFS) in accordance with Section 7 of the Endangered Species Act. The conclusion reached by these agencies was that Salem operations have not jeopardized and will not jeopardize the continued existence of these species or result in destruction or adverse modification of their habitat (USNRC 1980, NMFS 1991, 1992, 1993, 1999).

The CSA Consultants states that the only technology effectiveness that is certain is reductions in I&E with cooling towers. <FN 199> PSEG disagrees and believes that the estimated technology effectiveness values used in the Salem Section 316(b) Demonstration for modifications to the CWIS (i.e., Ristroph screens, and fish return) actually installed at Salem are appropriate and valid because they were based on site-specific studies and considered the effects of latent impingement mortality (PSEG 1999, Volume 16, Appendix G, Exhibit G-1-2).

PSEG does not believe the benefits evaluation for Salem (presented in the Application) was underestimated because an overall assessment of the cumulative effects for the Station was performed using multiple lines of evidence from both predictive and retrospectives studies (PSEG 1999, Volume 34, Appendix H). The studies showed that the Salem intake and other sources of stress on the relevant aquatic populations are not having an adverse environmental effect and that Salem's operations as a whole are not adversely affecting the biotic community of the Delaware Estuary.

Contrary to the CSA Consultants' general assertions on the underestimates associated with commercial and recreational benefits assessments (EBA, C1-5.4 and C1-5.6, respectively) the Salem § 316(b) Demonstration followed the CSA Consultants 1983 Cost-Benefit Guidelines and identified the benefits from changes in commercial and recreational species. The commercial values per pound of fish used by the CSA Consultants (Table B4-8) and PSEG (1999, Volume 15, Appendix F, F-13 Table 1) are very similar with the CSA Consultants' values on average being approximately four cents higher per pound. Benefits were estimated in the Salem § 316(b) Demonstration for the blue crab, which is considered the most economically important commercial invertebrate species in the mid-Atlantic (Epifano 1995). In addition, PSEG estimated recreational fishing benefits using the gains from increased fishing trips as well as additional fish per trip using both Random Utility and Travel Cost Models, as appropriate, in conducting a statistical, meta-analysis of the marginal value of the increased catch (PSEG 1999, Volume 15, Appendix F, Attachment 14).

The CSA Consultants state that benefits for forage species are underestimated because the facilities focus on losses of commercial and recreational species even when the predominant share of the losses are forage species and their full ecological role is not considered (EBA, C1-5.7). The statement is not valid for the Salem Section 316(b) Demonstration where the losses to the fisheries due to the losses of forage species were estimated using the production-forgone model for the bay anchovy, a fish species that is dominant in the I&E collections at Salem, for non-RIS forage species, and for representative forage invertebrate species (opossum shrimp and scud) that frequent the collections at Salem (PSEG 1999, Volume 14, Appendix F, Attachment F-4).

To summarize, USEPA has stated that data uncertainties lead to underestimates of Case Study benefits and cite the following factors as contributing to the underestimates: data limitations, estimated technology effectiveness, potential cumulative impacts, recreational benefits, secondary (indirect) economic impacts, commercial benefits, forage species, nonuse benefits, and incidental benefits. PSEG believes these general statements are not valid in regard to the Salem § 316(b) Demonstration (PSEG 1999) and, in fact, PSEG believes the USEPA Case Study of the Delaware Estuary has ignored site-specific information and overestimated the benefits for Salem.

Footnotes

192 See Attachment 3 for PSEG's review of USEPA's methods for valuing forage production foregone.

193 However, PSEG's estimates did not account for effects of density-dependent compensation and therefore, likely were biased high, also.

194 Furthermore, it should be noted that USEPA's implementation of the 50% rule was based on flawed estimates of recreational benefits.

195 67 Fed. Reg. 17161-17166, § VI.

196 67 Fed. Reg. 17192-17193, § IX.

197 67 Fed. Reg. 17192, § IX.

198 67 Fed. Reg. 17190, § IX.

199 67 Fed. Reg. 17140, § VI.

EPA Response

In response to PSEG's comments under B., EPA carefully considered the ESSA report and all comments by PSEG and made adjustments to its analysis of Salem's I&E data as considered appropriate for the purposes of EPA's regional analysis. Details of such changes are provided below.

Under C., EPA wishes to emphasize that the purpose of its analysis for the final rule was to develop an estimate of I&E across the entire mid-Atlantic region using available data from multiple facilities, not to conduct a detailed study of the Salem facility. EPA averaged rates across multiple facilities to develop its regional estimate, and therefore EPA believes that its I&E estimate for the mid-Atlantic is not significantly influenced by its estimates of Salem's I&E rates.

In regards to PSEG's comments on EPA's I&E methods under C.2., please see Chapter A7 of Part A of the Phase II Regional Study Document for a discussion of EPA's conclusions regarding entrainment survival.

In response to PSEG's comments under D.2. on the commercial fishing valuation methods used at proposal, please refer to the response to Comment 316bEFR.005.029 for EPA's.

In response to the comments under D.3.b, EPA notes that in the cost benefits analysis for the final Section 316b Phase II rule, EPA no longer uses a benefits transfer approach to estimate recreational fishing losses and benefits. Rather, EPA has developed a random utility model (RUM) to estimate benefits for each region. For further detail on the new methods please refer to the regional study document, Chapter A11: Estimating Benefits with a Random Utility Model (RUM). Specific results for the mid-Atlantic region are presented in Chapter D4 of Part D of the Regional Analysis Document (DCN #).

In response to Comment D.3.c., EPA believes that the National Marine Fishery Service (NMFS) has adequately corrected for sampling bias through long-established and tested survey and statistical methods. In addition, EPA does not believe that the Agency's analysis incorrectly calculates opportunity cost of time in the RUM models. EPA follows generally-accepted RUM procedures for estimating the opportunity cost of time. In regions where data were available on angler income, EPA included income for anglers who reported that they lost income by taking the fishing trip, and who reported their income. However, in all of these cases, only a minor fraction of anglers in the RUM data set provided information on household income. If anything, EPA's measure of opportunity cost of time would result in downward bias in estimates for regions where income was reported for extremely small numbers of respondents. For regions where income was estimated using median household income from the U.S. census, it is impossible to determine the direction of bias, if any, because, without collecting primary data, there is no way to compare the median income of anglers to the median income of all households in the region. EPA has followed standard, generally-accepted methods of RUM modeling. See response to comment #316bEFR.041.452 for additional details.

In response to comment D.4.a. EPA did not use the "50 percent rule of thumb" used at proposal for its final analysis.

In response to comments on replacement cost methods under D.4.c, please see the document entitled "Habitat-based Replacement Cost Method" (Docket # XX) and EPA's response to comment #316bEFR.005.035.

Under E.1., EPA stands by its statement that other environmental stressors may interact with I&E to cause further harm to aquatic organisms that are impinged and entrained. It also stands by its statement that there may also be indirect effects on birds and other organisms that feed on fish that are impinged and entrained. EPA believes that most scientists would agree with these assumptions, particularly in the absence of any data to the contrary.

In response to comments under E.1.b, please see response to Comment 316bEFR.025.015 for EPA's position on density dependence and Chapter A7 of Part A of the Phase II Regional Study Report for a discussion of EPA's conclusions regarding entrainment survival. Regarding production foregone calculations, several commenters have raised questions about the EPA calculations of production foregone, primarily with regard to the values of stage-specific fish weights. These commenters have indicated that in some cases the weight parameters used by EPA may lead to overestimation of production foregone. Some commenters have also questioned inconsistencies between values used for the same species occurring in different regions, and apparent discontinuities in weights between early life stages. Through the course of reviewing public comments on the initial case studies and later comments on the NODA, EPA has reviewed and revised many of the weight parameters. EPA relied upon numerous published records, local experts, and other resources to develop weight estimates. Following suggestions of commenters, EPA also revised some of its approximation methods, including the use of volumetric methods to improve estimates of egg weights.

Some commenters also indicated that the mathematical definition used to calculate estimates of foregone production require weights that represent the beginning and the end of each life stage. EPA acknowledges that this is true. However, such data are seldom available. In fact, the weight parameters used by EPA in its analyses include a variety of types of values, some of which are unknown because in some cases facility documents are not explicit about whether the values represent weights for the beginning, the end, or midpoints of particular stages. This issue is also complicated by the fact that some weights are determined indirectly through length-weight regression relationships. Length-at-age values found in different literature sources may also represent different parts of a lifestage.

Although such uncertainty is unfortunate, EPA believes that the practical effect on the benefits estimation is negligible. EPA disagrees with the characterizations put forth by some commenters that accuracy of these estimates are of vital importance to the benefits estimates. EPA notes that the benefits assessment does not put any direct valuation on the production foregone, per se. Production foregone estimates are used only in the context of the trophic transfer model which is used only to generate estimates of incremental foregone yield attributable to losses of forage species. The portion of the total benefits associated with the trophic transfer pathway is quite small, usually less than 2 percent of the total within any particular region. EPA believes its analysis of production foregone is reasonable. However, even if EPA's estimates of production foregone caused the trophic transfer model to overestimate foregone yield, the practical effect on the total benefits estimate would be very small.

In response to comments under E.2, EPA wishes to provide additional discussion of the basis of the pie charts that were used to summarize results. There are several “metrics” that can and are used to quantify and portray the impacts of I&E. These potential metrics (units of measurement) include numbers of organisms killed (regardless of lifestage), age 1 equivalents, mass (i.e., yield or body weight), and economic value (i.e., in monetized, dollar terms). Each potential metric has its advantages and limitations, depending on what the analysis is intended to portray. In some instances, it is possible to develop monetary estimates of impacts, as applicable in a benefit-cost analysis. In other instances, estimates of mass are needed to reflect the change in biomass harvested. There is no single right or wrong metric, and EPA does not directly compare losses across different species using its results for age 1 equivalents.

In its analysis of the 316b rule, EPA provides information using all of the above metrics as part of its assessment of the physical impacts of I&E, and of the benefits and costs of the rule. Each type of outcome metric (e.g., age 1 equivalents) is used so that readers can make their own inferences. In many instances, one type of metric is used because it feeds into the next step of the analysis (e.g., yield impacts on commercial harvests are combined with market prices per pound to develop economic measures of the impact on the commercial fishery).

Thus, in the regional analyses prepared as part of the cost benefit analysis for the final Section 316(b) Phase II rule, estimated losses of age 1 equivalent fish are reported by species/species groups in the results tables. Then they are classified as recreational, commercial, and forage species. Losses of the recreational species are valued using a random utility model, as detailed in Chapter A11 of the regional study document. Losses of the commercial species are valued using price data from the National Marine Fisheries Service, as detailed in Chapter A10 of the regional study document. Losses of forage fish are translated into foregone production among harvested species that are impinged and entrained, using an assumed trophic transfer ratio, and then translated into foregone production among these harvested species to develop an estimate of foregone yield.

The portion of forage species impacts from I&E that would have added biomass to those commercial or recreational fish landed are valued, albeit indirectly, through the direct use benefits estimated under recreational and commercial fisheries. However, the majority of forage species losses (i.e., those fish that are not converted to landed biomass) are not valued under the direct use benefits categories (i.e., for recreational or commercial fisheries), and therefore remain unvalued in EPA’s analysis of use values. Additional information on the methods EPA used to estimate forage losses is provided in the regional study document, Chapter A5. In the cost-benefits analyses, only the sums of total losses and total benefits are used in the analysis.

In terms of the pie charts for Salem (note that the same types of charts were developed for most of the other case study sites at proposal as well), EPA is simply reporting its findings, and not in any misleading manner. The use of age 1 equivalents is a suitable metric for considering and portraying the physical impact of I&E. Overall, after completing its NODA analysis, EPA found overall that 2% of the age 1 equivalent losses due to I&E would have been harvested as commercial or recreational landings. Therefore, these 2% of the impacted individual fish account for 100% of the recreational and commercial fishery benefits. Of the remaining 98% of age 1 equivalent fish (i.e., those fish not landed by recreational or commercial anglers), a large portion are forage fish. A small portion of the forage losses are indirectly reflected as increased recreational or commercial biomass, and thus this small share of the forage fish impact is captured in the direct use benefits values through the trophic transfer model. But the remaining forage fish are not captured in that analysis. In addition, any nonuse values associated with the forage fish impacts are not included. Therefore the forage losses are “undervalued” because the direct use benefits estimates pertain only to use values and only capture the small share of forage fish that end up as a contribution to the landed commercial or recreational yield This is what the pie chart communicates; and it is neither erroneous nor misleading.

Likewise, the unlanded increase in commercial and recreational fish are not assigned monetary value under the EPA’s approach to estimating direct use values. Therefore, they are “unvalued” in that context. This is what is communicated in the pie chart. The term “unvalued” does not mean that these fish truly have zero value; rather, their value is not well captured in the valuation of recreational or commercial fishery impacts. These fish have no direct use value that is captured in EPA’s analysis (although, by adding to the fishery stock, they may help sustain the increased annual yield that is harvested, and thus, indirectly, some aspect of their impact may become captured in the analysis). For further detail on EPA's response to a related comment on the fraction of unlanded and unvalued fish, please refer to comment # 316bEFR.336.009.

Under F., PSEG states that EPA incorrectly assumed that the modified Ristroph screens were first in operation in 1995, not 1997 as PSEG states. EPA regrets the error, which was inadvertent. However, EPA notes that inclusion of the 1995 did not have a significant effect on the results of EPA’s analysis, because it is based on an average across multiple years.

In response to PSEG’s comments under G., EPA notes that its analysis is concerned with 316b only, not 316a. Therefore, PSEG’s comments on potential thermal impacts have no bearing on EPA’s benefits analysis for this rule. In regards to threatened and endangered (T&E) species, EPA stands by its statement that no I&E data for these species were presented in Salem’s 1999 Permit Application. Without such data, EPA could not evaluate impacts on these species. PSEG’s statement that there are no “adverse” impacts is not pertinent to EPA’s analysis, which estimated I&E losses and the economic benefits of reducing these losses. EPA also notes that its analysis did not focus on assessing impacts on populations or communities (see responses to Comment 316bEFR.005.009 and Comment 316b.EFR.025.015. Nor did EPA describe Salem’s I&E rates as an “adverse environmental impact.” Nowhere in its analysis did EPA characterize I&E in these terms.

Finally, in response to PSEG’s comments under H., EPA notes that the referenced section of the Economic and Benefits Analysis (EBA; USEPA —821-R-02-001, Section C1-5) discusses data uncertainties and benefits estimates in general. None of this material references Salem in particular, nor is it meant to.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.09

Option: PSEG site-specific alternative

PSEG's Proposed Language for a Site-Specific Rule

January 2002

Draft Section 316(b) Regulations for Site-Specific Permit Renewal Options for Existing Sources

Part 125—Criteria and Standards for the National Pollutant Discharge Elimination System

Subpart I—Requirements Applicable to Cooling Water Intake Structures for New Facilities Under Section 316(b) of the Act (Sections 125.80--125.89 in Final Rule, 66 Fed. Reg. 65256)

Subpart II—Requirements Applicable to Cooling Water Intake Structures for Existing Facilities Under Section 316(b) of the Act (Likely Sections 125.90-125.99)

§ 125.9? Permit Renewal Options for Existing Facilities

(a) Demonstration Options. A permittee may seek to demonstrate Section 316(b) compliance for purposes of renewing an existing source's permit with a site-specific demonstration that meets the requirements of any one of the three options provided in this section: Option I, demonstration based on a prior Section 316(b) determination; Option II, demonstration based on a site-specific evaluation of the best technologies or other measures for minimizing entrainment and impingement effects; and Option III, demonstration based on a detailed assessment to determine the presence, if any, of adverse environmental impact ("AEI").

(1) Demonstration Option I. A permittee may demonstrate Section 316(b) compliance based on a prior Section 316(b) determination of best technology available ("BTA") made in conjunction with issuance of a permit when circumstances warrant continued reliance on that determination.

(A) Necessary Components of a Demonstration under Option I. The demonstration must allow the permit writer to determine that:

(i) The CWIS has previously been determined by a permitting authority to meet the statutory requirements of BTA on the basis of a Section 316(b) demonstration that was conducted in accordance with EPA's May 1, 1977 draft "Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500" ("EPA's 1977 Guidance");

(ii) There have been no material changes in the key bases for the prior Section 316(b) determination, including no material change in the operation of the facility, that would substantially increase entrainment or impingement losses;

(iii) All required technological and/or restoration measures have been implemented and appropriately maintained, and are satisfactorily achieving the levels of protection contemplated by the permitting authority in its prior Section 316(b) determination.

(iv) Data and/or information show that representative important species (“RIS”) are being maintained or that any declines in those species are not attributable to the CWIS; and

(v) The results of cost-benefit analyses of available technologies for minimizing AEI remain substantially similar to those in the prior determination.

(B) Findings Necessary for Issuance of Renewal Permit under Option 1. A permitting agency may issue a renewal permit based on a prior Section 316(b) determination if it makes, and documents in the Fact Sheet required under §124.8 to accompany a draft permit, positive findings with regard to each of the demonstration components identified in section (a)(1)(A) above, and includes in the Fact Sheet:

(i) The agency’s finding of fact that the prior Section 316(b) determination was based upon a demonstration conducted in accordance with the Agency’s 1977 Guidance;

(ii) Identification of the data and information that the permittee provided in support of the re-affirmance of the prior Section 316(b) determination;

(iii) The agency’s findings in support of the proposed determination; and

(iv) The agency’s proposed Section 316(b) determination.

(2) Demonstration Option II. A permittee may demonstrate Section 316(b) compliance based on a site-specific evaluation of the best technology to minimize entrainment and impingement effects associated with a CWIS.

(A) Necessary Components of a Demonstration under Option II. A Section 316(b) demonstration under Option II must include:

(i) A report identifying the suite of technologies potentially applicable to the CWIS and/or any planned voluntary conservation measures to be implemented in conjunction with section (c) below;

(ii) An analysis describing the bases for the selection of technologies or other voluntary conservation measures applicable to the facility;

(iii) An assessment of the issues associated with retrofitting the CWIS to include each of the applicable technologies or other voluntary conservation measures and their costs;

(iv) An assessment of the reasonably likely reductions in entrainment and impingement losses that would be achieved if the CWIS were to be retrofitted to operate with the technology and/or the offset from such losses if other voluntary conservation measures were to be implemented;

(v) A cost-benefit analysis that addresses and assesses the effects of the reductions in entrainment and impingement losses achievable through the application of each technology or other measure on life stages of the species for which an economic value can be determined utilizing readily available information, such as market values of commercial species, and recreational costs based on methods determined to be appropriate by the permitting agency and the appropriate fisheries management agencies.

(B) Standards for Supporting Documentation Under Option II. In evaluating the benefits of alternative technologies under Option II:

(i) A permittee must undertake the level of analysis that is appropriate to the situation and supported by the applicable data.

(ii) If the permitting agency determines that the applicant's demonstration does not contain sufficient information to assess the CWIS' effects on one or more RIS at the population level, due to inadequate, conflicting or unclear information about declines in any RIS, or to assess whether other technologies are potentially available for application to the CWIS, the agency may require the permittee to collect additional data, conduct additional analyses, and/or to conduct an analysis of the population level effects of the CWIS's losses as described in Section 125.9__(a)(2)(A)(i)-(iii) as appropriate.

(C) Findings Necessary for Issuance of Renewal Permit under Option II. The permitting agency may issue a permit renewal under Option II if it makes, and documents in the Fact Sheet required under §124.8 to accompany a draft permit, appropriate findings with regard to the following:

(i) The alternative technologies or voluntary conservation measures that are available for addressing the CWIS's effects;

(ii) The incremental costs and benefits of alternative technologies or other voluntary conservation measures relative to the existing CWIS's operation; and

(iii) The best technology or other measures for implementation, the costs of which are not wholly disproportionate to the benefits.

(3) Demonstration Option III. A permittee may demonstrate Section 316(b) compliance based on a detailed site-specific assessment of AEI.

(A) Necessary Components of a Demonstration under Option III. The permittee must undertake an analysis of potential AEI attributable to its CWIS, including:

(i) A detailed assessment that evaluates the effects of the existing CWIS's operation;

(ii) A demonstration of the extent to which the CWIS operation may be jeopardizing the sustainability of the populations of RIS; and

(iii) An assessment of any other appropriate factors for determining AEI.

(B) Standards for Supporting Documentation under Option III. A permittee's demonstration under

Option III should provide data and information to address the assessment factors in sections (b)(1)-(6) and should also be based on guidance to be developed by EPA, as supplemented or revised from time to time. Until such time as EPA issues final guidance, implementing Section 316(b), permittees shall follow EPA's 1977 Guidance.

(C) Findings Necessary for Issuance of Renewal Permit under Option III. The permitting agency may issue a permit renewal under Option III if it makes, and documents in the Fact Sheet required under §124.8 to accompany a draft permit, appropriate findings as follows:

(i) If the permitting agency finds that the CWIS as currently designed and operated is not causing any AEI, it shall issue the permit renewal and state its finding that the existing CWIS is deemed BTA.

(ii) If the permitting agency concludes that the assessment demonstrates that the CWIS as currently designed and operated is causing some AEI that can be addressed by appropriate technology or other measures, then it shall issue a permit renewal requiring the applicant to implement the identified measures and state its finding that implementation of the required measures is BTA.

(iii) If the permitting agency concludes that the assessment demonstrates that the CWIS as currently designed and operated is causing some AEI, but is unable to assess whether implementation of technology or other measures can satisfactorily address that AEI, then the permitting agency shall require the applicant to develop a Section 316(b) demonstration under Option II for minimizing entrainment and impingement effects.

(4) Demonstration Based on Multiple Options. In appropriate circumstances, a permittee may demonstrate Section 316(b) compliance on a site-specific basis by developing a demonstration that incorporates more than one of the three demonstration options detailed in this section.

(A) Necessary Components of a Multiple Option Demonstration. For each demonstration type included in a multiple option demonstration, the demonstration type shall include the required components of that demonstration type as specified above in sections (a)(1)(A), (a)(2)(A), and/or (a)(3)(A).

(B) Standards for Supporting Documentation under a Multiple Option Demonstration. For each demonstration type included in a multiple option demonstration, the demonstration type shall meet any applicable standards for supporting documentation as specified above in sections (a)(2)(B) and (a)(3)(B).

(C) Finding Necessary for Issuance of Renewal Permit under a Multiple Option Demonstration. A permitting agency may issue a permit renewal under a multiple option demonstration if it makes, and documents in the Fact Sheet required under §124.8 to accompany a draft permit, a finding that the applicant has satisfactorily demonstrated BTA to minimize AEI.

(b) Factors for Determining Adverse Environmental Impact in Site-Specific Demonstrations. In making determinations regarding adverse environmental impact for site-specific Section 316(b) demonstrations, applicants and permitting agencies shall evaluate the factors identified below, and shall also consider any subsequent guidance published by EPA to assist in making such demonstrations.

Section 316(b) demonstrations analyzing the potential for AEI shall be assessed, considering the magnitude of both short and long term impacts with reference to the following factors, so that operation of the CWIS does not interfere with the maintenance and typical functions of the RIS populations:

(1) Absolute damage (number of fish impinged or percentage of larvae entrained on a monthly or yearly basis);

(2) Percentage damage (% of fish or larvae in existing populations, which will be impinged or entrained, respectively);

(3) Absolute and percentage damage to any endangered species;

(4) Absolute and percentage damage to any critical aquatic organism;

(5) Absolute and percentage damage to commercially valuable and/or sport fisheries yield; or

(6) Whether the impact would endanger (jeopardize) the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (long term impact).

(c) Role of Voluntary Conservation Measures in Alternative Site-Specific Demonstrations. Under any of the alternative permit renewal options, voluntary restoration or conservation measures may be used, in conjunction with or instead of technologies, to demonstrate that an existing CWIS is not causing AEI. If a facility already has implemented such measures, the permitting agency will consider the benefits to the aquatic system in connection with any renewal determinations.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Summary of the Legal and Regulatory Bases in Support of the Site-Specific Application of Section 316(b) of the Clean Water Act Which Defines Adverse Environmental Impact

INTRODUCTION

USEPA has invited comment on whether it should adopt regulations that would implement § 316(b) <FN 1> of the Clean Water Act ("CWA") <FN 2> on a site-specific basis <FN 3> and the appropriate decision making criteria for adverse environmental impact ("AEI"). <FN 4> USEPA provides draft regulatory language for site-specific implementation of the requirements of § 316(b) <FN 5> but decided not to provide a specific definition of AEI. <FN 6> As PSEG has long urged, USEPA should continue to implement this statutory provision on a site-specific basis and evaluate AEI at a population or community level.

USEPA's site-specific sample rule is a formal process for determining the best technology available ("BTA") for minimizing adverse environmental impact ("AEI") at a particular facility, focusing on the site-specific interactions between the cooling water intake, the affected environment and the costs of implementing controls. <FN 7> As discussed in detail in the comments <FN 8> by both UWAG <FN 9> and PSEG <FN 10> on the Agency's Proposed Phase I Rule, <FN 11> a site-specific determination must be made to achieve the objectives of the Clean Water Act and AEI must be defined consistent with the community or population level approach.

The legislative history, the language of the statute, USEPA's guidance and long standing practice, and the very essence of what is being regulated -- the interaction of an intake structure with a specific aquatic environment -- all dictate that site-specific determinations are the best approach. PSEG fully supports USEPA implementing § 316(b) on a site-specific basis and requests USEPA define AEI at the community/population level.

Footnotes

1 33 U.S.C. 1326(b).

2 33 U.S.C. 1251 et seq.

3 See, e.g., 67 Fed. Reg. 17121, 17161, Col 2, Section VI.C, (April 9, 2002).

4 67 Fed. Reg. 17121, 17162, Section VI.C.

5 67 Fed. Reg. 17159-17161, Section VI.C.

6 See, e.g., proposed § 125.93.

7 67 Fed. Reg. 17159, Section VI.C.

8 Both of which PSEG incorporate by reference herein

9 Comments of the Utility Water Act Group on EPA's Proposed § 316(b) Rule for New Facilities and ICR NO. 1973.01 (November 9, 2000), Docket Control Number 4-0000. (Hereinafter “UWAG Phase I Comments”).

10 Comments on EPA's Proposed §316(b) Rule for New Facilities, Docket No. W-00-03 (November 8, 2000). Docket Control Number 4-0000. (Hereinafter “PSEG Phase I Comments”).

11 65 Fed. Reg. 49,060, Proposed § 316(b) Rule for New Facilities and ICR NO. 1973.01 (Aug. 10, 2000).

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA has chosen not to define the term "adverse environmental impact" in the final rule. Please refer to section VIII of the preamble to the final rule for more information.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

Comment ID 316bEFR.075.302

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.05

Implement a site-specific alternative

THE LEGISLATIVE HISTORY AND STATUTORY TEXT REQUIRE A SITE-SPECIFIC APPROACH TO IMPLEMENTATION OF § 316(B) AND PROVIDE THE DEFINITIONAL FOUNDATION FOR ADVERSE ENVIRONMENTAL IMPACT

The legislative history of § 316(b) is sparse but the placement of § 316(b) within the site-specific thermal discharge section of the statute indicates the intent of Congress for § 316(b) to be applied on a site-specific basis. The words of the statute, “location”, “design”, “construction”, and “capacity”, taken independently and in context, require a site-specific evaluation. These factors all support the continued implementation of §316(b) on a site-specific basis.

The substantive standard of §316(b) requires intakes to reflect "best technology available for minimizing adverse environmental impact." If there is no "adverse environmental impact," there is nothing "for minimizing," and the objective of BTA is satisfied.

A. The Statutory Language of § 316(b) Supports a Site-Specific Approach

The plain language of § 316(b) requires a site-specific approach. Section 316(b) requires “that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” <FN 12> Each of the terms “location”, “design”, “construction”, “capacity”, and “adverse environmental impact” are factors specific to the facility, the local environment, or the affected ecosystem. This is especially so with respect to an existing facility.

With most of the terms within this single sentence individually requiring a site-specific evaluation, there is no reasonable way to interpret all words of this sentence collectively to require anything but a site-specific evaluation. <FN 13> Because the plain language and the legislative intent are clear, the EPA cannot construe the requirement otherwise. <FN 14> The clear meaning of § 316(b) requires evaluations be performed on a site-specific basis.

Furthermore, adverse environmental impact refers to those environmental factors that determine the health of aquatic populations and ecosystems. Any environmental impact, whether adverse or not, can only be evaluated within the given ecosystem being affected. As discussed by Dr. Hartman <FN 15> ecosystems are distinct and unique, even ecosystems within the same waterbody. For example, the ecosystem of the Mississippi River is very different in Minnesota than the ecosystem of the Mississippi River in Louisiana.

B. The Legislative History of § 316(b) Indicates Congress Intended § 316(b) be Implemented on a Site-Specific Basis

Review of the legislative history of § 316(b) confirms the intent of the statutory language. Section 316 <FN 16> was incorporated in the CWA following a long and detailed debate to define the approach to control discharges of pollutants. The House bill <FN 17> and the Senate bill <FN 18> were forwarded to the Conference Committee containing disparate provisions for the control of thermal effluents under § 316. The Conference Report <FN 19> forged a compromise on thermal discharges between the Senate and House bills by retaining heat within the definition of a pollutant while providing a case-by-case (i.e., site-specific) variance provision if the facility could demonstrate that the thermal limits were “more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made.” <FN 20> Thus the intent of Congress, as accepted in the Conference Report, was to retain heat as a pollutant but allow the site-specific variance provision, acknowledging consideration of the technological, environmental, and economic conditions at a particular site. The statutory focus of § 316 clearly looks to the “population” of aquatic organisms in the specific “body of water into which the discharge is made.” <FN 21> Any impact must be evaluated at this population level.

Although the legislative history of § 316(b) is sparse, Anderson <FN 22> shows that Congress clearly intended § 316(b) to be evaluated on a case-by-case basis, based on its incorporation within § 316 for which there is extensive legislative history recognizing that any effect on the environment is based on the unique characteristics at a particular site. Much of the thermal discharge discussion, especially in the House, focused on the evaluation of the discharge of heat from steam electric plants and concluded that the thermal discharges should be controlled on a site specific basis. Section 316(b) was incorporated while the bills were in the Conference Committee and Congress found it appropriate to address intake structures in the same section they addressed thermal discharges, not elsewhere in the Clean Water Act. Therefore, in 1972, the record indicates Congress understood it was preferable to address intakes at steam electric power plants on a case-by-case basis and address impacts at the population level, intending §316 to be thus applied.

Footnotes

12 33 U.S.C. 1326(b).

13 Anderson, supra provides additional information.

14 Chevron v. Natural Resources Defense Council, 467 U.S. 837 (1984). UWAG Phase II comments, Appendix 20.

15 UWAG Phase II Comments, Appendix 20

16 33 U.S.C. 1326.

17 H.R. 11,896, 92nd Cong. (1971).

18 S. 2770, 92nd Cong. (1971).

19 Senate-House Conference Committee Report on S. 2770, House Report 92-1465, Senate Report 92-1236, Sept. 28, 1972 at 316, reprinted by Congressional Information Service.

20 33 U.S.C. 1326(a), reprinted in Legislative History at 63.

21 Id.

22 W. Anderson, II & E. Gotting, “Taken in Over Intake Structures? Section 316(b) of the Clean Water Act”, 26 Colum. J. Envtl. L. 1 (2001).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

The Substantive Statutory Standard Under § 316(b) Requires "Adverse Environmental Impact" be Defined

The substantive standard of § 316(b) requires intakes to reflect "best technology available for minimizing adverse environmental impact." Unlike the technological standards of §§ 301 and 306, which require point sources to install technology (e.g., BAT) without regard to the specific benefit to the environment to be achieved, the plain language of § 316(b) interposes an environmental-effects standard to determine whether an intake structure reflects BTA. USEPA recently stated in the context of its current rulemaking that:

"while the technical focus of an effluent guideline regulation is on the effectiveness of various technologies in treating wastewater discharges, [Section] 316(b) states that the location, design, construction, and capacity of cooling water intake structures shall reflect the best technology available "for minimizing adverse environmental impact . . . [E]nvironmental impacts caused by cooling water intake structures are highly site specific." <FN 23>

If there is no "adverse environmental impact," then there is nothing "for minimizing," and the objective of BTA is satisfied. As the Agency stated to the court, "adverse environmental impact" is an important legal concept that needs to be addressed in the § 316(b) regulations. <FN 24> A basis for USEPA's requesting an extension to the court order mandating promulgation of these regulations was to provide a benchmark for important concepts such as "adverse environmental impact." <FN 25> USEPA should follow through on its prior intention and include a biologically meaningful definition of AEI in the Phase II Rule.

The words of the statute, which require a determination that there is an "adverse" effect on the "environment" before further actions are required to achieve BTA, must be given their full import. <FN 26> USEPA cannot eliminate these words from the statute by presuming any intake causes an adverse effect. If USEPA were to do so, it would completely ignore the mandate of Congress. <FN 27>

Footnotes

23 Cronin v. Browner, No. 93 Civ. 0314 (AGS) (S.D.N.Y.) (declaration of J. Charles Fox in support of EPA's Motion to Modify Consent Decree at 7 (dated July 29, 1999)).

24 Cronin v. Browner, No. 93 Civ. 0314 (AGS) (S.D.N.Y.) (Opinion and Order filed March 28, 2000, at 0376) (referencing declaration of J. Charles Fox in support of EPA's Motion to Modify Consent Decree at 38.)

25 Cronin v. Browner, No. 93 Civ. 0314 (AGS) (S.D.N.Y.) (Opinion and Order filed March 28, 2000, at 0374) (referencing declaration of J. Charles Fox in support of EPA's Motion to Modify Consent Decree at 38.)

26 The first inquiry is" `whether Congress has directly spoken to the precise question at issue.' " FDA v. Brown & Williamson Tobacco Corp., 529 U.S. 120, 132 (2000). (quoting Chevron U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 842 (1984)). If, as here, the answer is affirmative, "the inquiry is at an end; the court `must give effect to the

unambiguously expressed intent of Congress.' " Id. (quoting Chevron , 467 U.S. at 842-43).

27 “An agency's action is "normally " considered arbitrary and capricious when it: has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise.” (Citing Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983)). Midwater Trawlers Cooperative, et al. v. Department of Commerce, et al., CV-96-01808-BJR, filed March 5, 2002 at 3630.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

The Overall Statutory Scheme Of The CWA Supports PSEG's Position That AEI Must Be Determined At A Biologically Relevant Unit

When the term adverse environmental impact is viewed in the context of the objectives and goals of the CWA, AEI must refer to those environmental factors that determine the health of aquatic populations and ecosystems. <FN 28> Courts have looked to the objective of the CWA, which is "to restore and maintain the chemical, physical and biological integrity of the Nation's waters," when construing its other provisions. <FN 29> Specifically, courts have noted that Congress used the term "integrity" to "convey a concept that refers to a condition in which the natural structure and function of ecosystems is maintained." <FN 30> In other words, "any change induced by man which overtaxes the ability of nature to restore conditions to [a] "natural' or "original' [state] is an unacceptable perturbation." <FN 31> Congress' general concern under the CWA was to protect and maintain the structure and function of ecosystems themselves. To meet the intent of Congress, USEPA must define AEI based on the impacts to aquatic populations, communities, or ecosystems, unless species of special concern (i.e., threatened or endangered) are affected.

Footnotes

28 Anderson, supra, at 39. See also, Maryland Power Plants, supra.

29 FWPCA, 101, reprinted in Legislative History at 4 (emphasis added). See, e.g., United States v. Riverside Bayview Homes, Inc., 474 U.S. 121, 131-35 (citing to §101(a) as supporting Corps of Engineer regulations that governed discharges of dredged and fill material into wetlands).

30 See Riverside Bayview Homes, 474 U.S. at 132-33 (citing the House Report language and concluding Congress intended to focus on protection of aquatic ecosystems).

31 H.R. Rep. No. 92-911 (1972), reprinted in Legislative History, at 764.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.05

Implement a site-specific alternative

REGULATORY GUIDANCE PROVIDED BY USEPA HAS CONSISTENTLY REQUIRED A SITE-SPECIFIC APPROACH FOR IMPLEMENTING § 316(B) AND PROVIDED A CONSISTENT DEFINITION OF ADVERSE ENVIRONMENTAL IMPACT

For almost 30 years, USEPA has interpreted § 316(b) of the CWA on a site-specific basis; in its regulations, development documents, and guidance documents.

Additionally, USEPA has generally interpreted AEI to be addressed on a community or population level and that long-standing interpretation should not be changed without a reasoned basis. These interpretations have consistently required the application of § 316(b) on a site-specific basis. In December 1973, little more than one year after the FWPCA's enactment, USEPA proposed regulations to implement the requirements of § 316(b). <FN 32> The proposal languished for several years while USEPA focused on other regulations under the FWPCA, and the final rule was not published until 1976. <FN 33> The regulations were set-aside on procedural grounds, <FN 34> but the court's decision was unrelated to the substantive content of the regulations; thus they may appropriately be cited as indicative of USEPA's contemporaneous interpretation of congressional intent. Both the proposed and final versions referenced and relied upon Development Documents discussed below, which describe factors and design alternatives to consider when making a § 316(b) determination, considerations that are applicable only to a specific site. These regulations are an important source of information about the definition of "adverse environmental impact" and how permitting authorities should proceed in determining whether such impacts are present.

Early USEPA guidance recognied that adverse environmental impact should be evaluated at the population-level when making a § 316(b) determination. <FN 35> In 1975 USEPA provided the following guidance as to the meaning of the term "adverse environmental impact":

Adverse environmental impacts occur when the ecological function of the organism(s) of concern is impaired or reduced to a level which precludes maintenance of existing populations; a reduction in optimum sustained yield to sport and/or commercial fisheries results; threatened or endangered species of aquatic life are directly or indirectly involved; the magnitude of the existing or proposed damage constitutes an unmitigable loss to the aquatic system. <FN 36>

USEPA's 1976 316(b) Development Document also established a community or population-level focus of adverse environmental impact determinations:

Serious concerns are with population effects that reduce harvestable cooling water intake structures may interfere with the maintenance or establishment of optimum yields to sport or commercial fish and shellfish, decrease populations of endangered organisms, and seriously disrupt sensitive ecosystems. [sic] <FN 37>

USEPA's 1977 Draft § 316(b) Guidance began by explaining "[R]egulatory agencies should clearly recognize that some level of intake damage can be acceptable if that damage represents a minimization of environmental impact" <FN 38> and also provided that the magnitude of an adverse impact should be estimated, considering both short-term and long-term impact, with reference factors that go primarily to the health or sustainability of the population. <FN 39>

These documents require site-specific analyses and an evaluation of community or population level AEI to demonstrate compliance with § 316(b). In the Phase II Rule, USEPA relies on its guidance documents calling for § 316(b) decisions to be made on a site-specific basis. <FN 40>

In 1998, USEPA stated to the Office of Management and Budget ("OMB") that it was the magnitude of impingement and entrainment effects which were critical in determining whether an intake was having an adverse environmental impact, and that the existence of such impact must be determined on a case–by–case basis. <FN 41> USEPA further stated to OMB that the determination of adverse ecological effects under § 316(b) should be evaluated in accordance with its 1998 Guidelines for Assessing Ecological Risk. <FN 42> USEPA's Ecological Risk Guidelines rely on the development of biologically relevant endpoints, e.g., populations or communities. <FN 43>

USEPA's long-standing population-level interpretation of adverse environmental impact and the requirement to evaluate intake structures on a site-specific basis should not be changed without a reasoned basis. There is no basis in the record for deviating from the approach required by the legislative history, the statutory language of § 316(b), and the extensive guidance promulgated by USEPA.

Footnotes

32 The judicial practice of according controlling significance to agency interpretations of statutes is especially pronounced when the administrative interpretation was adopted shortly after the statute's enactment and has been consistently maintained ever since. Zemel v. Rusk, 381 U.S. 1, 11 (1965); International Brotherhood of Teamsters v. Daniel, 439 U.S. 551, 556 n. 20 (1979).

33 See 41 Fed. Reg. 17,387 (1976).

34 Appalachian Power Co., et al. v. Train, 566 F.2d 451 (4th Cir. 1977).

35 With the exception of Threatened and Endangered species

36 U.S. Environmental Protection Agency, Guidelines to Determine Best Available Technology of the Location, Design, Construction, and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact Section 316(b) P.L. 92-500, at 52 (Dec. 1975), see also discussion at page 57.

37 "U.S. Environmental Protection Agency, Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact", at 5 (1976) [hereinafter 1976 Development Document].

38 U.S. Environmental Protection Agency, "Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500" at 3 ("1977 Draft 316(b) Guidance"), May 1, 1977.

39 Id. at 15. See, e.g., factors such as: percentage damage (percentage of fish or larvae in existing populations which will be impinged or entrained, respectively); absolute and percentage damage to any endangered species; absolute and percentage damage to commercially valuable and/or sport fisheries yield; or whether the impact would endanger (jeopardize) the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (long term impact).

40 67 Fed. Reg. 17161, Section VI.C. But, cf. 67 Fed. Reg. 17162, Section VI.C, Col. 3.

41 EPA (Part A of the Supporting Statement, Information Collection Request, Industry Screening Questionnaire: Phase I Cooling Water Intake Structures, EPA ICR Number 1828-02 October 1998) at 13 - 14.

42 USEPA, "Guidelines for Ecological Risk Assessment", EPA/630/R-95/002F, 63 Fed. Reg. 26,846 (May 14, 1998).

43 EPA (Part A of the Supporting Statement, Information Collection Request, Industry Screening Questionnaire: Phase I Cooling Water Intake Structures, EPA ICR Number 1828-02 October 1998) at 15.

EPA Response

EPA disagrees. The Agency is not bound by its previous implementation of section 316(b). See also the preamble and supporting documents.

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Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.05

Implement a site-specific alternative

THE CONSISTENT AND LONG-STANDING INTERPRETATION OF THE STATUTE BY USEPA AND THE COURTS SHOULD BE CONTINUED

USEPA has been interpreting § 316(b) of the CWA for almost 30 years in permitting proceedings either directly or through the delegated state permitting agencies with USEPA oversight and by the courts. The principles of deference to agency interpretations of statutes have important implications for a number of issues presented in the implementation of § 316 of the CWA. USEPA has not provided a reasoned basis for departing from their long-standing interpretation and thus should promulgate implementing regulations consistent with this interpretation.

A. Implementation of the Requirements of § 316(b) for Almost 30 Years has been on a Site-Specific Basis, Interpreting AEI on a Community or Population Level

USEPA has developed consistent and long-standing interpretations of a number of key provisions in § 316, through their own actions and through approval of state permitting agency actions. USEPA's interpretations of these provisions are consistent with the terms of the statute and have been conducted on a site-specific basis. USEPA permitting decisions have also interpreted AEI on a community or population level, not on an individual organism level. Accordingly, these interpretations are controlling and must be followed in applying § 316(b).

USEPA permitting decisions have interpreted AEI on a community or population level, not on an individual organism level. For example, in the Seabrook I case, the USEPA Administrator concluded that the combined intake entrainment mortality of 100 billion clam larvae, an estimated 4.6 percent of the population, would have "an insignificant effect on adult [clam] populations." <FN 44> In the subsequent Seabrook II decision following remand, the USEPA Administrator concluded that although "fish eggs and larvae may be expected to be subject to intake and thermal entrainment in substantial numbers," for most species "the impact of either intake entrainment or thermal discharge will be insignificant." <FN 45> As the First Circuit stated in affirmation of the USEPA Administrator's decision, "though the intake would act as an additional large predator, there are other more dangerous threats in the natural environment, which fish are able to survive because they are highly fecund." <FN 46> In discussions regarding particular species, the court strongly implied that the critical question is whether the intake "will affect the ability of the [species] to propagate and survive." <FN 47>

In a decision on a NPDES permit for Carolina Power and Light's Brunswick Station, USEPA confirmed that the first inquiry in a § 316(b) decision is whether entrainment and impingement create adverse impact. <FN 48> The factors to be considered were reiterated in the USEPA Region I Administrator's Decsion on Pilgrim Station. <FN 49> A population-based or community-based standard of adverse environmental impact is also evident in USEPA's decision in Goudey <FN 50> where USEPA was satisfied, for § 316(b) purposes, by a showing that the intake structure "has not caused any adverse effects upon a balanced indigenous fish community." <FN 51> In its Crystal

River determination, USEPA stressed that relevant adverse impact to the macroinvertebrates living in Crystal Bay was impact to communities and not individuals. <FN 52> In these decisions, USEPA applied the "adverse environmental impact" standard in a reasoned manner that indicates it does not believe damage to individuals is the proper test but rather whether these losses have impacted the relevant populations, communities, or ecosystems. Biological communities and populations are unique to a specific site and these interpretations of individual permit requirements are clearly site-specific. Agencies have also interpreted the “adverse environmental impact” standard of § 316(b) as requiring a permitting authority to carry the burden <FN 53> of demonstrating significant harm to biological communities and populations as opposed to individual losses.

Agencies have interpreted § 316 as authorizing voluntary use by permittees of conservation and mitigation measures, whose biological benefits must be considered by the permitting agency in determining whether and to what extent regulatory controls, including intake technology controls, are needed. <FN 54> These conservation and mitigation measures are specific to the permitted facility.

Agencies have also interpreted § 316(b)’s “best technology available” (“BTA”) provision to require permitting agencies to determine BTA on a case–by–case basis, taking into account the specific environmental and economic circumstances of the source in question and to evaluate intake technologies in terms of their feasibility and appropriateness for the source in question. <FN 55>

USEPA is proposing to “set performance standards for minimizing adverse environmental impact based on a relatively easy to measure and certain metric-reduction of impingement mortality and entrainment.” <FN 56> EPA has chosen this approach “to provide certainty about permitting requirements and to streamline and speed the issuance of permits.” <FN 57> In Cronin v. Browner, the court noted the USEPA’s position that “[T]he public has a significant interest in ensuring that the government does not promulgate rules via a process that emphasizes expediency over quality and accuracy.” <FN 58> USEPA rightly argued against expedience as the goal for the rulemaking process; it is inconceivable then that this could be an appropriate goal for implementation of the Final Rule. The court also noted that “[I]n this case, it is important that the regulations have a sound, scientific basis, comport with the requirements of the CWA, are compatible with other regulatory programs, and further USEPA’s broad policy goals of protecting human health and the environment.” <FN 59> USEPA is proposing to regulate intakes without a scientifically founded definition of AEI, in direct conflict with the Congressional mandate and EPA’s own statements to the court. Regulations impacting the regulated community on the order of billions of dollars should be based on sound science, not administrative expediency or convenience of the permitting agency.

Thus USEPA has consistently espoused that a population, community, or ecosystem-level assessment of the impacts is required to determine if they are “adverse”. Impacts, and any “minimization” required, can only be considered at a specific site. These have been the standards under which compliance with § 316(b) has been judged for almost 30 years. There is nothing in the record, which justifies a radical departure from this standard.

B. EPA Must Provide a Reasoned Basis for the Significant Departure from Its Interpretation of §316(b).

USEPA has invited comment on the framework proposed for implementing §316(b) in these regulations. <FN 60> Although the proposed regulations allow for site-specific evaluations as an alternative to the technology based standards, the proposal for technology based standards and the premise that all impingement and entrainment cause adverse environmental impact are significant departures from almost 30 years of USEPA policy and practical permit decision-making.

Regulatory agencies must follow judicially established administrative law requirements of decisional consistency and stare decisis. “Patently inconsistent application of agency standards to similar situations lacks rationality and is arbitrary.” <FN 61> The requirements of decisional consistency and stare decisis apply to decisions of administrative agencies as a part of the general administrative law requirement of “reasoned decision-making,” under which an agency must provide a clear and persuasive rationale and substantial support in the administrative record for change from a prior decision. <FN 62> A change in position must be justified by a “reasoned analysis” that explicitly addresses prior precedent and demonstrates a sufficient basis in the facts of record for the change. <FN 63>

Absent a clear, factually well-supported justification for changing course, an agency’s decision to depart from its prior decisions will be invalidated by the courts. <FN 64> In the specific context of § 316 of the Clean Water Act (“CWA”), the requirement of decisional consistency has been recognized in several permitting decisions. For example, USEPA has found that an applicant is entitled to renewal of a Section 316(a) variance on a showing that (1) plant operating conditions and load factors are unchanged and are expected to remain so for the life of the new permit; (2) there are no changes to plant discharges or other discharges in the vicinity; and (3) there are no material changes in the biotic community likely to be affected. <FN 65> Changes that would be considered significant include “increased discharge volumes, increased thermal loading, change to design conditions and change to stream designation or documentation.” <FN 66> USEPA Region V has also recognized that §316(a) variances should be renewed in the absence of any material change. <FN 67>

USEPA has acknowledged that the language of § 316(b) can be interpreted to allow for site-specific decision-making but has determined that the language of § 316(b) also can be interpreted to allow a technology-based approach. <FN 68> Although USEPA uses the Chevron analysis to justify its departure from 30 years of decisional consistency, the Agency does not provide a reasoned basis for this changed interpretation as required by previous judicial decisions. <FN 69> USEPA claims that absolute deference to its current interpretation is required because the Congressional mandate is ambiguous and USEPA provides judicial citations purportedly supporting that claim. <FN 70> Even if the Congressional mandate were determined to be ambiguous, the judicial citations provided by USEPA demonstrate just the opposite ¾ that agency deference is only appropriate where there is a final determination on the merits of the changed position. <FN 71> Because there is no final determination of the changed position, the proposed rulemaking is more akin to a policy statement and may be entitled to respect <FN 72> but does not rise to a level requiring deference.

Footnotes

44 In re Public Service Co. of New Hampshire, 10 Envtl. Rep. Cas. (BNA) 1257, 1272 (EPA June 7, 1977) [hereinafter Seabrook I].

45 In re Public Service Company of New Hampshire, Permit Application No. NH 0020338, No. 76-7 at 13 (August 4, 1978) [hereinafter Seabrook II].

46 Seacoast Anti-Pollution League v. Costle, 597 F.2d 306, 309 (1st Cir. 1979).

47 Seacoast Anti-Pollution League v. Costle, 597 F.2d 306, 310 (1st Cir. 1979).

48 In the Matter of Carolina Power and Light Co., NPDES Permit No. NC0007064, slip op. at 28, 44-45 (Nov. 7, 1977)

49 In re Pilgrim Nuclear Station Units 1 & 2 (March 11, 1977)(Boston Edison), EPA Region I (NPDES Permit Nos. MA0003557 and MA0025135).

50 Goudey and Hickling (NYSEG), EPA Region II (Determination Approving Intake Structures), February 12, 1982.

51 Goudey and Hickling (NYSEG), EPA Region II (Determination Approving Intake Structures), February 12, 1982, at 2.

52 Crystal River (Florida Power Corp. ("Florida Power")), EPA (NPDES Permit No. FL0000159 Findings and Determinations) ("Crystal River"), December 2, 1986, at 4-6.

53 In re Central Hudson Gas and Electric Corporation, Decision of the General Counsel No. 63, EPA (July 29, 1977) at 26. Section 316(b)'s allocation of the burden of proof to the permitting agency is further confirmed by §556(d) of the Administrative Procedure Act ("APA"), which provides that "[e]xcept as otherwise provided by statute, the proponent of a rule or order has the burden of proof." Section 556(d) governs NPDES determinations by EPA. See U.S. Steel Corp. v. Train, 556 F.2d 822, 834 (7th Cir. 1977).

54 For additional information see, T. J. Schoenbaum and R. B. Stewart, "The Role of Mitigation and Conservation Measures in Achieving Compliance with Regulatory Statutes: Lessons from Section 316 of the Clean Water Act", 8 N.Y.U. Envtl. L.J. 237 (2000). See, e.g., Fish Stocking Programs see, e.g., Crystal River (Florida Power), USEPA Region IV (Findings and Determinations re: NPDES Permit No. FL0000159), Sept. 1, 1988, at 7-8; John Sevier (Tennessee Valley Authority ("TVA")), USEPA (NPDES Permit No. TN0005436), 1986; Pittsburg (PG&E), Ca. RWQCB (NPDES Permit No. CA0004880), April 18, 1990; Hudson River Settlement Agreement (1980) and Hudson River Settlement Agreement (1993) (also included donation of public park and research funding); Chalk Point (PEPCo), MDE (NPDES Permit No. MD0002658B Modified Permit), April 29, 1991; Contra Costa (PG&E), USFWS (Letter to Ca. RWQCB), April 13, 1993; Roseton (In the Matter of Central Hudson Gas & Electric et al., Docket No. C/II - WP-77- 01 Appendix A), April 22, 1981; Fish Ladders see, e.g., Salem (PSEG Nuclear)NJPDES Permit No. NJ0005622), August 1, 2001; Wetlands see, e.g., SONGS (So. Ca. Edison, San Diego Gas & Elec.), Ca. MRC (Final Report to the Coastal Comm'n), Aug. 1989; Goudey (NYSEG), NYDEC, Bureaus of Fisheries and Environmental Protection (Region II Comments on SPDES Permit No. NY0003875), Aug. 23, 1983 (also included development of fishing access at another site); Salem (PSEG Nuclear)NJPDES Permit No. NJ0005622), August 1, 2001; Artificial Reefs see, e.g., SONGS (So. Ca. Edison, San Diego Gas & Elec.), Ca. MRC (Final Report to the Coastal Comm'n), Docket No. 89012, Aug. 1989; Goudey (NYSEG), NYDEC, Bureaus of Fisheries and Environmental Protection (Region II Comments on SPDES Permit No. NY0003875), Aug. 23, 1983; Salem (PSEG Nuclear)NJPDES Permit No. NJ0005622), August 1, 2001.

55 See, e.g., In re Public Service Company of New Hampshire, Permit Application No. NH 0020338, No. 76-7 at 13 (August 4, 1978) ("each Section 316 proceeding, by its very nature, is necessarily unique."); Goudey and Hickling (NYSEG), EPA Region II (Determination Approving Intake Structures), February 12, 1982, at 2. (where EPA was satisfied, for §316(b) purposes, by a showing that the intake structure "has not caused any adverse effects upon a balanced indigenous fish community."); Crystal River (Florida Power), USEPA Region IV (Findings and Determinations re: NPDES Permit No. FL0000159), Sept. 1, 1988, at 8; Gerald Gentleman (NPPD), NDEC (Stipulation amending NPDES Permit No. NE0111546), Nov. 1, 1981and (Letter from NDEC to NPPD confirming BTA), April 18, 1977; Dunkirk (Niagara Mohawk Power Corp. ("NiMo")), NYDEC (Letter and summary of meeting re: BTA and Intake Screen Modifications), June 6, 1996. See also W. Anderson, II & E. Gotting, "Taken in Over Intake Structures? Section 316(b) of the Clean Water Act", 26 Colum. J. Envtl. L. 1 (2001).

56 67 Fed. Reg. 17141, Section VI.A.

57 Id.

58 Cronin v. Browner, No. 93 Civ. 0314, 0373 (AGS) (S.D.N.Y., filed March 28, 2000), citing Def.'s Mem. At 21-23.

59 Cronin v. Browner, No. 93 Civ. 0314, 0373 (AGS) (S.D.N.Y., filed March 28, 2000), citing Def.'s Mem. At 22.

60 See, e.g., 67 Fed. Reg. 17121, 17161, Col 2 (April 9, 2002).

61 Contractors Transport Corp. v. United States, 537 F.2d 1160 (4th Cir. 1976); See also, generally the discussion in Charles H. Koch, Jr., Administrative Law and Practice § 5.67[4] (2nd ed. 1997).

62 Motor Vehicle Manufacturers Ass'n v. State Farm Mutual Automobiles Ins. Co., 463 U.S. 29, 57 (1983); Greater Boston Television Corp. v. FCC, 444 F.2d 841, 852 (D.C. Cir. 1970), cert. denied, 403 U.S. 923 (1971). See also, Burlington Truck Lines v. United States, 371 U.S. 156, 167-68 (1962).

63 Greater Boston Television, 444 F.2d at 852.

64 See, e.g., Cleveland Construction, Inc. v. NLRB, 44 F.3d 1010, 1015-1016 (D.C. Cir. 1995) (The court chastened the NLRB for unjustified deviation from NLRB precedent assigning single-site representation in similar situations, and vacated the NLRB's decision for inconsistency.); Professional Airways Sys. Specialists v. Federal Labor Relations Auth., 809 F.2d 855, 859 (D.C. Cir. 1987) (The court set aside a refusal by the FLRA to award employees back pay, finding that the FLRA had departed from prior FLRA precedent in its decision); Grace Petroleum Corp. v. FERC, 815 F.2d 589, 593-594 (10th Cir. 1987) (The Court of Appeals reversed a FERC ruling, on the grounds that FERC failed to follow its own precedent and had failed to provide an adequate justification for the change).

65 Cheswick (Duquesne Light Co. ("DLCo")), Commonwealth of Pennsylvania Department of Environmental Resources ("PADER") (Letter re: NPDES Permit No. PA0001627 Permitting Decision), May 4, 1990; United States Environmental Protection Agency ("USEPA") Region IV (Letter re: 316 Guidance for Permit Reissuance addressed to Tennessee Office of Water Management), Aug. 11, 1988; New Castle (Penn Power Co.), PADER (Letter re: 316(a) variance renewal, Permit No. PA0005061), date unknown; USEPA (Office of General Counsel ("OGC") Opinion on Section 316), Feb. 24, 1982. See also Brunner Island (PP&L), USEPA Region III (Letter re: extension of NPDES Permit), Oct. 4, 1990.

66 Cheswick (DLCo), PADER, (Letter re: NPDES Permit No. PA0001627 permitting decision), May 4, 1990.

67 Black Dog (Northern States Power Co.), USEPA Region V (Letter to Timothy Scherkenbach re: NPDES Permit Requirements), Aug. 9, 1989; USEPA Region V (Letter from Director Water Div. to Chief Surface Water Quality Div., Michigan DNR, re: 316 (a) and (b) deficiencies in Michigan's steam electric plants), Aug. 9, 1969.

68 EPA Response to Public Comment: CWA Section 316(b) New Facility Rule--Final, January 2, 2002, Comment ID 316bNFR.068.007, page 1183-1188.

69 Motor Vehicle Manufacturers Ass'n v. State Farm Mutual Automobiles Ins. Co., 463 U.S. 29, 57 (1983); see also, Midwater Trawlers Cooperative, et al. v. Department of Commerce, et al., CV-96-01808-BJR, filed March 5, 2002 at 3630.

70 Smiley v. Citibank, N.A., 517 U.S. 735, 742 (1996); Christensen v. Harris County, 529 U.S. 576, 587 (2000); Piney Run v. Commrs of Carroll
County, ___F.3d___ (4th Cir 2001) 2001 WL 1193211.

71 Smiley v. Citibank, N.A., 517 U.S. 735, 742 (1996) (The court's statement that "[W]e do not think that anything which can accurately be described as a change of official agency position has occurred here" does not validate deference to the agency); Christensen v. Harris County, 529 U.S. 576, 587 (2000) [The court was reviewing "an interpretation contained in an opinion letter, not one arrived at after, for example, a formal adjudication or notice-and-comment rulemaking" (which would require greater deference); Piney Run v. Commrs of Carroll County, 268 F.3d 255 (4th Cir 2001) (Reviewing a regulation finalized after notice and comment).

72 See, e.g., Skidmore v. Swift & Co., 323 U.S. 134, 140 (1944).

EPA Response

EPA disagrees. The Agency is not bound by its previous implementation of section 316(b). See also the preamble and supporting documents.

Comment ID 316bEFR.075.307

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 2.04.05

Implement a site-specific alternative

THE ESTABLISHED AND LONG-STANDING INTERPRETATIONS OF SECTION 316 OF THE CLEAN WATER ACT BY USEPA ARE CONSISTENT WITH THE ACT, REASONABLE, AND ACCORDINGLY ARE CONTROLLING

Section 316(b) has been successfully implemented on a site-specific basis for almost 30 years, using the population or community metric for determining AEI. The legislative history of § 316(b) indicates the intent of Congress for § 316(b) to be applied on a site-specific basis and that impacts be evaluated on a “population” level. The statutory words, “location”, “design”, “construction”, and “capacity”, require a site-specific evaluation. The regulations, development documents, and regulatory guidance provided by USEPA have required a site-specific approach for implementation of § 316(b) and that a population, community, or ecosystem-level assessment of the impacts is required to determine if they are “adverse”. Permitting decisions, many of which have been upheld by courts, have applied the requirements of § 316(b) on these bases. The principle of stare decisis requires continuity of an interpretation absent a compelling and reasoned basis for a change. These factors all support the continued implementation of § 316(b) on a site-specific basis and a definition of AEI that requires a population, community, or ecosystem-level assessment when determining the existence of any adverse environmental impacts. PSEG supports this approach.

EPA Response

EPA disagrees. The Agency is not bound by its previous implementation of section 316(b). See also the preamble and supporting documents.

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Attachment 3

Review of EPA's Biological Loss Estimates for Salem Generating Station

presented in

U.S. EPA Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA-821-R-02-002. February 2002)

Delaware Estuary Case Study

Prepared for PSEG Services Corporation, Newark, NJ

Prepared by Douglas G. Heimbuch, Ph.D., PBS&J, Beltsville, MD

3/05/02

I. Introduction

In its report entitled "Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule", (EPA-821-R-02-002. February 2002)" ("CSA" report), United States Environmental Protection Agency ("EPA" or the "Agency") claimed (Table B4-16, Chapter B4) that the average annual economic losses due to impingement and entrainment ("I&E") at PSEG Nuclear LLC's ("PSEG") Salem Generating Station ("Salem") were between $13.1 million and $27.1 million. EPA based this claim on its estimates of the yield lost to the commercial fishery (pounds of fish), reduction in recreational catch (numbers of fish), production foregone, and its estimates of the economic value (dollars per pound or per fish) of commercial landings, recreational catch and production foregone. EPA attributed over 98% of its estimate of economic losses to the effects of entrainment.

This report presents a review of the methods EPA used to estimate yield lost to fisheries (in pounds of fish and in numbers of fish), and production foregone due to entrainment at Salem. The purpose of the review is to identify methods and data selected by EPA that had the potential of producing estimates of losses at Salem that were biased high. This report also compares EPA's estimates of these quantities to corresponding estimates that were presented in PSEG's 1999 Salem Permit Renewal Application ("1999 Application"), or if not presented in the Application that are consistent with methods used in the Application.

A. Overview of EPA's Methods and Estimates

The estimates of economic losses due to entrainment that are presented in CSA Table B4-16 are the sum of estimates of economic losses to the commercial fishery, the recreational fishery, and estimates of economic losses attributable to the loss of non-use values and to lost forage (see CSA Table B4-15). <FN 1> EPA's estimates of the economic losses to the commercial fishery are based on its estimates of the yield lost to the commercial fishery (in pounds) and the commercial value of a pound of fish (see CSA Table B4-9). EPA's estimates of the economic losses to the recreational fishery are based on its estimates of the reduction in recreational catch and the recreational value of the catch of an additional fish (see CSA Table B4-7). EPA's estimates of the loss of non-use values are based on its estimates of the economic losses to the recreational fishery (i.e., EPA assumed nonuse value was equal to 50% of recreational value), and hence on its estimates of the reduction in recreational catch. EPA's estimates of the economic losses attributable to lost forage are based on its estimates of production foregone (in pounds) and the economic value of a pound of production (see CSA Table B4-12 and B4-14).

In summary, the biological parameters that formed the basis of EPA's economic assessment for Salem were its estimates of yield lost to the fishery (see CSA Table B4-3 and Table B3-16, reduction in recreational catch (see CSA Table B4-3), and production foregone (see CSA Table B3-17). EPA derived its estimates of reduction in recreational catch from its estimates of yield lost to the fishery (in pounds):

Because the economic evaluation of recreational yield is based on numbers of fish rather than pounds, foregone recreational yield was converted to numbers of fish. This conversion was based on the average weight of harvestable fish of each species. (CSA page B4-2)

EPA's estimates of yield lost to the fishery are the product of its estimates of age-1 equivalents (see CSA Table B3-15) and its estimates of yield per recruit (i.e., yield per age-1 fish).

This review focuses on EPA's estimates of the parameters underlying yield lost to the fishery and reduction in recreational catch (i.e., age-1 equivalents and yield per recruit) and on EPA's estimates of production foregone.

B. Report Organization

EPA's method for estimating each of the key component biological parameters (i.e., age-1 equivalents, yield per recruit ("YPR"), and production foregone) on which the economic assessment was based is reviewed in the following sections. Section II presents a review of EPA's methods and estimates of yield foregone, and the component parameters: age-1 equivalents and YPR. Section III presents a review of EPA's methods and estimates of production foregone. Section IV presents a summary and overall conclusions.

II. Yield Foregone

A. Age-1 Equivalents

EPA based its estimates of age-1 equivalents on lifestage-specific loss estimates (see CSA Table B3-6) from Appendix L of PSEG's 1999 Application, which EPA adjusted for its assumption that no entrained fish survive (see CSA Table B3-7). EPA then estimated age-1 equivalents given its adjusted estimates of lifestage-specific losses and, for representative important species ("RIS"), lifestage-specific natural mortality rate estimates from Appendix L of the Application (see CSA

Appendix B2). For non-RIS, EPA selected lifestage-specific natural mortality rate estimates from the literature (CSA Appendix B2).

1. Lifestage-Specific Loss Estimates

a. EPA's Method

EPA's estimates of lifestage-specific losses were based on the assumption that no entrained organisms survive: "Salem's entrainment survival factors were eliminated for all analyses (Tables B37 through B3-10) because EPA found insufficient justification in Salem's 1999 Application for their use." (CSA page B3-27)

Whether or not the Application provided adequate documentation regarding entrainment survival, the existence of entrainment survival has been demonstrated by many independent studies (EPRI, 2000). EPA's assumption of no entrainment survival clearly introduces biases into its estimates of estimates of losses. Furthermore, EPA's assumption that no entrained organisms survive is inconsistent with facts noted by EPA in its Preamble to the Proposed Phase II Rule for 316(b) (Federal Register, Vol. 67, No. 68, p 17136):

The mortality rate of entrained organisms varies by species and life stage entrained. Naked goby larvae demonstrated mortality rates as low as 2 percent whereas bay anchovy larvae mortality rates were as high as 97 percent.

To produce entrainment loss estimates that reflected its assumption that no entrained organisms survive, EPA adjusted the entrainment loss estimates for Salem from Appendix L of the Application (which accounted for the effects of entrainment survival). For each species, EPA deduced the average entrainment survival rate that had been applied in PSEG's 1999 Application (memorandum dated 5/28/02 from Liz Strange and Dave Cacela, Stratus Consulting, Inc. to Lynne Tudor and Tom Wall, U.S. EPA). EPA then used its deduced survival rate estimates to adjust the loss estimates presented in Appendix L of the Application to produce estimates that assumed no survival of entrained organisms.

b. Comparison of EPA and PSEG Estimates

EPA's adjusted estimates of entrainment losses (see CSA Table B3-7) are biased high due to its erroneous assumption of no entrainment survival. The likely magnitude of the bias is depicted in Figure 1, which compares EPA's loss estimates to PSEG's loss estimates, which were based on the best available estimates of entrainment survival rates (see Appendix F, Attachment F-2, Section III.C.4 and Tables 12 and 13 of PSEG's 1999 Application).

2. Estimates of Age-1 Equivalents

a. EPA's Method

EPA computed species-specific estimates of the number of age-1 equivalents based on the lifestage-specific loss estimates for each species. For each lifestage that experienced losses at Salem, EPA estimated the equivalent number of age-1 fish (i.e., if the fish had not been lost to entrainment at Salem, how many would have survived to be 365 days old). EPA then summed the age-1 equivalents over all lifestages to produce its estimate of the age-1 equivalents of the losses for the species.

For each lifestage, EPA estimated age-1 equivalents using the following formula to translate the lifestage-specific loss into the age-1 equivalents (see CSA Chapter A5, equations 4 and 5):

[see hard copy for equation]

This formula assumes that for every lifestage, the loss occurs sometime in the middle of the lifestage. For some species and lifestages this assumption is not valid and introduces a large bias.

For example, EPA estimated the age-1 equivalent striped bass in 1993 to be 4.1 million fish (CSA Table B3-8), which were mostly due to entrainment of the juvneile-1 lifestage. EPA's method treated the losses of juvenile-1 striped bass as if they occurred sometime in the middle of that lifestage which lasts 130 days, roughly from week 25 through week 43 (roughly the last week of June through the last week of October). EPA's estimate for the fraction of striped bass that would survive the entire juvenile-1 lifestage (of 130 days) is 10.3% (see CSA Appendix B2, Table B2-10). However, since EPA assumed that the entrainment losses occurred sometime in the middle of the juvenile lifestage, EPA set the survival rate from (its assumed) time of entrainment to the end of the juvenile-1 lifestage to 18.7% (i.e., the value of   in this example) to reflect its assumption that the time spent from the date of entrainment to the end of the juvenile-1 lifestage was substantially less than the full lifestage duration of 130 days.

However, the actual entrainment data show that the losses occurred at the beginning of the juvenile-1 lifestage (Figure 2), around week 25. Therefore, the actual duration from the date of entrainment to the end of the juvenile-1 lifestage was approximately 130 days (the full lifestage duration). Therefore the survival rate for the full lifestage duration, i.e. 10.3%, should have been applied. Using the correct survival rate of 10.3% would have produced an estimate of 2.3 million age-1 equivalents (still assuming no entrainment survival). The effect of EPA's erroneous assumption was to cause its estimate (of 4.1 million age-1 equivalents) to be 1.8 times as large as it should have been.

EPA's method apparently was patterned after PSEG's approach for estimating age-1 equivalents of entrained eggs and larvae, which took into account the fact that the ages of entrained eggs and larvae are not known (Appendix F, Attachment F-2, Section III.E). However, EPA erroneously applied the method to all age-0 lifestages, including juveniles. In the Application, the entrainment loss during a juvenile lifestage was assumed to occur at the beginning of the lifestage. This assumption was made because as juvenile fish grow, their susceptibility to entrainment declines quickly. For example, the average (over all years with springtime entrainment sampling and recorded entrainment of juvenile striped bass, through 1999) midpoint week of occurrence of juvenile striped bass entrainment was week 25, and in no year were juvenile striped bass observed in entrainment samples after week 28.

b. Comparison of EPA and PSEG Estimates

The likely magnitude of the bias introduced by EPA's erroneous assumption regarding the date of entrainment of juvenile fish is depicted in Figure 3 which compares PSEG's estimates of age-1 equivalents (which are based on loss estimates that include terms for entrainment survival) to corresponding estimates of age-1 equivalents based on EPA's formula (and PSEG's loss estimates that include terms for entrainment survival).

The cumulative effects on estimates of age-1 equivalents of EPA's erroneous assumption regarding the date of entrainment of juvenile fish and EPA's erroneous assumption that no entrained fish survive, are depicted in Figure 4. Figure 4 compares PSEG's estimates of age-1 equivalents to the estimates of age-1 equivalents that EPA listed in CSA Table B3-15. EPA's estimates are severely biased high.

B. Yield per Recruit

1. EPA's Method

EPA's formula for estimating yield lost to the fishery does not explicitly include a term for YPR. However, the formula EPAused to estimate age-1 equivalents can be shown to be equivalent to the product of 1) age-1 equivalents and 2) YPR. In CSA Chapter A5, EPA lists its formula (equation 7) for estimating yield lost to the fishery as:

[see hard copy for equation]

However, this reviewer was unable to reproduce EPA's tabulated results (CSA Table B3-8) using this equation, which is not the standard equation for computing yield to a fishery (e.g., see Ricker, 1975). However, the following equation, which is the standard formulation (Ricker, 1975), does reproduce EPA's results (EPA's documentation apparently contains a typographical error):

[see hard copy for equations]

2. Comparison of EPA and PSEG Estimates

Parameter estimates (for mortality rate and average weight at age) from CSA Appendix B2 and this formula for YPR produce the YPR estimates in Table 1. Also listed in Table 1 are YPR estimates from PSEG's 1999 Application. EPA's estimates are consistent with those from the Application.

III. Production Foregone

A. EPA's Method

1. Algebraic Formulation

EPA's estimates of production foregone are based on the method by Rago (1984):

[see hard copy for equations]
[Rago's equation (3)]
[Rago's equation (4)]

On page 85 of Rago's paper, he extends his method to address lifestage-specific estimates: "By adding a subscript to P, G, Z and B, we can calculate production of a particular age or size class (i). Thus:

[see hard copy for equation]

However, EPA apparently misinterpreted Rago's formula for production foregone and applied it incorrectly to the data. EPA used the following formula (CSA Chapter A5, equation 8):

[see hard copy for equation]

EPA's error was that it used the average (over the duration of the lifestage) weight per fish for the parameter Wi. Whereas in Rago's formula, the parameter Wi (referred to as in Rago's equation (5)) represents the average (over individuals within the population) weight per fish at the beginning of the lifestage. EPA's misuse of Rago's equation produces overestimates of production foregone because the average weight for the entire lifestage is greater than the weight at the beginning of the lifestage.

2. Input Parameter Values

In addition to its misuse of Rago's formula, many input parameter values (i.e., value of Gi and Wi) that EPA used for its estimates of production foregone are seriously flawed.

a. Lifestage-specific Weights for Age-0 Fish

EPA claims to have estimated the average weight per fish for all age-0 lifestages (i.e., egg, yolk-sac larvae, post yolk-sac larvae and juveniles) by extrapolation from the weight of fish at age-1 (see CSA Appendix B2). In the CSA, EPA did not provide documentation for its method of extrapolation, however, in response to questions from this reviewer, EPA did explain its method (document entitled "RESPONSE TO UWAG QUESTIONS RE: PHASE II PROPOSAL RECORD -- Revised July 3, 2002"). EPA assumed that the difference in weight between any two successive lifestages (within the interval between eggs and age 1) was the ratio of (1) the average of the weight of an egg and the weight of an age-1 fish, and (2) the number of lifestages between egg and age 1:

[see hard copy for equation]

EPA provided no justification for this method of interpolation, which appears to have no basis in biological fact or theory.

Estimates of lifestage-specific weights based on EPA's method of extrapolation (presented in CSA Appendix B2) are simply not realistic. For example, EPA estimated the average weight of post yolk-sac larvae striped bass to be 0.194 pounds (CSA, Appendix B2 Table B2-10). It is more likely that post yolk-sac larvae striped bass weigh less than 0.0001 pounds (based on the length-weight relationship from Bason (1971) and life stage-specific entrainment lengths from Appendix L, Tab 11 of the Application).

EPA's extrapolated estimates of the average weights of age-0 fish (which EPA used in its estimates of production foregone) are not scientifically valid and generally are biased high (e.g., see Table 2).

b. Lifestage-specific Growth Rates

Although not documented in its CSA report, EPA's response (document entitled "RESPONSE TO

UWAG QUESTIONS RE: PHASE II PROPOSAL RECORD -- Revised July 3, 2002") to questions from this reviewer indicated that EPA estimated the instantaneous growth rate (Gi) using the following relationship:

[see hard copy for equation]

which is valid when Wi and Wi+1 represent the weight per fish at the beginning of lifestages i and i+1, respectively (e.g., see equation (7a) in Rago, 1985). However, EPA apparently used the average weight values listed in CSA Appendix B2, which are average weights for the lifestages (not beginning weights).

Furthermore, for age-0 lifestages, the average weights EPA used in its computation of growth rates apparently were the invalid interpolated values listed in CSA Appendix B2. Therefore, even if it had correctly computed growth rates (e.g., using a formula that relates growth rates and average weights), EPA's growth rate estimates would have been erroneous because the estimates of average weights (used as inputs) were not valid.

B. Comparison of EPA and PSEG Estimates

In PSEG's 1999 Application for Salem, estimates of production foregone were presented for bay anchovy and for non-RIS forage species using the methods described in Appendix F, Attachment F-4, Section I.E.1. The estimated production foregone (due to entrainment) for the Basecase Scenario <FN 2> for bay anchovy was estimated to be 546,000 pounds per year (Appendix F, Attachment F-4, Table 11 of the Application), and the Basecase Scenario production foregone (due to entrainment) for non-RIS forage species was estimated to be 39,000 pounds per year (Appendix F, Attachment F-4, Table 11 of the Application).

EPA's estimate of production foregone for bay anchovy (average for 1978-1995, 1997 and 1998) is 7,044,000 pounds per year (CSA Chapter B3, Table B3-17), and its estimate of production foregone for non-RIS forage species (average for 1995-1998) is 419,000 pounds per year (CSA Chapter B3, Table B3-17).

Both EPA and PSEG used natural mortality rate estimates from Appendix L, Tab 18 of the Application. Also, Both EPA and PSEG assumed that mortality rates and weights at age for non-RIS forage were the same as for bay anchovy. However, the production foregone estimates in the Application were based on estimates of weight at the beginning and end of each lifestage (Table 2), whereas EPA's estimates of production foregone were based on its estimates of average lifestage-specific weights (Table 2). For each age-0 lifestage, EPA's estimates of average weight greatly exceeds (sometimes by orders of magnitude) PSEG's estimate of the maximum weight for the lifestage.

The errors in EPA's method for estimating production foregone and its errors in input parameter values cause its estimates to be severely biased high (Figure 5). If Rago's equation is correctly applied and if reasonable beginning and ending weights for age-0 lifestages (e.g., the weights in Table 2) are used rather than EPA's extrapolated values, the estimate of production foregone for bay anchovy would be 631,000 pounds (9% of EPA's reported estimate of 7,044,000 pounds), and the estimate for non-RIS forage would be 30,000 pounds (7% of EPA's reported estimate of 419,000 pounds).

IV. Summary

This review of EPA's methods for estimating yield foregone and production foregone due to entrainment at Salem identified several serious errors in EPA's methods that cause EPA's estimates to be biased high.

EPA's estimates of yield foregone (which is the product of the number of age-1 equivalent fish and the yield per recruit) are flawed because it (1) incorrectly omitted the effects of entrainment survival on lifestage-specific loss estimates and (2) used overestimates of juvenile survival (from the date of entrainment to the end of the juvenile lifestage) in its estimates of age-1 equivalents. The cumulative effect of these errors generally was to cause EPA's estimates of age-1 equivalents (and hence yield foregone) to be biased high. For weakfish, striped bass, Atlantic croaker and spot (the four species examined in the Application that had the highest estimates of yield foregone), EPA's estimates were 54%, 119%, 454% and 536%, respectively, higher than PSEG's estimates (which accounted for entrainment survival and the fact that juvenile entrainment generally occurs early in the lifestage).

EPA's estimates of production foregone are flawed because it (1) incorrectly applied the formula for computing production foregone (from Rago, 1984), (2) used invalid estimates (based on its extrapolation method) of average lifestage–specific weights of age-0 fish, (3) incorrectly applied the formula for computing growth rates from initial weights of fish in successive lifestages, and (4) derived invalid estimates of growth rates based on its invalid estimates of average lifestage-specific weights of age-0 fish. The cumulative effect of these errors for bay anchovy and non-RIS forage species was to cause EPA's estimates of production foregone to be biased high. For bay anchovy, EPA's estimate was 1016% higher that it would have been without these errors, and for non-RIS forage, EPA's estimate was 1297% higher than it would have been.

[see hard copy for appendices/tables/figures]

Table 1. Comparison of EPA's estimates of yield per recruit ("YPR") and PSEG's estimates of YPR that were used in its estimates of pounds lost to the fishery that were presented in the Application.

Table 2. Comparison of weights at age for age-0 bay anchovy that were used in estimates of production foregone. EPA's extrapolated estimates are from CSA Appendix B2, Table B2-5. PSEG's estimates are based on a length-weight regression and average length of fish by lifestage (length-weight relationship from Derickson and Price (1973) and life stage-specific entrainment lengths from Appendix L, Tab 11 of the Application).

Figure 1. Comparison of EPA's and PSEG's estimates of average annual entrainment losses. EPA's estimates assume no entrained fish survive. PSEG's estimates are from Appendix L, Tab 9 of the Application (reproduced in CSA Table B3-6). EPA's estimates are from CSA Table B3-7. Abbreviations: Atlantic croaker (AC), American shad (AS), alewife (AW), blueback herring (BH), striped bass (SB), spot (SP), weakfish (WK), white perch (WP).

Figure 2. Observed density of juvenile 1 striped bass in entrainment samples at Salem in 1993 (the year with EPA's highest estimate of age-1 equivalents for striped bass (CSA Table B3-8)).

Figure 3. Comparison of EPA's and PSEG's methods for estimating age-1 equivalents. All estimates depicted in this figure are based on PSEG's estimates of entrainment losses (i.e., the estimates include terms for entrainment survival). The differences between the PSEG and EPA estimates are due to EPA's assumption that entrainment losses of juvenile fish occur in the middle of the juvenile lifestage. Abbreviations: Atlantic croaker (AC), American shad (AS), alewife (AW), blueback herring (BH), striped bass (SB), spot (SP), weakfish (WK), white perch (WP).

Figure 4. Comparison of EPA's and PSEG's estimates of age-1 equivalents. This figure shows the cumulative effect of EPA's erroneous assumption regarding the date of entrainment of juvenile fish and EPA's erroneous assumption that no entrained fish survive. PSEG's estimates of age-1 equivalents were computed using the methods described in Appendix F, Attachment F-4 of the Application. EPA's estimates are from CSA Table B3-15. Abbreviations: Atlantic croaker (AC), American shad (AS), alewife (AW), blueback herring (BH), striped bass (SB), spot (SP), weakfish (WK), white perch (WP).

Figure 5. Comparison of EPA's and PSEG's estimates of production foregone for bay anchovy and non-RIS forage. PSEG's estimates are from Appendix F, Attachment F-4 of the Application and represent the Basecase Scenario . EPA's estimates for bay anchovy represent an average for 1978-82, 1985-95, 97 and 98. EPA's estimates for non-RIS forage species represent an average for 1995-98. The estimates labeled "Rago Model" were computed using the formula in Rago (1984), correctly applied to PSEG's weight-at-age estimates (beginning and ending weights) for bay anchovy.

Footnotes

1 PSEG's review of EPA's assessment of economic losses and benefits valuations are addressed in a separate report prepared by NERA, Inc. under the direction of David Harrison, Ph.D.

2 In the 1999 Salem Permit Application, PSEG defined a Basecase Scenario for Salem operation. The Basecase Scenario assumed that the withdrawal rate of each of the 12 CWS pumps was 175,000 gpm during normal operation, and that during scheduled outages 7 CWS pumps ran at 175,000 gpm (Appendix F, Attachment F-4 of the Application). The average cooling water withdrawal for this scenario is roughly 3,024 mgd.

EPA Response

Regarding entrainment survival, please see Chapter A7 of Part A of the Phase II Regional Study Document (DCN #) and response to Comment 316bEFR.306.506. Salem did not provide the Agency with convincing evidence that entrainment survival occurs at Salem.

Regarding EPA's calculation of production foregone, several commenters have raised questions about the EPA calculations of production foregone, primarily with regard to the values of stage-specific fish weights. These commenters have indicated that in some cases the weight parameters used by EPA may lead to overestimation of production foregone. Some commenters have also questioned inconsistencies between values used for the same species occurring in different regions, and apparent discontinuities in weights between early life stages.

Through the course of reviewing public comments on the initial case studies and later comments on the NODA, EPA has reviewed and revised many of the weight parameters. EPA relied upon numerous published records, local experts, and other resources to develop weight estimates. Following suggestions of commenters, EPA also revised some of its approximation methods, including the use of volumetric methods to improve estimates of egg weights.

Some commenters indicated that the mathematical definition used to calculate estimates of foregone production require weights that represent the beginning and the end of each life stage. EPA acknowledges that while this is ideal, such data are seldom available. In fact, the weight parameters used by EPA in its analyses include a variety of types of values, some of which are unknown because in some cases the I&E monitoring documents are not explicit about whether the values represent weights for the beginning, the end, or midpoints of particular stages. This issue is also complicated by the fact that some weights in the monitoring documents are determined indirectly through length-weight regression relationships. Length-at-age values found in different literature sources may also represent different parts of a lifestage.

Although such uncertainty is unfortunate, EPA believes that the practical effect on the benefits estimation is negligible. EPA disagrees with the characterizations put forth by some commenters that accuracy of these estimates are of vital importance to the benefits estimates. EPA notes that the benefits assessment does not directly value production foregone, per se. Production foregone estimates are used only in the context of the trophic transfer model which is used only to generate estimates of incremental foregone yield attributable to losses of forage species. The portion of the total benefits associated with the trophic transfer pathway is quite small, usually less than 2 percent of the total within any particular region. Thus, even if the commenter was correct that the analysis inflated estimates of production foregone and caused the trophic transfer model to overestimate foregone yield, the practical effect on the total benefits estimate would be very small.

□□□□□□□□

Comment ID 316bEFR.075.501

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02

Benefit Estimation Methodology

ATTACHMENT 4

ECONOMIC EVALUATION OF THE DELAWARE ESTUARY CASE STUDY IN THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S 316(B) EXISTING FACILITIES BENEFITS CASE STUDIES

Prepared for PSEG
August 2002

EXECUTIVE SUMMARY

This report reviews and evaluates economic issues in the case study prepared by Abt Associates, Inc. ("Abt") for the U.S. Environmental Protection Agency ("EPA") to measure the economic benefits of reducing impingement and entrainment ("I&E") at in-scope cooling water intake structures ("CWIS") within the Delaware Estuary (hereafter "Delaware Case Study"). <FN 1> The Delaware Case Study is significant in part because it is used as the basis for the EPA's estimates of the national benefits of its proposed requirements for existing facilities under Section 316(b) of the Clean Water Act. But the Delaware Case study—along with the other case studies—is perhaps even more important because its methodologies might provide models for preparation or review of benefit-cost assessments in individual 316(b) permit applications.

Although EPA's initial approach to benefit estimation is sound—since the approach is based upon an "effect by effect" procedure to develop total benefits as the sum of individual components—many of the specific methodologies and data EPA uses to develop the individual components have major flaws. Many of the methodologies and applications are inconsistent with EPA's recent guidelines for preparing economic analyses (U.S. EPA 2000), with the Office of Management and Budget's ("OMB") guidelines for economic assessments (OMB 2000), and with basic economic textbooks on environmental benefit assessment (e.g., Freeman 1993). Since the specific methodologies are critical to developing economically sound benefit values, these flaws in the EPA methods make the estimates in the Delaware Case Study inadequate bases for national benefit estimates and inadequate guides for evaluating individual benefit-cost assessments.

To summarize, we find the following:

1. EPA's commercial benefit estimates are substantially overstated because of mischaracterizations of the empirical studies used in the assessment.
2. EPA's recreational benefit estimates are suspect because of the use of an overly simple benefit transfer method and a flawed RUM study.
3. EPA's nonuse benefits have no conceptual or empirical support.
4. EPA's forage fish benefits are overstated by including a flawed methodology—the replacement cost approach—as one of the two methods.

The following are specific evaluations of the methodologies EPA uses for the four individual components in the Delaware Case Study. <FN 2> To provide a sense of perspective on their relative empirical importance, Figure ES- 1 shows the percentages of overall benefits at Salem accounted for by each of the four categories.

Figure ES- 1. Summary of EPA-Estimated Losses at Salem by Category
[see hard copy for figure]

A. EPA's Commercial Benefit Estimates Are Substantially Overstated Because of Mischaracterizations of the Empirical Studies Used in the Assessment

Benefits due to projected increases in commercial catch represent the largest of the four categories, accounting for about 64 percent of overall benefits in the Delaware Case Study. EPA calculates commercial benefits by first using ex vessel prices and added catch for the various commercial species to determine the added gross revenues to commercial fishermen. Citing various empirical studies, EPA then argues that the added producer surplus represents 40 percent to 70 percent of gross revenues; using EPA's approach the mid-range value is 55 percent (i.e., gross revenues are multiplied by 0.55). Then, citing two other studies as well as a personal communication, EPA claims that producer surplus represents 22 percent of the total "multi-market" welfare—including producers, wholesalers, processors, retailers and consumers — and thus that the producer surplus estimates should be multiplied by 4.5 to obtain an estimate of "total surplus." The net result is that EPA's estimate of commercial fishing benefits is equal to about 2.5 times the added gross revenues to commercial fishermen (0.55 x 4.5 = 2.48).

1. EPA's ex vessel commercial fish values can be confirmed

EPA's estimates of the ex vessel values appear to be reliable. The values, which range from $0.11 per pound for alewife to $3.18 per pound for striped bass, appear to be accurate estimates of the average values for ex vessel prices in New Jersey and Delaware. Although the range of certain species suggests that affected fish would be caught in other areas, these state values are representative. Note that EPA's use of prevailing ex vessel prices assumes that I&E at Salem—and the other in-scope facilities—does not affect the market prices of commercial fish. This assumption seems sensible in light of the large overall market for fish; note however, that EPA's use of the 4.5 multiplier contradicts this assumption by implying a substantial change in price.

2. EPA's estimates of producer surplus benefits (mid-range equal to 55 percent of gross fishing revenues) are not supported in the literature that EPA cites; this literature suggests a mid-range value of at most 15 percent of gross fishing revenues and likely one that would "tend toward zero"

The literature that EPA cites does not support its estimates that Delaware fishermen would gain between 40 percent and 70 percent of the gross fishing revenues as additional producer surplus in the long run. It is well established in the economic literature (see, e.g., Freeman 1993) that in open access fisheries, there is a tendency for producer surplus to be driven to zero. This "tragedy of the commons" means that commercial fishermen would not receive any additional producer surplus from reduced I&E at Salem; all of the potential gains would be dissipated by additional fishing effort.

The studies that EPA cites show substantial gains to fishermen, but these studies relate primarily to short-term gains that do not take into account the long-term factors that operate in commercial fisheries. Moreover, to the extent that the studies indicate some special circumstances that might mitigate these effects—such as entry restrictions—they relate to West Coast and Great Lakes fisheries rather than the East Coast. Indeed, the study that EPA relies on for the “4.5 multiplier” (Norton et al. 1983) points out that producer surplus was in fact zero for fishermen in the southern part of the Atlantic fishery—net costs were equal to net revenues. Strand (2002), who is also one of the co-authors of Norton et al. (1983), notes that the study found the overall producer surplus for East Coast striped bass fishermen to be about 15 percent of gross revenues.

3. The studies cited by EPA do not support the “multi-market” multiplier (4.5) used by EPA to translate changes in producer surplus to fishermen into changes in total producer and consumer surplus

The “multi-market” multiplier of 4.5 is not supported in the studies cited. The only East Coast study cited is Norton et al. (1983), which reports information on the total surplus to retailers and consumers as well as the total surplus to commercial fishermen in the striped bass fishery. Although the ratio of these two values is 4.5, there is no indication in the report that it would be valid to use that ratio to estimate additional consumer and retailer surplus for changes in the fishery. Indeed, as Strand—one of the authors of the study—notes, this is “an extraordinarily odd procedure indeed.” (Strand 2002). EPA claims that the multiplier of 4.5 also is derived from empirical work by Richard Bishop and others on the Great Lakes, including a draft report that is not available for distribution. The study that is available does not appear to include the specific empirical results cited by EPA. In any event, these studies relate to the Great Lakes and thus are not relevant to the East Coast.

4. EPA provides no evidence to support a claim that consumers would benefit from the changes in commercial catch through lower prices

Consumers could in theory gain from additional commercial fish made available through reduced I&E at Salem, but only if the changes were sufficient to affect the market price. EPA has presented no information on the relevant market for commercial fish and the relative importance of I&E losses. Changes in I&E at Salem seem small relative to the volume of commercial fish in the East Coast fish markets, suggesting that there will not be a change in the market price and thus no consumer surplus gains from I&E changes.

5. Overall, the evidence suggests that mid-range commercial benefits are equal to 15 percent or less of gross fishing revenues, indicating that EPA overstates the likely long-run economic benefits by at least a factor of 16

The available evidence on conditions in the East Coast suggests that the economic benefits—measured as producer and consumer surplus gains—will be small due to reduced I&E at Salem. Certainly, there is no conceptual or substantial empirical support for the claim that benefits would be equal to almost 2.5 times the value of the gross increase in revenues to fishermen. If gains to fishermen were 15 percent of the gross increase—as suggested by the one East Coast study noted by EPA in its discussion of commercial benefits—the long-run benefits would be less than one-sixteenth of the value reported by EPA in the Delaware Case Study.

B. EPA's Recreational Benefit Estimates Are Suspect Because They Rely on an Overly Simple Benefit Transfer Method and a Flawed RUM Study

EPA applied a benefit transfer approach to estimate recreational losses from several "representative important species" due to I&E at Salem and other in-scope and out-of-scope facilities in the Delaware Estuary. EPA also developed a random utility model ("RUM") analysis of recreational fishing benefits from reduced I&E to estimate recreational losses associated with two species—weakfish and striped bass. EPA's comprehensive benefit estimate adopts the RUM estimates for weakfish and striped bass and the benefit transfer estimates for the other species.

1. EPA's use of benefit transfer to value recreational fishing benefits is sound

Benefit transfer is an appropriate methodology for developing estimates of the potential recreational fishing benefits from changes in I&E at Salem or any other CWIS. As the EPA Guidelines note,

"[t]he advantages of benefit transfer are clear. Original studies are time consuming and expensive; benefit transfer can reduce both the time and financial resources needed to develop benefit estimates" (U.S. EPA 2000, p. 86).

Although the Delaware Case Study is not clear on precisely why the studies used for the benefit transfer were chosen or why others were not used, the four studies provide values for similar areas and species; all four studies relate to species affected by Salem I&E and to recreational fishing along the Atlantic coast.

2. EPA uses an overly simple application of the benefit transfer method

Although EPA's decision to use benefit transfer itself is sound, the technique EPA uses to transfer the benefits is not one that is recommended by EPA Guidelines. EPA's analysis applies a point estimation approach to transfer a range of values developed in other studies and to develop a low and high estimate for each fish species. In discussing this approach, the EPA Guidelines state, "As it is rare that a policy case and study case will be identical, this approach is not generally recommended." EPA's Delaware Estuary Case Study fails to explain why it was selected, and whether other approaches were considered.

3. EPA's RUM study has major flaws

The RUM method is well established as a methodology for evaluating recreational fishing benefits. Such models allow one to estimate the benefits of improving conditions in one fishery relative to other alternatives. It is important, however, that the studies use valid data on the nature of the choices available to anglers, particularly on the differences in the travel costs to the alternative sites anglers might choose.

The RUM model developed by EPA for the Delaware Case Study has substantial inadequacies that suggest that its results are not reliable estimates of the willingness to pay of recreational anglers for I&E changes at Salem. <FN 3> These inadequacies include the following:

-Employing unweighted intercept (angler) data. Over-representation of avid anglers results in biased estimates of the average value of improved fishing opportunities.

-Incorrectly calculating trip costs. Several assumptions bias trip costs upward and thus bias estimates of the value of improved fishing opportunities.

-Inappropriately modeling decisions. Modeling trips in a sequential manner—first the decision to recreate and then the selection of the recreation site—is inferior to modeling these as simultaneous choices.

C. EPA's Nonuse Benefits Have No Conceptual or Empirical Support

Nonuse benefits represent potential benefits not associated with any direct use by individuals or humankind of the Delaware Estuary resources affected by Salem I&E. These benefits are sometimes referred to as passive use values or bequest values if they relate to future generations.

The Delaware Case Study does not include an independent assessment of the potential nonuse benefits affected by Salem I&E. Instead, EPA applied a "rule of thumb" that nonuse benefits would be equivalent to 50 percent of estimated recreational benefits. EPA claims that this is a "long-standing" benefit transfer approach.

1. EPA's 50 percent "rule of thumb" has no basis in the EPA Guidelines or in the economic literature

This rule of thumb has neither conceptual nor empirical support as a valid measure of the willingness to pay of individuals for nonuse effects of I&E at Salem.

-The author of the original article discussing the "rule of thumb" refers to it as a "tenuous empirical basis from which to estimate national nonuser benefits" (Freeman 1979, p. 171). This author does not include the method in his comprehensive treatise on benefit assessment (Freeman 1993).

-Other authors have voiced similar criticisms. Fisher and Raucher (1984), for example, note that "[t]he proportional relationship [the 50 percent rule] is not in the least robust." (p. 47).

-Although some studies have calculated both use and nonuse values and compared the totals, these studies do not evaluate situations that are at all comparable to I&E in the Delaware Estuary.

Thus, the 50 percent rule is not appropriate as a benefit transfer approach to evaluating nonuser benefits for the Delaware Case Study.

2. EPA provides no empirical basis for a claim that changes in I&E at Delaware facilities would lead to any nonuse benefits

EPA provides no information whatsoever on nonuser benefits that might be relevant for I&E in the Delaware Estuary. Indeed, the total discussion of nonuser benefits in the Delaware Case Study (p. B4-11) is only one paragraph. This one-paragraph description is used to explain and justify annual benefits ranging from about $800,000 to $2.7 million per year.

3. Extensive empirical information on the status of the Delaware fishery suggests that there are no

nonuse benefits

Although EPA does not present any information related to nonuse benefits, there is extensive information on the environmental status of the Delaware Estuary that provides insight into the likely importance of this category. The existing literature on nonuse benefits suggests that nonuse values are likely to be significant under two conditions:

1. The resource is unique (e.g., the Grand Canyon); and

2. The losses to the resource are substantial and irreversible (e.g., damming the Grand Canyon).

Detailed studies on the status of the Delaware Estuary and the effects of I&E at Salem indicate that these conditions are not likely to be met for I&E at Salem.

-Historical data indicate a consistent and significant improving trend for growth in the stock of the major species affected by Salem I&E.
-Salem I&E has a negligible effect on the few fish species whose stocks have been declining recently.
-Even the declining stocks are not threatened to fall below key biological reference points.
-Any effects of Salem I&E could be reversed by various measures.

This information suggests that the nonuse benefits associated with I&E at Salem are not significant. Any positive estimate for nonuse benefits should be based on an acceptable study of nonuse effects, consistent with EPA's Guidelines (2000) and on current economic methods (e.g. Freeman 1993), rather than on a crude and inappropriate rule of thumb.

D. EPA's Forage Fish Benefits are Overstated by Including a Flawed Methodology—the Replacement Cost Approach—as One of Two Methods

Forage fish refer to species that are not commercially or recreationally fished. These fish represent prey for other species that are commercially or recreationally fished, and thus provide potential indirect benefits if they increase the numbers of those fish. EPA developed values for forage fish losses at

Salem based on two approaches:

1. Value of production foregone. EPA estimated the value of the recreational and commercial species whose production would be changed as a result of changes in forage fish populations.

2. Replacement cost. EPA estimated the cost of raising fish for stocking to replace the forage fish affected by I&E.

The values are higher using the replacement cost approach.

1. Additional forage fish lead to benefits to the extent that they increase commercial and recreational catch

Changes in forage fish populations can lead to benefits—in the form of additional consumer and producer surplus—if they increase the numbers of commercial and recreational fish. Thus, this is a valid benefit category for the Delaware Case Study. Forage fish represent an example of indirect ecosystem benefits—they provide services that do not directly benefit individuals but rather provide biological services required for services that do benefit individuals.

2. The production foregone method in theory could lead to valid benefit estimates

The production foregone method provides a valid methodology for evaluating the potential indirect benefits of forage fish changes. The validity of the calculations, of course, depends upon the accuracy of the scientific assessments of the linkages between changes in forage fish and changes in the populations of commercial and recreational species.

3. In contrast, the replacement cost method is not an economically valid benefit methodology

Replacement cost is not a valid method of assessing the benefits of changes in I&E at Salem (or anywhere else). The EPA Guidelines provide an extensive list of acceptable benefit assessment methodologies; replacement cost is not among these methodologies, and for good reason.

Hatchery costs provide a measure of the costs of one potential alternative for improving fish populations—stocking additional forage fish. Such stocking may be a worthwhile exercise. But the costs do not provide a measure of the benefits. Indeed, accepting such an approach would make a mockery of benefit-cost analysis. If a project's costs were also used as a measure of its benefits, benefit-cost analysis would suggest all projects had a net benefit of zero.

E. Before Issuing a Final 316(b) Rule, It Is Imperative that EPA Revise the Economic Benefit Methodologies in the Delaware Case Study and Other Case Studies to Correct Serious Deficiencies

It is important that the economic benefit methodologies in the Delaware Case Study be sound, both because they underlie estimates of the benefits of alternative 316(b) regulatory alternatives and because they are likely to be used by applicants and permit writers to evaluate specific 316(b) benefit-cost assessments.

The overall approach in the Delaware Case Study is sound—developing "effect-by-effect" estimates of the potential benefits from reduced I&E at Salem. But the methodologies used for the four effects have serious flaws that should be remedied before the final rule is promulgated.

1. For commercial fishing benefits, EPA should review the empirical foundations and revise its estimates

The commercial fishing benefits in the Delaware Case Study are overstated because they exaggerate the likely consumer and producer surplus associated with changes in the commercial catch. The values do not appropriately acknowledge the long-run tendency for producer surplus to be dissipated, which means that most additional gross ex vessel revenues will not constitute long-term benefits.

More importantly, EPA uses a "multiplier" to translate changes in producer surplus into a total "multi-market" surplus that has no theoretical justification. The validity of such a multiplier would imply substantial reductions in fish prices, but EPA has provided no information to support such a claim.

Indeed, given the relatively small effect that changes in I&E at Salem would have on overall supply, it is unlikely that consumers would receive any additional consumer surplus gains.

EPA should revise its estimated range of potential commercial fishing benefits from Salem I&E to reflect long-term effects on producer surplus (consistent with the newest time frame for the regulatory proposal) and the absence of any effects on fish prices.

2. For recreational fishing benefits, EPA should modify its application of the benefit transfer approach and revise (or ignore) its RUM study

EPA's recreational fishing benefits are based on the benefit transfer approach and a RUM study carried out by EPA. The benefit transfer study should be reevaluated to consider using a more sophisticated approach that would allow the value per fish to vary with individual circumstances. The RUM study—which is used to value two of the relevant species—either should be ignored or should be revised to eliminate (or explain) apparent methodological problems.

3. For nonuse fishing benefits, EPA should discard the estimates derived from the 50 percent rule of thumb

EPA's nonuse benefits are based upon a crude rule of thumb that has no validity and no applicability to I&E changes in the Delaware Estuary. Unless EPA has specific evidence of nonuse benefits associated with changes in I&E in the Delaware Estuary, this category should be eliminated as part of the Delaware Case
Study.

4. For forage fish, EPA should discard the replacement cost method and rely exclusively on the production foregone method

Forage fish can provide benefits because of the effects they have on commercial and recreational species. EPA should base its estimate of benefits on the production foregone method and discard the alternative replacement cost method, which has no conceptual or empirical foundation as a measure of benefits.

[comment text continued in 316bEFR.075.502]

Footnotes

1 This report focuses on economic assessments. A companion report prepared by Douglas Heimbuch, Ph.D., evaluates issues related to the biological benefits assessments in the Delaware Case Study (Heimbuch 2002).

2 Other reports provide additional economic assessments related to the proposed 316(b) regulations. See Desvougues et. Al. (2002), Stavins

3 (2002), and Strand (2002). Harrison et al. (2000) provides an overview of the general economic issues related to 316(b) benefit-cost determination. This section relies upon the analyses in Desvouges et al. (2002).

EPA Response

The comment states that the methods and data EPA employees to estimate the benefits of the regulatory options in the Delaware Estuary case study have major flaws. The comment further states that EPA's methodologies and applications are inconsistent with EPA's recent guidelines for preparing economic analyses (U.S. EPA 2000, DCN #6-1931), with the Office of Management and Budget's ("OMB") guidelines for economic assessments (OMB 2000, DCN #6-3256), and with basic economic textbooks on environmental benefit assessment (e.g., Freeman 1993, DCN #5-1265). The comment concludes that the Delaware Case Study provides "inadequate bases for national benefit estimates and inadequate guides for evaluating individual benefit-cost assessments." EPA disagrees.

EPA's approach to economic analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003). Moreover, EPA's Guidelines expressly state that they "do not provide a rigid blueprint or a 'cook-book' for all policy assessments ... [and that t]he most productive and illuminating approaches for particular situations will depend on a variety of case-specific factors and will require professional judgment to apply." Id. at p. 2. The Guidelines also recognize that the choices made on how to approach the economic analysis issues in a given situation will necessarily be influenced by factors such as the nature of the issues present, the relevant statutory requirements, the availability of data, the cost and time needed to obtain data, and the need for expedition in taking regulatory actions. Id. at pp. 3, 5 (n. 2), 59, 64. Therefore, EPA's Guidelines for Preparing Economic Analysis are not legally binding and, in fact, allow EPA to use the most up to date approaches to benefit estimation, if applicable.

EPA has changed and improved many of the methods used to estimate benefits for the final Phase II 316b rule. Therefore, a number of the points made in this comment are no longer relevant. Nevertheless, specific concerns regarding EPA's approach to economic analysis of the Section 316(b) Phase II regulation are discussed below.

1. Commercial Fishing Benefits

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316EFR.005.029.

2. Recreational Fishing Benefits

For EPA's Response to comments on the methods used to estimate recreational fishing benefits for the proposed Phase II rule, please see the response to comment 316EFR.075.504. For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Therefore, the comments on benefit transfer presented here are no longer relevant.

The Agency disagrees that its RUM methodology is flawed. EPA does follow standard and generally accepted practices for sampling methodology, calculation of trip costs, and participation modeling. Please see responses to comments #316bEFR.041.452 and #316bEFR.072.058 for details regarding EPA's application of
RUM modeling. In addition, the Agency points out that it revised its RUM analysis to include a larger geographic area as suggested by the commenter. For detail see Chapter D4, RUM Analysis, of the regional study document (DCN # 6-0003).

3. Non-use Benefits

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. EPA attempted to include non-use benefits categories for the final Section 316(b) Phase II rule analysis. However, Given the unavoidable uncertainties in estimating non-use benefits at the national level, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. See Chapters A9, Economic Benefit Categories and Valuation, and A12, Non-Use Meta-Analysis Methodology, in the regional study document prepared for the analysis for the final Phase II rule (DCN # 6-0003)

4. Using Hatchery Costs to Value Forage Species

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E (DCN # 6-0003).

Comment ID 316bEFR.075.502

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02.02

Commercial Fishing Benefits

[comment continued from 316bEFR.075.501]

I. INTRODUCTION

This report reviews the case study developed by the United States Environmental Protection Agency ("EPA") regarding the potential benefits of reducing impingement mortality and entrainment ("I&E") <FN 4> at cooling water intake structures ("CWIS") within the Delaware Estuary ("Delaware Case Study" or "Case Study"). <FN 5> NERA's focus is on the economic issues related to the benefits assessment in the Delaware Case Study. <FN 6>

A. Background

On April 9, 2002, EPA issued a proposed rule ("316(b) Phase II Proposed Rule," 67 FR 17121) that would establish requirements for CWIS for existing power producing facilities with a cooling water intake flow of 50 million gallons per day or more from rivers, streams, estuaries, and other U.S. waters. This proposed rule represents Phase II in EPA's development of regulations to implement Section 316(b) of the Clean Water Act. The proposal involves methodologies for determining the "best technology available" ("BTA") that Phase II facilities with CWIS would be required to adopt in order to minimize I&E of fish and other organisms. The proposed requirements would be implemented through National Pollutant Discharge Elimination System ("NPDES") permits.

As part of its development of the proposed rule and pursuant to the requirements of Executive Order 12866 ("Regulatory Planning and Review") and relevant statutes, EPA prepared an analysis of the benefits and costs of the proposed rule and alternatives. To inform this exercise, EPA also prepared a number of case studies examining the potential benefits of reducing I&E at CWIS in various ecosystems around the U.S. This report examines the Delaware Case Study—which evaluates the effects of I&E at CWIS within the transition zone of the Delaware Estuary and within the scope of the 316(b) Phase II Proposed Rule. The Delaware Case Study is one of several case studies developed by EPA; other case studies are the Ohio River Watershed Case Study, the Tampa Bay Watershed Case Study, San Francisco Bay/Delta Estuary Case Study, the Brayton Point Station Facility Case Study, the Seabrook and Pilgrim Facilities Case Study, the J.R. Whiting Facility Case Study, and the Monroe Facility Case Study.

The remainder of this chapter provides an overview of the Delaware Case Study results, a discussion of the specific objectives of this report, and an outline of the other chapters.

B. Overview of EPA Delaware Case Study Benefit Results

The Delaware Case Study presents results for the four in-scope facilities <FN 7> on the Delaware Estuary as well as separately for PSEG Nuclear LLC's Salem Generating Station ("Salem"). This report focuses on the results for Salem.

Table 1 summarizes the Delaware Case Study midpoint results reported in the Delaware Case Study for Salem. EPA estimates total annualized losses due to I&E at Salem at approximately $23 million per year. The vast majority of the losses (98 percent) are due to entrainment rather than impingement. Note that the values presented in Table 1 are annualized. Using a discount rate of seven percent and a retirement date of 2021 for the Salem plant, these annualized values imply that the present value of losses due to Salem I&E would be approximately $218.1 million (in 2000 dollars).

Table 1. Summary of EPA Midpoint Estimates of Damages due to I&E at Salem Facility
[see hard copy for table]

Figure 1 summarizes the results by loss category for the four categories of economic losses estimated by EPA. Commercial losses account for a substantial majority of the overall losses, representing about 64 percent of the total. Recreational losses are the next largest category, at 24 percent. Forage fish losses account for a very small proportion (0.1 percent) of total losses, and nonuse losses account for the remainder of EPA's estimate.

Figure 1. Summary of EPA-Estimated Losses at Salem by Category
[see hard copy for figure]

C. Objective of this Report

The objective of this report is to evaluate the economic methodologies used by EPA in the Delaware Case Study. <FN 8> In particular, we consider whether the analyses are based upon sound conceptual and empirical methodologies. The criteria for these judgments are based upon the economic literature as well as on recent guidelines for regulatory analyses developed by U.S. EPA (2000), and by the Office of Management and Budget ("OMB") (1996).

Evaluating the soundness of the economic methodology in the Delaware Case Study is important for at least two reasons. First, EPA uses the results of the Delaware Case Study (along with results from the other case studies) to estimate the overall national benefits of the 316(b) Phase II Proposed Rule and various regulatory alternatives. Second, the case study methodologies are likely to be used by applicants and permit writers as guidance for the implementation of benefit-cost analyses to evaluate options for individual permits.

D. Outline of the Report

The report is organized as follows. Chapter II provides a brief overview of benefit-cost analysis and the benefit assessment process, including an evaluation of the extent to which the Delaware Case Study follows EPA guidance in its basic approach. The next four chapters provide assessments of the benefit categories in the Delaware Case Study: Chapter III considers commercial fishing benefits; Chapter IV considers recreational fishing benefits; Chapter V considers nonuse benefits; and Chapter VI considers forage fish estimates. The final chapter summarizes recommendations regarding modifications EPA should make before issuing a final Phase II rule.

II. FRAMEWORK FOR BENEFITS ASSESSMENTS AND EVALUATION OF EPA BENEFITS ASSESSMENT APPROACH

This chapter considers the overall framework for carrying out a benefits assessment. The chapter reviews the general principles—emphasizing EPA's recent Guidelines for Preparing Economic Analyses (EPA 2000, subsequently "EPA Guidelines")—and evaluates the consistency of the overall approach in the Delaware Case Study with these principles. We conclude that the general "effect-by-effect" approach used by EPA in the Delaware Case Study is consistent with sound economic principles and with the EPA Guidelines. <FN 9> Moreover, the benefit categories included in the Delaware Case Study correspond well to the framework provided for ecosystem benefits in the EPA Guidelines.

A. Overview of Benefit-Cost Analysis

Benefit-cost analysis is a well-established methodology for providing information to decision makers faced with the task of determining whether a project should be undertaken, and if so, at what scale of activity (see, e.g., Nas 1996 and U.S. EPA 2000). The approach involves systematic enumeration of benefits and costs that would accrue to members of society if a particular project were undertaken. Benefit-cost analysis provides an ex ante perspective; a project is evaluated in advance to aid in deciding in what form it should be undertaken and, indeed, whether the project should be undertaken at all.

The rationale for undertaking a benefit-cost analysis of a particular decision is to allow society's resources to be put to their most valuable use. In choosing among alternatives, the basic benefit-cost principle is to select the alternative that produces the greatest net benefits (i.e., benefits minus costs). It is possible that all project alternatives produce net benefits that are negative. In that case, the higher value alternative is to "do nothing," which at least produces a net benefit of $0.

Benefit-cost analyses of the choice of Best Technology Available ("BTA") require the careful enumeration of the monetary value of different impacts resulting from various alternatives. These impacts are typically separated into costs (negative impacts) and benefits (positive effects), although the two categories may be closely related.

The costs included in cost-benefit assessments should reflect costs to society as a whole, rather than transfers from one group to another. EPA Guidelines for Preparing Economic Analyses define social cost as follows:

The total social cost of pollution control is the sum of the opportunity costs incurred by society because of a new regulatory policy; the opportunity costs are the value of the goods and services lost by society resulting from the use of resources to comply with and implement the regulation, and from reductions in output (U.S. EPA 2000, p. 113, emphasis in original).

This definition is consistent with guidelines from the Office of Management and Budget (1996) and standard economic theory as described in economic texts on benefit-cost analysis.

The benefits included in benefit-cost assessments should reflect benefits to society. Estimates of benefits associated with environmental improvements reflect social benefits when they are based on the willingness to pay ("WTP") of individuals who receive the increased environmental services (e.g., recreational fishing services). WTP represents the value of a good or service in monetary terms (i.e., the amount the individual is "willing to pay" in dollar terms). The current EPA Guidelines for preparing economic analyses explain this concept as follows:

The willingness to trade off compensation for goods or services can be measured either as willingness to pay (WTP) or willingness to accept (WTA). Economists generally express WTP and WTA in monetary terms. In the case of an environmental policy, willingness to pay is the maximum amount of money an individual would voluntarily exchange to obtain an improvement (or avoid a decrement) in the environmental effects of concern. Conversely, willingness to accept compensation is the least amount of money an individual would accept to forego the improvement (or endure the decrement) (2000, p. 60, emphasis in original).

EPA notes that: "In practice, WTP is generally used to value benefits because it is often easier to measure and estimate" (2000, p. 61).

This approach to measuring benefits is consistent with Office of Management and Budget Guidelines and standard economic texts (e.g., Tietenberg 2000).

B. EPA Guidelines for Assessing Ecosystem Benefits

The recent EPA Guidelines provide a framework for benefit assessment as well as specific guidelines for organizing assessment of ecological benefits such as those related to reduced I&E.

1. EPA Guidelines for the "Effect by Effect" Approach

The EPA Guidelines provide an overview of the "effect-by-effect" approach for valuing the benefits of an environmental program, such as the issuance of a 316(b) permit. The Guidelines note that this is the most widely used approach for estimating the benefits of a policy option. An alternative approach is to develop WTP estimates for the combined effects of the environmental program, which would eliminate the need to identify, quantify and value each effect separately. <FN 10>

The general effect-by-effect approach as laid out in the EPA Guidelines consists of three logical components:

1. The identification of physical effects.
2. The quantification of the major physical effects.
3. The estimation of the values of these physical effects.

The EPA Guidelines provide additional recommendations for these various steps and how to implement them in various circumstances, including where ecosystem benefits occur.

2. EPA Guidelines for Evaluating Ecosystem Benefits

The benefits due to reduced I&E represent ecosystem benefits because they affect the services provided by the nation's water resources. In the case of the Delaware Estuary, for example, changes in I&E at Salem affect fish populations in the Delaware Estuary and in other water bodies that the affected fish populate.

The EPA Guidelines (2000) provide a summary of the benefit categories relevant to an assessment of ecological benefits. Figure 2 outlines this classification scheme.

Figure 2. Summary of Classification Scheme from EPA Guidelines
[see hard copy for figure]

The following is a brief overview of the categories relevant to ecosystem valuation (adapted from EPA 2000), which serves as a prelude to the consideration of categories included in the Delaware Case Study.

-Market benefits. Direct market benefits relate to primary products that can be bought and sold in competitive markets. The EPA Guidelines note that examples include agricultural products, commercial fish species and timber.
-Non-market benefits. These include benefits that are experienced directly by individuals but that are not bought and sold in markets. Non-market benefits listed in the EPA Guidelines include both consumptive uses (e.g., recreation fishing and hunting) and non-consumptive uses (e.g., scenic vistas, wildlife viewing, hiking and boating).
-Indirect benefits. Ecosystems can provide services that do not directly benefit individuals but may be valued because they provide biological services required for services that are valued directly by individuals. Examples in the EPA Guidelines include wetlands, usefulness in recharging groundwater, mitigating flooding or trapping sediments.
-Non-use benefits. This category includes benefits not associated with any direct use by individuals or mankind. Also referred to as passive use values, these benefits are based upon the knowledge the resource exists in an improved state. The EPA Guidelines mention the commitment of some groups to particular animals or ecosystems as examples of nonuse benefits.

This list provides a useful template for evaluating the benefit assessments contained in the Delaware Case Study.

C. Benefit Assessment Approach in the Delaware Case Study

This section considers the consistency of the approach in the Delaware Case Study with the EPA guidelines, both the overall approach and the particular approach for ecosystem benefits.

1. Overall Approach

The Delaware Case Study follows the "effect-by-effect" approach recommended in the EPA guidelines. The following are the activities corresponding to the three-step process in the EPA guidelines contained in the Delaware Case Study.

--Identification of physical effects. EPA performed several tasks related to this step.
   -Described the physical setting in the Delaware Estuary.
   -Noted that the current CWIS at Salem involves the I&E of various aquatic species.
   -Categorized the aquatic species affected by Salem into those considered to be "representative important species"
   -Identified whether the various species are commercial, recreational or forage fish.
--Quantification of physical effects. EPA performed several tasks in this category for Salem. The

tasks include breakdowns by species.
-Estimated annual impingement.
-Estimated annual entrainment.
-Determined the splits between recreational, commercial and forage.
-Determined the numbers of age 1 equivalents.
-Determined the yield lost to fisheries and production foregone.
--Estimation of the values of these physical effects. The steps involved here are discussed in the following section.

This strategy is similar to the approach developed by PSEG in Salem's 1999 Application (PSEG 1999).

2. Benefit Valuation Approach

U.S. EPA (2002a) provides an overview of its benefit estimation for Salem in Chapter B6 that summarizes the nature of the benefit valuation. Figure 3 reproduces the basic steps.

Figure 3. Overview of EPA's Methodology for Valuing Economic Losses due to I&E at Salem
[see hard copy for figure]

This valuation approach is consistent with the general approach for ecological benefits in the EPA Guidelines, with one exception. Figure 4 reproduces the EPA Guidelines categories, adding the specific categories for Salem.

Figure 4. Application of EPA Classifications to Salem Case Study
[see hard copy for figure]

The exception between the approach in the EPA Guidelines and the approach in the Delaware Estuary Case Study is the treatment of nonuse benefits. In the EPA Guidelines, nonuse benefits are treated as a separate category from all of the use benefits. In the Delaware Case Study, the nonuse category is treated as a supplementary element of recreational benefits. As discussed in Chapter V, the treatment of nonuse benefits in the Delaware Case Study is not consistent with sound economic principles, including those reflected in the EPA Guidelines.

D. Summary

The general benefit assessment approach in the Delaware Case Study is consistent with the EPA Guidelines in following the "effect-by-effect" approach. EPA develops estimates of the effects of I&E on populations of various fish species and develops estimates of the changes in relevant fish populations. These changes in fish populations are used to develop total dollar benefit estimates for I&E based on the following benefit categories:

1. Commercial benefits;
2. Recreational benefits;
3. Forage benefits; and
4. Nonuse benefits.

The following four chapters estimate the specific methodologies used in the Delaware Case Study for these four categories.

[comment text continued in 316bEFR.075.503]

Footnotes

4 Impingement is defined as the trapping of fish and other aquatic life on equipment at the entrance to CWIS. Entrainment occurs when small aquatic organisms, eggs, and larvae are taken into the cooling system, passed through the heat exchanger, and then discharged back into the source water body.

5 The Delaware Case Study is Section B of U.S. EPA (2002a).

6 Other reports provide additional economic assessments related to the 316(b) Phase II Proposed Rule. See Desvouges et al. (2002), Stavins (2002), and Strand (2002). Harrison and Schatzki (2000) provides an overview of general economic issues related to 316(b) benefit-cost determinations. The biological issues in the Delaware Case Study are discussed in Heimbuch (2002).

7 EPA states that there are 539 existing power plants that would be regulated under this rule. EPA refers to these as the “in-scope” facilities (67FR 17130).

8 This report does not evaluate other aspects of the Phase II rule, including the economic criteria that should be used to determine BTA and the importance of site-specific evaluations. See Harrison and Schatzki 2000 for an evaluation of these issues in the context of EPA’s Phase I rule. Evaluations of other economic issues related to the Phase II proposal are provided in Desvouges et al. 2002, Stavins 2002 and Strand 2002.

9 Note that consistency with the EPA Guidelines is not assured. In other case studies, EPA uses a so-called Habitat Replacement Cost (“HRC”) approach that is not consistent with the EPA Guidelines or sound economic methodology. See Harrison et al. (2002) and Stavins (2002) for evaluations of the HRC approach in the context of EPA’s case studies for the Pilgrim and Brayton Point facilities, respectively.

10 In other 316(b) case studies, EPA uses what it terms the Habitat Replacement Cost (“HRC”) method to develop a comprehensive value estimate. This is not a valid economic approach, as noted in Harrison et al. (2002) and Stavins (2000).

EPA Response

This comment summarizes the overall approach EPA used in the cost-benefits analysis for the proposed Section 316(b) Phase II rule. Comments on specific methods have been included in other comments.

For EPA's response to comments on whether EPA guidelines were followed in estimating non-use values, please see the response to comment #316bEFR.005.013.

For EPA's response to comments on Commercial benefits please see the response to comment #316b.EFR.005.029.

For EPA's response to comments on recreational benefits please see the response to comments #316b.EFR.075.504 and #316b.EFR.041.452.

In the analyses for the NODA and the final rule, EPA estimates forage benefits by translating foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to uncertainty in monetizing non-use values for this rule. The Agency, however, has explored several methods that indicate the potential for significant non-use values. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003).

Also please refer to the discussion of ecosystem services and values in Chapter A9 of the Regional Studies Document.

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Author Name Maureen F. Vaskis & Mark F. Strickland
Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.02.02
Commercial Fishing Benefits

[comment continued from 316bEFR.075.502]

III. EVALUATION OF THE EPA METHODOLOGY FOR ESTIMATING THE ECONOMIC VALUE OF COMMERCIAL FISHING BENEFITS

This chapter examines EPA's methodology for determining the value of commercial fishing benefits associated with a reduction in I&E. The chapter presents a brief overview of EPA's evaluation of commercial benefits, provides conceptual background on fishery economics that underlies our assessment of EPA's methodologies, and then presents our assessment of EPA's analysis of commercial benefits. The final section summarizes our conclusions regarding EPA's assessment of commercial benefits.

A. Overview of EPA's Methodology and Results for Salem

Chapter A-9 of EPA's Case Study outlines the three basic steps taken to evaluate the direct commercial fishing benefits of reduced I&E:

1. Estimate the increase in commercial landings attributable to a reduction in I&E;
2. Calculate the market value (i.e. the change in gross revenue) of the increase in commercial landings; and
3. Convert the market value calculation into an estimate of total social benefit.

The following sections discuss each of these steps in the Delaware Case Study.

1. Increase in Commercial Landings

The first step in EPA's methodology is to assess the I&E-related change in commercial landings, as measured by pounds of commercial species sold dockside by commercial harvesters. Chapter A-5 of EPA's Case study describes the specific methodology used to estimate this change. The methodology involves calculating the number of fish with commercial value that will reach harvesting age, estimating the number of these fish that will be harvested, and allocating the resulting yield between commercial and recreational anglers according to historical trends. As noted, EPA based their estimates on data collected from Salem.

Table 2 shows EPA's estimates of foregone commercial landings at Salem due to I&E for each individual "representative important species" ("RIS"), as well as the total foregone landings for all non-RIS fish. The table distinguishes between losses due to impingement and losses due to entrainment, the latter of which accounts for over 98 percent of the total.

Table 2. Foregone Commercial Landings due to I&E at Salem (pounds)
[see hard copy for table]

2. Additional Gross Revenues to Commercial Fishermen due to the Increased Commercial Landings

The second major step in EPA's methodology is to develop estimates of the additional gross revenues to commercial fishermen associated with the increases in commercial landings that could occur if I&E were reduced under a final rule for existing generation facilities under Section 316(b). EPA obtained market data on the commercial prices for each RIS from the National Marine Fisheries Service (NMFS), which lists ex vessel values and volumes for commercial landings of each species in each state (or, where isolation of individual states is not feasible, for groups of neighboring states). To adjust for differences in prices over time, EPA determined the average price over ten years and used this average to determine the price per pound of each species. EPA estimated the value for non-RIS species by taking the average of all RIS values. Table 3 shows the prices of the species affected by I&E at Salem, as estimated by EPA. Prices are given in 2000 dollars.

Table 3. Ex Vessel Prices of Species Affected by I&E at Salem as Calculated by EPA
[see hard copy for table]

EPA multiplied the change in the commercial catch for each species (Table 2) by its average ex vessel price (Table 3) to determine the change in gross revenue to commercial fisherman. Table 4 shows the change in gross revenue due to I&E at Salem for each RIS and all non-RIS fish.

Table 4. EPA Estimates of the Gross Revenues of Commercial Species Affected by I&E at Salem
[see hard copy for table]

3. Added Social Benefit

The third step in EPA's methodology is to convert the calculations of gross revenue into estimates of total economic surplus, which includes both producer and consumer surplus. Producer surplus represents the revenues that producers as a whole receive in excess of their total costs. Consumer surplus represents the benefit that consumers as a whole derive from purchasing goods or services at the relevant price, net of the amount that they pay for the goods or services.

a. Producer Surplus to Commercial Fishers

Citing studies by Rettig and McCarl (1985), and Huppert (1990), EPA first argues that

"the economic literature ... suggests that producer surplus values for commercial fishing ranges [sic] from 50 to 90 percent of the market value. That is, the wholesale landings values are a close proxy for producer surplus because the commercial fishing sector has very high fixed costs relative to its variable costs. Therefore the marginal benefit from an increase in commercial landings can be estimated to be approximately 50 to 90 percent of the anticipated change in commercial fishing revenues" (U.S. EPA 2002a, p. A9-5).

The Case Study document then cites Cleland and Bishop (1984) and a personal communication with Dr. Bishop as supporting an estimate that in Great Lakes fisheries, the surplus of commercial fishermen is approximately 40 percent of gross revenues. On this basis, EPA concludes that "producer surplus estimates in the range of 40 percent to 70 percent of landings values ... probably are a more suitable reflection of longer-term market conditions" (U.S. EPA 2002a, p. A9-5; see also p. B4-8).

b. Surplus to Consumers and Other Market Participants

EPA argues further that this surplus to fishermen is only a fraction of the total change in surplus that will also accrue to wholesalers, processors, retailers, and ultimately to consumers as a result of reductions in I&E. The Case Study document cites Norton et al. (1983), Holt and Bishop (2002), and a personal communication with Dr. Bishop for support of this claim:

"Primary empirical research deriving "multi-market" welfare measures for commercial fisheries have estimated that surplus accruing to commercial anglers amount [sic] to 22.2% of the total surplus accruing to watermen, retailers and consumers combined in the striped bass markets in New York and Baltimore (Norton et al., 1983); and 22.3% in the Great Lakes (Bishop, personal communication, and Holt and Bishop, 2002) (U.S. EPA 2002a, p. A9-5).

Thus, total economic surplus across the relevant commercial fisheries multi-tiered markets can be estimated as approximately 4.5 times greater than producer surplus alone (given that producer surplus is roughly 22% of the total surplus generated). This relationship is applied in the case studies to estimate total surplus from the projected changes in commercial landings" (U.S. EPA 2002a, pp. B4-8, B4-9).

Although the Delaware Case Study is not clear on the derivation of this estimate, a response to questions by the EPA (U.S. EPA 2002b) indicates that the multiplier is based on the total surplus derived from commercial fishing by fishermen, wholesalers, retailers and consumers, as reported in Norton et al. (1983). The authors report that in 1980, fishermen across the Atlantic coast derived $0.77 million in producer surplus from their striped bass catch. The authors calculate the total benefit to consumers, retailers, and wholesalers to be $2.71 million. The surplus to commercial fishermen therefore represents 22 percent of the $3.48 million total surplus.

4. Example of EPA's Calculation

Table 5 illustrates EPA's methodology for the calculation of annual I&E impacts on commercial fishing. This table is based upon a similar table developed by EPA in the Delaware Case Study. <FN 11>

Table 5. Example of EPA's Calculation of Total Surplus Losses from Commercial Weakfish Fishing due to I&E at Salem (baseline)
[see hard copy for table]

B. Conceptual Considerations

1. Theory of Open Access Fisheries

It has been well established for almost 50 years that under an open access fishery, competition among fishermen will drive producer surplus to zero for all fishermen. <FN 12> Ocean fisheries are typically common property resources, with no one exercising control over them. Since no individual or group has the property rights to the fishery, no single fisherman can exclude any other from exploiting the fishery. This situation has been labeled “the tragedy of the commons” in a famous article by Garrett Hardin (1968).

Under such circumstances, “externalities” associated with the use of the common resource by many independent producers result in a reduction in the productivity of that resource. In fisheries such as the Delaware Estuary, as more fishermen harvest fish from the water, the ability of the fish population to reproduce at the most profitable rate is compromised. The result is that the economic value of the resource—i.e. the producer surplus—is dissipated and even destroyed, because fish are harvested at a point where the marginal cost of harvesting them, including the effects on the future stock, is higher than the marginal benefit.

The economic inefficiencies associated with open access fisheries can be summarized as follows: <FN 13>

-Too many economic resources are committed to fishing—more fishermen employ more boats and fishing effort than would be economically optimal.

-Current fishermen therefore earn a substantially lower return on their efforts.

-Over-fishing reduces the stock below its optimal level, which in turn lowers future profits from fishing. <FN 14>

These considerations mean that an open access fishery will generate no producer surplus. For our purpose, the key implication is that changes in conditions at the fishery—such as an increase in the number of commercial fish available due to reduced I&E—will not lead to any change in producer surplus.

Freeman (1993) provides a graphical depiction of the implications of open access on producer surplus and illustrates that changes in environmental quality—such as a reduction in I&E at Salem—would not lead to increases in producer surplus to fishermen. Figure 5 shows the marginal cost curve and average cost curve for a given commercial fishery, along with the relevant demand curve. As Freeman notes, if the fishery were privately owned, the output and price would be given by the intersection of the marginal cost function and the demand curve, with price equal to and quantity equal to ; fishermen would obtain a producer surplus in this case. An improvement in environmental quality—such as a reduction in I&E at Salem—would reduce the marginal cost (not shown) and lead to an increase in quantity, a decrease in price, and an increase in producer surplus to fishermen.

Figure 5. Welfare Measurement for Open-Access Resources: The Case of a Fishery
[see hard copy for figure]

The situation is very different in the case of an open access fishery. In this case, the economic incentives lead to a situation where the price (Pc) would be equal to average cost (not marginal cost), and where each fisherman earns zero profits. Freeman notes that for the same change in environmental quality in a fishery with open access, even if quality improves and fish become more abundant, “there is no change in producer surplus.” The logic behind this result is that positive producer surplus would lead additional fishermen to enter the fishery, driving the price down to Pc and the quantity up to xc. At this point, all of the producer surplus is again dissipated and no fishermen receive any producer surplus.

The graph shows that changes in environmental quality therefore have no effect on net producer surplus. Better fishing conditions shift the average cost curve outward to ACx. This reduction in costs and temporary improvement in profit results in additional fishing effort by existing fishermen and by new entrants. The added effort increases fishing output <FN 15> and reduces the price of fish until the zero profit position is reached in the new circumstances. The net result is that the improved conditions do not yield long-term producer surplus gains to fishermen; the superior fishing conditions are dissipated by additional fishing effort (and price changes, to the extent that these occur).

2. Changes in Producer and Consumer Surplus Due to Small Changes in Additional Fish

Figure 5 suggests that consumers would gain from the environmental improvement in the form of reduced prices for fish. This result, however, depends upon the demand elasticity; the more elastic the demand for fish, the smaller the welfare gain associated with the environmental improvement. Because small segments of a given market have more elastic demand curves than the market as a whole, consumer benefit from changes to small market segments will also be small, or even negligible. As Freeman (1993) notes:

"[I]f this fishery is small relative to the market and the demand curve is perfectly elastic, there is no welfare gain [from the improvement in environmental quality]. The physical improvement in productivity brought about by the higher water quality is entirely dissipated by the uneconomic competition of fishermen for the potential increase in rents" (Freeman 1993, p. 308-9).

Figure 6 illustrates the situation in which the effect is small relative to the overall market for fish—and thus demand is perfectly elastic. As discussed below, this appears to be the case for the effect of I&E at Salem. The figure shows the shift in the average cost curve from to and the increase in the number of fish bought and sold. However, because the average cost still equals the price, there is no change in the profits to commercial fishers. Moreover, there is no change in consumer surplus, since the price remains the same. The improvement in environmental quality leads to additional fish caught and sold, but no increase in producer or consumer surplus, and thus no environmental benefits.

Figure 6. Welfare Measurement for Open-Access Resources with Perfectly Elastic Demand
[see hard copy for figure]

C. Evaluation: EPA's Commercial Benefit Estimates Are Substantially Overstated Because of Mischaracterizations of the Empirical Studies Used in the Assessment

This section evaluates EPA's approach to estimating the benefits to the commercial fishery of reduced I&E at the Salem facility, in light of the conceptual issues discussed in the previous section. Based on this evaluation, the commercial estimates reported by EPA appear to be substantially overstated.

1. Ex vessel Commercial Fish Prices

EPA's estimates of the ex vessel values appear to be reliable. The values, which range from $0.11 per pound for alewife to $3.18 per pound for striped bass, appear to be accurate estimates of the average values for ex vessel prices in New Jersey and Delaware, based on NMFS data (NMFS 2002). Although the range of certain species suggests that affected fish would be caught in other areas, these state values are representative.

Note that by using the prevailing ex vessel prices EPA appears to assume implicitly that the cropping at Delaware in-scope facilities does not affect the market price. This assumption seems sensible in light of the large overall market for fish. Note however, that EPA's use of the 4.5 multiplier (discussed below) contradicts this assumption by implying a substantial change in price.

2. Estimates of Producer Surplus Benefits to Fishermen

EPA's Delaware Case Study estimates that the producer surplus to fishermen will be between 40 and 70 percent of gross revenues.
EPA cites four published sources and a personal communication with Dr. Richard Bishop, a co-author of two of the studies, in support of the claim that producer surplus will fall between 40 and 70 percent of gross landing revenues. There are several problems with this claim, which upon further inspection does not appear to be supported by the literature cited.

a. Surplus as Proportion of Gross Revenue

A review of EPA's sources suggests that the conclusions drawn regarding producer surplus are taken somewhat out of context and that they are inappropriate for use in the present analysis. EPA's Guidelines emphasize the importance of transferring benefits from like cases. For the present case study, the differences are significant enough that they result in significant errors.

Rettig and McCarl (1985) appears to be the source of EPA's 50 to 90 percent estimate, which the authors cite in the context of the salmon and steelhead fisheries of the Pacific Northwest. They argue that in that context, "variable costs may be approximately 50% of revenues for all commercial operators" (p. 205), which would imply a (short-term) producer surplus of 50 percent of revenue. The authors suggest (again in the context of salmon and steelhead fisheries in the

Pacific Northwest) that 90 percent may be appropriate for a sensitivity analysis, based on research by two previous sources in British Columbia and Alaska. Importantly however, Rettig and McCarl note that the higher estimate was intended to include surplus to processors and retailers (p. 206). If used in conjunction with EPA's other procedures for estimating total surplus, this would double-count the surplus and result in significant overestimates.

Although not directly concerned with the rehabilitation of a fishery, Cleland and Bishop (1984) includes data from which the fishermen's surplus as a percentage of gross revenues can be calculated. After accounting for depreciation and the opportunity cost of capital, the estimated return to labor ranged from –57 percent to + 35 percent of gross revenues. Cleland and Bishop note that 1981, the survey year, was "a very good year by comparison to historical standards. Returns to labor are likely to be far lower in poor years" (p. 42).

It is important to note that the characteristics of fisheries vary substantially with respect to the methods used to harvest fish and the composition of fishing investments. Some fisheries involve significantly greater capital investment than others, for example. According to Norton et al. (1983), New England fishermen received only $0.21 per pound in surplus for striped bass, suggesting a surplus of around 11 percent of gross revenues (p. 44). Excluding fixed costs (for the short-term) the proportion would rise to around 30 to 35 percent (pp. 7-8). Norton et al. (1983) further note that for Southern Atlantic fisheries, fishermen's surplus was actually zero (p. 44). Strand (2002), one of the authors of the Norton et al. study, puts surplus at "approximately 15 percent of vessel values" for Atlantic fisheries. The Pacific Northwest and Great Lakes fisheries cited in the sources used by EPA therefore may not be representative of the Atlantic fishery analyzed for the Delaware Case Study. A complete analysis would attempt to develop estimates of fishermen's surplus that was relevant to the fisheries and markets in question.

b. Applicability of "Rule of Thumb" to Short and Long Run

In addition to these questions about the applicability of the rules of thumb used by EPA, given the different geographical location of the relevant fisheries, there are also questions related to the time-period over which the rule of thumb would be relevant if it were applicable. EPA's sources emphasize the short-term nature of the rule of thumb, particularly in the higher range. EPA does not acknowledge the difference between short-term and long-term effects in its discussion.

In his review, Huppert (1990) notes that when applying the 50 to 90 percent "rule of thumb" to estimate quasi-rents, <FN 16> the approach can only be appropriate in the very short run:

"For very short-run policy shifts, it might be reasonable to assume both labor and capital to be fixed factors, making quasi-rent equal to Total Revenue [sic] minus the component of variable costs that can be avoided in the short run (e.g. fuel expenses). A slightly different procedure, but in the same spirit, is calculation of quasi-rent or rent as a percentage of the fishery gross revenues.… Rettig and McCarl [1985] <FN 17> suggested using a range of percentages from 50 percent to 90 percent for sensitivity analysis. The logic for these percentages is that they represent the variable inputs cost as a fraction of total cost for a wide variety of fishing operation studies on the Pacific coast."

Again, this approach would be more appropriate the shorter the time period over which the benefits are purported to flow. The longer the 'run' being considered, the more elastic the labor supply is likely to be, and the less fixed is the capital. … [T]he rule of thumb exclusion of capital and labor costs in calculating fishery benefits is strictly a very short-run approximation" (Huppert 1990, pp. 28-29).

Huppert's point is that a "rule of thumb," such as used by EPA in this case, will only be applicable as long as certain fixed costs—e.g., capital investments such as a commercial fisher's boat and other equipment, and the labor of the fishing crew—are not changed in response to a change in fish stocks. Initially, when fishermen decide to expend more or less fishing effort, the only costs that change are the variable costs, which include fuel and may include the opportunity cost of labor, assuming that alternative employment is available. Since the fixed costs are already incurred and do not change, they do not figure in the producer surplus calculations. In their discussion of the salmon and steelhead fisheries in the Pacific Northwest, Rettig and McCarl (1985) make a similar point. They note that the use of a proportion greater than 50 percent would only apply in first year.

In the longer term, however, the fixed costs that were ignored when calculating the share of revenues offset by costs must also be included. In the longer run firms can make changes in their output and production mix based on external conditions because the supply of capital and labor is no longer fixed. EPA does not appear to make any attempt to adjust its estimates to account for long-term considerations, but uses the 40 to 70 percent value even as a long term value. To stay true to EPA's sources, it should stick to its lower-bound estimate for the long-term—also keeping in mind the discussion in the preceding section regarding the appropriate magnitude of producer surplus for Eastern fisheries.

c. Considerations Related to Open Access

In addition to these longer-run effects on producer surplus, which would apply in any segment of the economy, the open access characteristics of fisheries further reduce the surplus that can be expected by fishermen in both the short- and longer-term. As noted earlier in the discussion of open access, a change in the number of fish available to be harvested will have no effect on producer surplus, which will be zero regardless of the number of fish available, unless measures are taken to prevent economic over-fishing.

Indeed, the sources cited by EPA affirm this point. As noted above, Norton et al. (1983) found that for fishermen in Southern parts of the Atlantic fishery analyzed, the producer surplus was in fact zero, because net costs were equal to net revenues. Rettig and McCarl (1985) observe that under open access,

"[f]ishermen, vessels, and operating capital enter until costs have risen by as much as the increase in revenues. Profits and, hence, net benefits are dissipated." … If there were no new impediments to entry, net benefits in the long run would tend toward zero" (Rettig and McCarl 1985, p. 205-6).

As a result of these considerations, the change in surplus to fishermen that results from the change in harvest due to I&E at Salem is likely to be very small over the long-term, and may in fact approach zero.

3. Use of Multi-Market Multiplier

As discussed earlier, EPA multiplied its estimate of producer surplus to commercial fishermen by 4.5 to account for potential surplus to consumers and other producers in the supply chain. The studies cited by EPA do not support the "multi-market" multiplier (4.5) used by EPA to translate changes in producer surplus to fishermen into changes in total producer and consumer surplus. EPA applies this scaling factor to account for the purported benefits to consumers, retailers, and wholesalers, despite the fact that economic theory and its own primary sources suggest that such benefits are unlikely to exist. In a discussion of the relevance of consumer surplus in analyses of changes in fisheries, Bishop et al. (1990) write:

…most applied studies focus on single populations or a subset of all the populations of a species or group of related species. Management of such subunits may have little or no effect on prices in markets where outputs from many subpopulations are bought and sold. If market prices are unaffected, then consumer surplus does not change and the economic conclusion is that management measures would have little or no effect on consumers.

The price of fish ultimately depends upon the total catch and consumer demand for fish, as well as the availability of substitutes for any particular species that may be affected. The potential harvest affected by I&E at Salem is a very small share of the total expected fishing catch in the Atlantic market, or even for the smaller mid-Atlantic region. Because the change due to I&E in the number of fish that would be brought to market is a negligible portion of the total catch, the price of fish would not be expected to change as a result of I&E. Consumer surplus will only change if the demand curve shifts, or if the price of fish changes for some other reason. But since neither of these is expected as a result of I&E at Salem, consumer surplus will not change. As a consequence, it would be inappropriate to estimate changes in consumer surplus in any analysis of the effects of I&E at Salem. In the example from Freeman (1993) cited previously, Freeman notes that where a fishery "is small relative to the market and the demand curve is perfectly elastic, there is no welfare gain." We therefore would not expect to see a change in consumer surplus as a result of changes to I&E at Salem.

Note that this conclusion is consistent with the possibility that reducing I&E at Salem could result in a small increase in fish sales, and thus additional consumer spending on fish. Despite increased spending, however, any additional fish sales would not lead to additional consumer surplus, or benefit in excess of the price paid. One way to understand this point is to consider those consumers who might be affected by the marginal increase in fish available for sale. Recall that consumer surplus is typically depicted as the area between the demand curve and the price. At the fish purchase that "clears" the market, the marginal consumer surplus, like the marginal profit, is equal to zero. When the number of fish available increases slightly, the marginal consumers who choose to purchase these additional fish would be those at the very "tip" of the consumer surplus "triangle." They would therefore derive a benefit from these fish that was very close to zero. The effect on consumer surplus of Delaware Estuary I&E is therefore negligible.

Similar reasoning can be used to conclude that there will be no effect on retailers' surplus as a result of I&E, because the price that retailers receive from consumers will not change, and retailers' costs have not changed. Thus, although there might be marginally more fish available in the entire market, any effects on individual retailers would be negligible.

The only level of the supply chain above fishermen themselves where it is possible that there could be some producer surplus is at the wholesale level. It is possible that I&E losses could affect certain wholesalers who purchase fish from affected fishermen. Even here, however, it is unlikely that wholesalers' surplus would be affected, because neither wholesaler costs nor the prices they receive from retailers are likely to change. Although some wholesalers may purchase marginally fewer fish from commercial fishermen as a result of I&E, these fish would be at the margin, and therefore contribute very little to the overall wholesaler surplus. Nevertheless, to account for the possibility that some fishermen are themselves wholesalers, or that some wholesalers are significantly affected by reductions in catch from selected fishermen, it may be appropriate to consider potential effects on the surplus accruing to them. One way of accounting for this would be to use wholesale rather than ex vessel prices as the basis for any producer surplus calculations. This could be considered a sensitivity case that would give an upper bound to the surplus estimates. Such a case would be unlikely to increase the surplus estimates dramatically, since wholesale prices are not substantially higher than ex vessel prices.

In addition, the "mark-up" included in wholesale prices should not be interpreted as "pure profit" or surplus to wholesalers. Additional sales of fish of course will result in increased revenue to the wholesalers. But assuming that the entire "mark-up" constitutes a profit for wholesalers ignores the additional costs that are borne by a wholesaler in carrying the goods and bringing them to market. For example, Norton et al. (1983) observes that the wholesalers' mark-up of 10 to 20 percent covers many of the variable costs associated with the purchase of fish from watermen. At the very least, these variable costs must be excluded from any calculation of the surplus to wholesalers. In a competitive market, one would in fact expect that the variable costs of the additional fish sold would be the same as the price received—and therefore the net surplus would be zero.

Ignoring the additional costs associated with the wholesale mark-up when using the wholesale price to estimate gross revenues results in overestimates of the total surplus accruing to wholesalers.

D. Summary

In summary, EPA's estimates of commercial benefits are significantly overstated. EPA relies upon two "rules of thumb" that generate excessive estimates of the surplus that would accrue to market participants as a result of increases in the commercial catch if I&E were reduced at Salem.

Using more reasonable estimates of surplus associated with increases in the commercial catch would result in much lower estimates than those EPA developed for the Delaware Case Study. One plausible alternative (i.e., from Strand (2002), citing his work on Norton et al. (1983)) would suggest that the mid-range increase in surplus would be only 15 percent of gross landing revenue—or one-sixteenth what EPA has estimated.

[comment text continued in 316bEFR.075.504]

Footnotes

11 This methodology is presented in Table A9-1 in U.S. EPA (2002a). Although the title of Table A9-1 refers to striped bass, the values appear to be based upon shad. Note that the example we present in Table 5 relates to weakfish.

12 The classic article is Gordon (1954). The basic arguments are described in environmental and natural resource textbooks. See, e.g., Tietenberg (2000).

13 These inefficiencies are sometimes described as "economic over-fishing." This is distinguished from "biological over-fishing," in which fish are harvested faster than they can reproduce their population, leading to a decline in fish stocks.

14 Note that the increase in output from the additional fishing effort may be short-lived if the increased effort further diminishes fishing stocks. See Freeman (1993). Freeman (1991) provides illustrative calculations of the magnitude of the effects of alternative demand elasticities on consumer surplus gains.

15 See Freeman (1993). Freeman (1991) provides illustrative calculations of the magnitude of the effects of alternative demand elasticities on consumer surplus gains.

16 Quasi-rents are defined as "the income of a seller of a good or service over and above its opportunity cost when the good is temporarily in fixed supply" (Pearce, 1995). Because there is limited opportunity to expand capital invested in fishing in the short-term, the fixed costs associated with it are not relevant to the calculation of producer surplus.

17 Huppert cites this as 1984, but is actually referring to Rettig and McCarl's 1985 study.

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

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Subject Matter Code 10.02.01.02
Random Utility Model (RUM)

Author Name Maureen F. Vaskis & Mark F. Strickland
Organization PSEG Services Corporation, Ofc of Environmental Counsel

[comment continued from 316bEFR.075.503]

IV. EVALUATION OF THE EPA METHODOLOGY FOR ESTIMATING THE ECONOMIC VALUE OF RECREATIONAL FISHING BENEFITS

This chapter describes and evaluates EPA's methodologies for estimating recreational losses due to I&E at the Salem facility and other in-scope facilities in the Delaware Estuary. The chapter describes the two methodologies used by EPA to develop recreational benefits estimates for this category.

A. Overview of EPA Methodology and Results

The Delaware Case Study describes EPA's development of recreational fishing values. The methodology is complicated by the fact that EPA used two different types of methodologies to develop recreational benefits, the benefits transfer approach for all species and a random utility model ("RUM") study for two of the species; the final results include the use of the RUM results for those two species and the benefit transfer results for the other species.

The following is an outline of the basic steps the EPA followed in developing recreational benefit estimates for the Delaware Case Study:

1. Estimate the increase in recreational fish yield attributable to a reduction in I&E (converting pounds into number of fish).

2. Determine the additional consumer surplus for all species using the benefit transfer methodology.

3. Prepare a RUM study for two species and calculate the additional consumer surplus for these two species using the RUM study results.

4. Calculate the total social benefit from additional recreational catch based upon the results of both the benefit transfer study and the RUM study.

The following sections discuss each of these steps in the Delaware Case Study.

1. Determine Increase in Recreational Yield

The first step in EPA's methodology is to assess the I&E-related change in recreational yield, as measured by pounds of each species caught recreationally. The first elements are the same as for the calculations of additional commercial fishing, as described in the previous chapter. The total yield was partitioned by species based upon percentages obtained from the PSEG filing for Salem. Because the economic values for recreational yield are based upon numbers of fish rather than pounds, the recreational yield values were converted to numbers of fish based upon the average weight of harvestable fish for each species.

Table 6 shows EPA's estimates of recreational yield in pounds due to I&E for each individual "representative important species" ("RIS"), as well as the total for all non-RIS fish. The table distinguishes between losses due to impingement and losses due to entrainment, the latter of which accounts for over 98 percent of the total. Table 7 shows the equivalent table after the yields have been transformed to numbers of fish.

Table 6. Foregone Recreational Yield due to I&E at Salem (pounds)
[see hard copy for table]

Table 7. Foregone Recreational Yield Due to I&E at Salem (numbers)
[see hard copy for table]

2. Determine Recreational Benefits Based on Benefit Transfer

The second major step in EPA's methodology is to develop estimates of the values that recreational fishermen place on the additional yields using the benefit transfer methodology.

a. Benefit Transfer Approach

In a benefit transfer approach, results from studies of recreational anglers' willingness to pay ("WTP") for increases in recreational catch rates are applied to expected changes in catch rates that would result from reduction of I&E. For all of the species, EPA used the benefit transfer approach to value the recreational costs of I&E. EPA followed two steps in this analysis.

(1) Estimate Average Recreational Values Based on Existing Studies

EPA valued each affected species using values from previous studies of recreational fishing in the mid-Atlantic region. Table 8 shows the four studies that EPA used to develop estimates for transfer to the Delaware Estuary recreational fishery and the recreational values, which the studies derive by type of fish.

Table 8. Studies Used by EPA in Its Benefit Transfer Approach to Estimate Values for Potential Changes in Recreational
[see hard copy for table]

EPA used these studies to develop separate lower and upper bounds for recreational fish values in Delaware and New Jersey. EPA then weighted these values according to the percentage of recreational landings in each state to derive weighted average low and high values. Table 9 lists these values, as well as a midpoint value. The midpoint values for the different species range from $1.45 for white perch to $9.51 for striped bass.

Table 9. Average Recreational Values by Species Due to I&E at Salem
[see hard copy for table]

b. Calculate Recreational Losses by Species

EPA multiplied the estimated fish values by the estimated loss to the recreational catch due to I&E at Salem to produce high and low estimates of recreational losses by species, which are presented in Table 10.

Table 10. EPA Estimates Using Benefit Transfer Method of Recreational Losses due to I&E at Salem by Species
[see hard copy for table]

3. Random Utility Model

a. EPA based estimates of recreational losses associated with two species—weakfish and striped bass—on a RUM analysis of recreational fishing benefits from reduced I&E in the Delaware Estuary. EPA used these estimates--and not the benefits transfer estimates for striped bass and weakfish--in calculating the total value of losses at SalemEstimate Values by Species of Reducing I&E at Salem

EPA used data from the NMFS Marine Recreational Fishery Statistics Survey ("MRFSS") combined with the 1994 NMFS Add-on MRFSS Economic Survey ("AMES"). These data provide information about recreational anglers, where they fish, and what fish they catch.

EPA used data from the MRFSS and the AMES to develop a RUM that models site selection as a function of historic catch rates for certain species and other relevant variables. <FN 18> EPA also used a negative binomial model to predict anglers' choices as to how many fishing trips to take during a recreational season. EPA used these models to estimate the per-trip welfare gain from higher catch rates associated with reducing or eliminating I&E of relevant species.

Table 11 shows EPA's estimates of per-trip welfare gain associated with eliminating I&E of striped bass and weakfish in the Delaware Estuary. The table also shows EPA's estimate of the WTP for an additional fish based upon the RUM study. Also included are values for gains to fishermen when no target species was identified.

Table 11. EPA RUM Estimates of Per-Trip Welfare Gain by Species for Elimination of I&E at Salem and Willingness to Pay for an Additional Fish per Trip
[see hard copy for table]

b. Estimate Fishing Days for Targeted Species

EPA estimated that recreational anglers in Delaware and New Jersey engaged in a total of about 5.4 million fishing days per year. EPA determined the allocation of the fishing trips to the various target species and accounted for the (modest) effect of growth in the number of fishing days due to the improved catch rates.

Table 12 summarizes the relevant results from EPA's projections of the numbers of trips by target species in the baseline conditions, taking into account the additional trips that would result from improved fishing due to eliminating I&E at Salem. These results show that EPA's estimates of recreational fishing in Delaware and New Jersey break annual trips down by the targeted species. EPA estimates that there are almost 1 million recreational fishing trips per year that target weakfish, about 0.1 million that target striped bass, and about 1.1 million with no target.

Table 12. Total Number of Recreational Fishing Days per Year
[see hard copy for table]

c. Estimate Total Recreational Losses by Species

The estimates of fishing days by species were multiplied by the estimated welfare gains per trip by species to produce an estimate of recreational losses for each species. Table 13 shows the EPA's results for Salem. Note that although EPA provides low and high values, there is no explanation of how the two estimates differ—and in fact they appear to be virtually identical. (The total high value is only 0.4 percent higher than the total low value.)

Table 13. Total Estimated Recreational Losses from Salem by Species
[see hard copy for table]

One confusing element of EPA's recreational valuations is the calculation of the total baseline losses for "no target" species. For reasons that are not explained, the value per trip for weakfish ($1.08) is used to calculate the recreational benefits for the "other species" trips rather than the value per trip for "other species" ($0.41); the use of the weakfish value increases the value attributed to "other species" by a factor of more than 2.5 ($1.08/$0.41=2.63).

4. Combine Benefit Transfer and RUM Results to Develop Recreational Losses Due to I&E at Salem

EPA developed total recreational losses due to Salem by combining the results for the two methodologies. These values are combined and reported in Chapter B6 of the Delaware Case Study.

-RUM values are used for striped bass and weakfish.

-Benefit transfer values are used for the "other species," i.e., the species included in the benefit transfer studies other than striped bass and weakfish.

Table 14 summarizes EPA's estimates of these recreational losses for the Salem facility, based upon the two methodologies. Note that as indicated in a footnote, the recreational value for weakfish includes the value attributed to "no target" species from the RUM analysis. The table includes specific values for each species (other than weakfish and striped bass) developed in the benefit transfer analysis, although the table in Chapter B6 only shows a total for "Other Species."

Table 14. EPA Estimates of Recreational Losses Attributable to I&E at Salem
[see hard copy for table]

B. Conceptual Considerations

EPA's Guidelines (U.S. EPA 2000) describe several methodologies that are appropriate for estimating environmental benefits. OMB has also developed guidelines (1996) that are relevant to the methods used by EPA to obtain its benefits estimates. These guidelines identify best practices for conducting regulatory analysis for significant regulatory actions, such as the 316(b) Phase II Proposed Rule. In this section, we review the recommendations in EPA's

Guidelines regarding use of the benefit transfer methodology and discrete choice models, also known as RUMs.

1. Benefit Transfer Methodology

This section discusses the "benefit transfer" approach, which EPA used to obtain estimates of benefits associated with recreational fishing for all but two of the RIS evaluated for the Delaware Estuary Case Study. The benefit transfer approach adapts results from existing studies, as a substitute for conducting an original valuation study.

Broadly speaking, EPA considers benefit transfer to be an appropriate valuation methodology. As EPA's September 2000 Guidelines for Preparing Economic Analyses note,

The advantages to benefit transfer are clear. Original studies are time consuming and expensive; benefit transfer can reduce both the time and financial resources needed to develop benefit estimates (U.S. EPA 2000, p. 86).

EPA (2000) also provides guidelines for interpreting the benefit transfer methodology.

a. Describing the Policy Case and Affected Population

EPA's Guidelines recommend that the benefit transfer exercise begin with identifying and describing the policy case and the affected population:

The first step in a benefit transfer is to describe the policy case so that its characteristics and consequences are understood. It is equally important to describe the population impacted by the proposed policy. As part of this step, it is important to determine whether effects of the policy will be felt by the general population or by specific subsets of individuals (e.g., users of a particular recreation site or children) (U.S. EPA 2000, p. 86).

In order to evaluate the policy case and any alternatives, it is also important to determine the appropriate baseline against which to assess it. OMB (1996) describes considerations that are important to selection of an appropriate baseline:

The benefits and costs of each alternative must be measured against a baseline. The baseline should be the best assessment of the way the world would look absent the proposed regulation…

When more than one baseline appears reasonable or the baseline is very uncertain, and when the estimated benefits and costs of proposed rules are likely to vary significantly with the baseline selected, the agency may choose to measure benefits and costs against multiple alternative baselines as a form of sensitivity analysis… In every case, an agency must measure both benefits and costs against the identical baseline (OMB 1996).

b. Selecting Studies

The next two steps involve selecting studies to form the basis of the benefit transfer exercise:

-Identify existing, relevant studies. Existing, relevant studies are identified by conducting a literature search. This literature search should, ideally, include searches of published literature, reviews of survey articles, examination of databases, and consultation with researchers to identify government publications, unpublished research, works in progress, and other “gray” literature.

-Review available studies for quality and applicability. The analyst should review and assess the studies identified in the literature review for their quality and applicability to the policy case. The quality of the study case estimates will, in part, determine the quality of the benefit transfer. Indicators of quality will generally depend on the method used. ... (EPA 2000, p. 86)

The EPA Guidelines further note that “assessing studies for applicability involves determining whether available studies are comparable to the policy case.” They offer three criteria to be used in assessing which studies are applicable for use in the benefit transfer:

1. The basic commodities must be essentially equivalent [to the policy case];

2. The baseline and extent of the change should be similar [to the policy case]; and

3. The affected populations should be similar [to the policy case]. (U.S. EPA 2000, pp. 86-87)

c. Transferring the Benefit Estimates

After the analyst has identified appropriate studies, the values from those studies must be transferred to the policy case. The EPA Guidelines discuss four approaches that can be used in doing this (U.S. EPA 2000, p. 87):

-Point estimate. This approach involves taking the mean value (or range of values) from the study case and applying it directly to the policy case. As it is rare that a policy case and study case will be identical, this approach is not generally recommended. Rather than directly using existing values, analysts will often adjust point estimates based on judged differences between the study and policy cases.

-Benefit function. This approach is more refined but also more complex. If the study case provides a WTP function, valuation estimates can be updated by substituting applicable values of key variables, such as value estimates across studies. As with the benefit function transfer approach, key variables from the policy case are inserted into the resulting benefit function.

-Meta-analytic approach. Meta-analysis is a statistical method of combining a number of valuation estimates that allows the analyst to explore systematically variations in value estimates across studies.

-Bayesian approach. This is an alternative to the meta-analytic approach. Bayesian approach provides a systematic way of incorporating study case study information with policy case information.

d. Addressing Uncertainty

Finally, the analyst should address the sources of uncertainty involved in application of the selected studies and the chosen transfer methodology.

Benefit transfer involves judgments and assumptions. Throughout the analysis, the researcher should clearly describe all judgments and assumptions and their potential impact on final estimates, as well as any other sources of uncertainty inherent in the analysis (U.S. EPA 2000, p. 87).

2. Discrete Choice Models/RUMs

The EPA Guidelines note that RUMs (also referred to as discrete choice models) may be the best approach for analyzing the effects on social welfare of environmental quality changes, such as improvements in fishing catch rates. Discrete choice models focus on the decision to recreate at a particular site as compared to alternatives. It is important, however, that the studies use valid data on the nature of the choices, particularly on the differences in the travel costs to the alternative sites that the surveyed anglers face.

Random utility models (RUMs) were developed initially to analyze transportation-mode choices (McFadden 1973, 1974). They are also well-suited for evaluating recreation-site choices (Freeman 1993, Schuhmann 1998). The random utility approach is well-designed to estimate behavioral responses in cases where an individual is faced with one or more discrete choices among a number of different identifiable goods or activities. Using standard axioms of rational behavior, the individual is presumed to rank his or her choices according to the benefit (or "utility") that he or she expects to derive from each. The random utility approach posits that the utility an individual receives from a given activity can be observed with a degree of uncertainty, and the probability that a person will choose to recreate at a particular site will be a function of the expected utilities of all sites within his or her choice set. <FN 19>

C. Evaluation: EPA's Recreational Benefit Estimates Are Compromised by an Overly Simple Benefit Transfer Method and a Flawed RUM Study

This section provides an evaluation of EPA's economic methodology in the Delaware Case Study for evaluating the dollar value of recreational losses due to I&E at Salem.

1. Although Benefit Transfer is a Sound Methodology, EPA Uses an Overly Simple Approach

This section evaluates EPA's use of a benefit transfer method to value recreational fishing benefits. We find that EPA's decision to value these benefits using a benefit transfer method is sound, but EPA's benefit transfer technique is too simplistic and is not endorsed by EPA's Guidelines (2000).

a. EPA's Use of Benefit Transfer to Value Recreational Fishing Benefits is Sound

In general, EPA's choice to use a benefit transfer technique is sound. Benefit transfer is a reasonable approach to obtaining estimates for recreational fishing. Many studies of recreational fishing in the Mid-Atlantic region exist for use in such an assessment.

Although the Delaware Case Study is less than fully explicit in explaining how EPA selected the studies it used for the benefit transfer to the recreational fishery, the studies on which EPA relies appear to generate plausible estimates. In addition, the four studies appear to perform fairly well against at least two of the three criteria discussed in EPA's Guidelines: the basic commodities are essentially equivalent and the affected populations are similar.

b. EPA Uses an Overly Simple Application of the Benefit Transfer Method

Although EPA's decision to use benefit transfer itself is sound, the technique EPA uses to transfer the benefits is not one that is recommended by EPA Guidelines. EPA's analysis for the Delaware Estuary Case Study applies a point estimation approach to transfer a range of values developed in the studies used in the policy case. EPA uses this approach to develop a low and high estimate for each fish species.

This approach is not recommended by EPA's Guidelines. As noted above, the Guidelines state, "As it is rare that a policy case and study case will be identical, this approach is not generally recommended." Despite the fact that the point estimation approach is not recommended, EPA's Delaware Estuary Case Study fails to explain why this approach was selected, and whether other approaches were considered.

Note also that the studies used by EPA develop values for a marginal increase in fish catch. This is appropriate and answers the relevant economic question: how much is one additional fish worth? EPA applies them, however, as though they were average values. A better approach would be to treat them as marginal values. <FN 20>

2. EPA's RUM Study Has Major Flaws

As noted above, the availability of large quantities of detailed data is a prerequisite for conducting correct RUM analyses. An appropriate application of RUM would recognize that there are several levels at which people make decisions; it would model the choices available using detailed inputs to derive the expected utilities for each of them. Because of their speculative nature, RUM analyses are very sensitive and can be easily distorted by incorrect specifications and/or data inaccuracies (Desvousges et al. 2002). The analysis of recreational benefits using RUM conducted by the EPA suffers from a number of such problems, which result in a sizeable overstatement of the value of recreational losses due to I&E at Salem. These problems are described in Desvousges et al. (2002) and are summarized below:

--EPA uses unweighted intercept data, which are not representative of the general population of anglers and over-represents avid anglers who—by definition—place a much higher value on fishing than regular anglers.

--While the opportunity cost of fishing (measured most closely as the per hour wage rate) is among the most important inputs in EPA's model, the EPA relied on an incomplete dataset and made a number of inappropriate assumptions. These include:

-Using the full wage rate to value leisure time, when existing information suggests that leisure time should be valued at one-third of the wage rate.

-Making a number of questionable assumptions to fill in those survey observations that are missing due to people's unwillingness to report their income. These assumptions consistently lead to higher wage estimates. For example, those who do not report unemployment status are considered fully employed and their opportunity cost to fishing is estimated by considering their state, sex, age, and boat ownership. (Wage estimates based on such inputs are also likely to be imprecise.) Homemakers or retired employees are assigned a wage, even though they do not forgo any income by undertaking a fishing trip. Similarly, the forgone wages of part-time employees are valued at the full wage rate.

In summary, the EPA's RUM analysis uses incorrect inputs and makes a number of assumptions that result in an overestimation of the value of the recreational losses. While it is still unclear that the RUM could be successfully used in this case due to data limitations, the EPA misused even the data they obtained. These limitations would have to be corrected before the RUM results for the Delaware Case Study could be considered reliable estimates of recreations benefits.

3. In Its Final Estimates, EPA Uses Values from Both Benefit Transfer and RUM Without Addressing the Inconsistencies and Possible Double Counting

EPA's final damage estimates use the RUM values for striped bass and weakfish and the benefit transfer for all other species. They follow this procedure without addressing the potential inconsistencies and double counting.

a. EPA's Valuations for RUM Are Significantly Higher, Particularly for Weakfish

The two methods used in EPA's report yield significantly different values for weakfish. In the RUM analysis, the weakfish value per fish is more than five times higher than the benefit transfer valuation. This result is significant given that weakfish account for almost a third of the total losses estimated by EPA. EPA does not discuss this discrepancy.

b. The Inclusion of "No Target" Species Creates the Possibility of Double Counting

EPA's inclusion of all "no target" species in the weakfish valuations seems highly questionable. When these values are added to the benefit transfer estimates—which include values for many other species—EPA appears to be double counting some cases. However, it is difficult to be certain because EPA's methodology for including the "no target" estimates is not clear. In particular, EPA's per fish valuations are difficult to reproduce from the numbers and methodologies they provide.

D. Summary

EPA uses two methodologies—RUM and benefit transfer—to value recreational losses due to I&E at Salem and then uses results from both. While the benefit transfer methodology is fundamentally sound, its application in this case is not consistent with the recommendations in the EPA Guidelines (2000). The RUM analysis has several important limitations. In addition, the discrepancies between the results for these two models are never addressed. Collectively, these limitations call into question the EPA's recreational estimates. At the very least, EPA should reconsider the methodologies discussed here.

[comment text continued in 316bEFR.075.504]

Footnotes

18 The variables included in the RUM are: travel cost (including in some cases, the opportunity cost of travel time), the presence or lack of a boat ramp at the site, the natural logarithm ("log") of the number of sites within the particular reach on which the site is located, the square root of the historic catch rate for the species if targeted by the angler, and ambient concentrations of Total Kjeldahl Nitrogen as a proxy for visual water quality at the site. EPA used data on catch rates of weakfish, striped bass, flounder, bottom fish, and "big game." The model resulted in positive significant (above the 99 percent level) coefficients for the first three of these species.

19 This discussion was adapted from Desvousges et al. (2002). See this source or Freeman (1993) for further discussion of the RUM approach.

20 As an example of an alternative, and preferred, approach, PSEG's Salem filing (PSEG 1999) used a statistical meta-analysis of the marginal value of increased catch. EPA's Guidelines note that this approach "provide[s] a systematic way of incorporating case study information with policy case information" (U.S. EPA 2000, p. 87).

EPA Response

The commenter first outlines the basic steps that EPA followed in developing recreational benefit estimates for the Delaware Case Study and then evaluates EPA's methodology for estimating dollar value of recreational losses due to I&E at Salem. The commenter concludes that although EPA's choice to use benefit transfer technique and RUM studies is sound, EPA's recreational benefit estimates are compromised by an overly simple benefit transfer method and a flawed RUM study.

EPA responds here to the benefits transfer questions and issues raised by the commenter, but also notes that EPA has significantly reduced its reliance on benefit transfer to estimate recreational fishing benefits for the final rule analysis. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional recreational fishing models. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region.

Where the benefits transfer approach was applied, at proposal or final rule, EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT). In the § 316(b) Phase II benefits analysis at proposal, the steps were followed as recommended in the Guidelines when using BT:

1. describe the policy case;
2. identify existing, relevant studies;
3. review available studies for quality and applicability;
4. transfer the benefit estimates; and
5. address uncertainty.

All of these steps were followed in the Phase II benefits analysis at proposal.

Four alternative BT methods are described in the Guidelines: point estimate, benefit function, meta-analysis, and Bayesian. In the Phase II benefits case studies, EPA followed the point estimate approach because the data collection required to implement alternative BT approaches made them infeasible or impractical. For example, to use the alternative methods, a large quantity of socioeconomic and demographic data would need to be collected on anglers and non-anglers at each case study fishing site. Time and budget constraints did not allow for the collection of this type of data, nor did it appear that the value added in terms of potential added precision would be notable.

This is because most of the fish valuation studies assembled from the literature generated per fish dollar values of comparable levels, such that pooling the data, or dropping a few individual studies, would not alter the dollar value outcomes appreciably.

The point estimate approach involves taking the value(s) from a study case and applying it directly to the policy case. Rather than a single point estimate, the § 316(b) case studies relied on a suite of prior empirical studies to construct site-specific and species-specific ranges of values. In fact, this is a "weight of evidence" approach that is, in spirit, a practical though informal variation of more elaborate BT approaches.

The studies that EPA used for its BT analysis are published in peer-reviewed journals and estimate values for regions and fish types that are comparable to those in the case study locations. Selection of studies was consistent with the Guidelines and based on selection criteria outlined by Desvousges (1998, DCN #5-1261), which is considered standard in BT application.

Some commenters suggested that EPA rely on a single study (in lieu of drawing on the broader base of studies available in the literature) for some sites. For example, Dr. Stavins states the following concerning BT studies used in the Brayton Point case study at proposal:

"... EPA could have drawn upon a much more appropriate source for its recreational benefit transfer method, namely a recent National Oceanographic and Atmospheric Administration (NOAA) study conducted by Hicks, et al. (1999) of the National Marine Fisheries Service (NMFS)(DCN #4-1603). The Hicks, et. al. (1999) study is the most appropriate source for benefit transfers of recreational fishing values for this work since it provides estimates of the value of a marginal increase in catch for relevant species groups for the affected geographic area."

EPA notes that the Hicks study is, in fact, the main study that it applied in the BT portion of the Brayton Point recreational impacts analysis. In addition, the Agency created a range of available values by fish type and location to develop a "weight of evidence" approach. EPA believes that relying on a single recreational valuation study at a given site when additional good data are available is less preferable because it may ultimately place too much emphasis on a single source of information, even if the underlying study is site-specific and well executed. By using Hicks et al. in conjunction with several other applicable studies, EPA developed greater confidence in the results, especially because the various studies EPA used in the BT all generated dollar values of similar magnitudes.

EPA has followed standard, generally accepted methods of RUM modeling, which do estimate marginal values. See response to comment #316bEFR.041.452 for additional details regarding EPA's RUM models.

The commenter further states that the inclusion of all "no-target" species in the weakfish valuations leads to overstatement of total benefits from reduced weakfish I&E. EPA notes that weakfish catch rates were used as a proxy of the quality of recreational fishing sites for no-target anglers. Because a large percentage of no target anglers caught weakfish and because this species are common in the Delaware River estuary, it is reasonable to assume that the majority of no-target anglers would benefit from improved weakfish catch rates. As noted above, EPA no longer uses case studies of individual facilities for the final rule analysis. Instead, EPA has estimated regional recreational fishing models.

For the regional recreational fishing models, quality of recreational fishing sites for no-target anglers was defined in terms of average catch rates for all species caught by no target anglers. See response to comment # 316bEFR.306.320 for detail.

Finally, the commenter states that discrepancies between the results from the benefits transfer approach and RUM "call into question the EPA's recreational estimates." EPA disagrees. Benefit transfer involves adapting research conducted for another purpose in the available literature to address the policy questions at hand, therefore it is unreasonable to expect that recreational fishing values based on benefits transfer would be identical to values developed based on a site-specific study. Given the unavoidable uncertainties in monetizing both use and non-use values for the ecological resources that would be affected by the 316(b) rule, the Agency believes that it is appropriate to use alternative valuation techniques to develop a range of recreational fishing benefits for the proposed rule. See also response to comment # 316bEFR.338.047 regarding evaluation of uncertainty in valuation of ecological resources affected by the 316(b) rule.

Comment ID 316bEFR.075.505

Author Name Maureen F. Vaskis & Mark F. Strickland

Organization PSEG Services Corporation, Ofc of Environmental Counsel

Subject Matter Code 10.03.01.01

Salem

[comment continued from 316bEFR.075.504]

V. EVALUATION OF THE EPA METHODOLOGY FOR ESTIMATING THE ECONOMIC VALUE OF NONUSE BENEFITS

This chapter describes and evaluates EPA's methodologies for estimating nonuse losses at the Salem facility and other in-scope facilities in the Delaware Estuary. The chapter begins with an overview of EPA's methodology and results, discusses conceptual considerations, and then evaluates EPA's approach.

EPA's use of a crude "rule of thumb" benefits transfer technique to value nonuse losses is fundamentally flawed, without support in the economics literature. EPA presents no information to indicate that there are nonuse losses from I&E at Salem. Accordingly, EPA should not include the nonuse losses based upon its "rule of thumb" in its benefits estimates for the final rule.

A. Overview of EPA's Methodology and Results for Salem

This section provides an overview of EPA's methodology for estimating nonuse losses and summarizes EPA's results.

1. Methodology

To estimate the nonuse losses associated with I&E at the Salem facility, EPA applied a simple "rule of thumb" that nonuse values are equivalent to 50 percent of the estimated recreational fishing benefits. EPA appears to base this "rule of thumb" primarily on two papers dating from the 1970s and 1980s, <FN 21> which claim to show that nonuse values were at least 50 percent of recreational use values in the individual instances studied. EPA did not perform an explicit benefits transfer to justify the applicability of the rule of thumb to the Delaware Estuary.

2. Results

Using this approach, EPA estimates the annual nonuse losses associated with I&E at the Salem facility. Table 15. shows this estimation.

Table 15. EPA Estimates of Nonuse Losses at Salem
[see hard copy for table]

B. Conceptual Considerations

This section discusses a number of conceptual considerations that are important in understanding whether nonuse values are likely to be important in the context of losses to I&E in the Delaware

Estuary, and if so, how they could be appropriately estimated. We begin with a brief overview of the conceptual bases for nonuse benefits.

1. Conceptual Bases for Nonuse Benefits

In his text on measuring environmental and resource values, Freeman (1993) reviews the literature on nonuse (or existence) value. He notes that nonuse value has been attributed to a number of motivations, including bequest, altruism, and an ethical concern for the status of non-human species or proper rules of human conduct. He argues that there is an important distinction between degradation of a natural resource and its permanent destruction. Freeman develops a theoretical framework for evaluating nonuse values which supports this distinction. He concludes by noting that while the literature is unresolved on this issue, nonuse values are most important when the resource in question is special or unique and the loss or injury is irreversible:

Another important question is, when are nonuse values likely to be important? The long literature on nonuse values emphasizes the uniqueness or specialness of the resource in question and the irreversibility of the loss or injury. For example, economists have suggested that there are important nonuse values in preserving the Grand Canyon in its natural state and in preventing the global or local extinction of species and the destruction of unique ecological communities. In contrast, resources such as ordinary streams and lakes or a subpopulation of a widely dispersed wildlife species are not likely to generate significant nonuse values because of the availability of close substitutes. Moreover, the literature does not suggest that nonuse values are likely to be important where recovery from an injury is quick and complete, either through natural processes or restoration (Freeman 1993, p. 162).

Thus, Freeman's (1993) review of this literature suggests two criteria to evaluate whether the nonuse value for the Delaware Estuary is likely to be important:

1. Is the resource unique?
2 Are the losses to the resource irreversible?

If both of these criteria are not met, Freeman (1993) suggests that the nonuse values are likely not to be important.

2. Estimating Nonuse Value

If nonuse value is relevant, the next question is how to estimate it. The standard method for estimating nonuse value is "contingent valuation" ("CV"). In the CV method, individuals are asked how much they would be willing to pay for a described commodity (for example, to preserve an identified resource), or whether they would be willing to pay a specified amount. <FN 22> Use of this method has been controversial among economists, because it relies on stated preferences, which can be prone to bias and misstatement, rather than on actual choices. Nevertheless, CV is an accepted method in the economic literature for measuring nonuse value.

EPA's Guidelines (2000) confirm this point. They state: "Currently, contingent valuation is the only established method capable of estimating non-use values ... " (p. 84).

3. Evaluation of "Rule of Thumb"

As noted, EPA's estimates of nonuse benefits are based on a crude benefit transfer technique, in which EPA multiplied its recreational benefits estimates by a factor of 50 percent. EPA asserts that this is a "long-standing" approach, arguing,

One long-standing benefit transfer approach for estimating nonuse values is to apply a ratio between certain use-related benefits estimates and the passive use values anticipated for the same site and resource change (EPA 2002, p. A9-10).

a. Freeman Citation

EPA's claim that this is a "long-standing" approach is based upon a 1979 review authored by A. Myrick Freeman for the Council on Environmental Quality. <FN 23> In his review, Freeman cites two papers: (1) a 1976 report by Heintz, Hershaft, and Horak, which itself describes two surveys, one by Meyer (1974) pertaining to preservation of a salmon fishery in British Columbia, and another by Horvath (1974) focused on the southeastern U.S.; and (2) a survey by Walsh, et al. (1978), focusing on improved water quality in the South Platte River Basin. Freeman notes that these studies claim to find nonusers willing to pay roughly 50 percent as much as users to preserve a recreational resource.

Although he is cited as the principal source for EPA's use of this "rule of thumb," Freeman does not appear to be very comfortable with it. First, in his 1979 review, he concludes his review of the "rule of thumb" by calling it "a tenuous empirical basis from which to estimate national nonuser benefits" (p. 171). More important, he omits any discussion of this approach from his 1993 book, The Measurement of Environmental and Resource Values: Theory and Methods, a standard text on environmental benefit estimation. Instead, Freeman points to CV and other stated preference techniques as the appropriate methods to use in estimating nonuse value. Referring to these approaches, he states: "[T]he hypothetical direct valuation methods treated [in Chapter 6 of his book] are likely to offer the only feasible approaches to estimating nonuse values for public policy purposes" (1993, p. 159).

b. Fisher and Raucher Citation

EPA also cites a 1984 review article by Fisher and Raucher, which offers a more complete review of the literature reviewed by Freeman. Fisher and Raucher note that this "rule of thumb" was apparently first used by Abel, et al. (1998). Fisher and Raucher are critical of the rule of thumb: "The proportional relationship used by Abel et al. is not in the least robust" (Fisher and Raucher 1984, p. 47). In particular, they criticize the Meyer (1974) and Horvath (1974) results as inappropriate for generalization and poorly conceived. Somewhat incongruously, however, Fisher and Raucher conclude with the claim that "the existing evidence indicates that nonuse benefits generally are at least half as great as recreational use benefits" (1984, p. 60).

c. Other Citations

In defense of the "50 percent rule," EPA further cites two studies, one by Sanders et al. (1990), and another by Sutherland and Walsh (1985). Sanders et al. use a 1983 mail survey to estimate nonusers' willingness to pay to "protect" a number of rivers in the State of Colorado. Sutherland and Walsh use a mail survey to value nonusers' willingness to pay to "protect water quality" in Montana's Flathead

Lake and River.

Both studies are problematic as a basis for application of a “50 percent rule.” These studies were conducted for resources that are altogether different from the Delaware Estuary, and therefore should not be applied to I&E at Salem.

4. Empirical Considerations Related to I&E in the Delaware Estuary: How Irreversible Are Fish Losses?

From an ecosystem perspective, it is possible to use existing information to assess how the I&E losses at Salem relate to one of the two criteria discussed at the beginning of this section, namely, whether the fish losses at Salem are irreversible.

In order to establish whether I&E at Salem is likely to yield nonuse losses of any importance, we need to evaluate the effect of Salem on the relative abundance of fish species in the Delaware Estuary. Standard theory of renewable resources such as fish stocks suggests that at some point, the stock can decline to a level below which the stock is unable to reproduce itself sufficiently fast to sustain itself and will tend inevitably toward zero (this is the so-called “critical depensation” point). <FN 24> If the stock of any species were rapidly declining, such that it could be in a state of critical depensation, and if this were linked to I&E at Salem, the irreversibility criterion for nonuse losses suggested in Freeman (1993) might be satisfied.

As we show in the section, there is no evidence of this. If anything, the stock of most key fish species in the Delaware Estuary has been increasing since the late 1970s and future projections show that Salem would have virtually no influence on the behavior of fishery stock.

A detailed study by PSEG in 1999 analyzed historical data for nine RIS and observed a consistent and significant trend for growth in the stock of seven of the species. Most species were not only increasing in abundance, but they were also increasing at a rapid rate (PSEG 1999). Several of the species, including weakfish, striped bass and American shad, were depleted in the late 1970s but experienced a recovery in abundance during the years when Salem was in operation. The declines in the stock of the two remaining species, spot and blueback herring, are not linked to the operation of Salem. According to the Atlantic States Marine Fisheries Commission (“ASMFC”), the stock of blue herring has been declining since the mid-1960s, which predates the opening of Salem by a decade (ASMFC 1998). The observed decline in the stock of spot, on the other hand, is due to the abnormally high abundance of the species observed in 1988, which created the illusion of a negative growth rate in subsequent years, when in fact the abundance of spot was at levels comparable to those before 1988. (PSEG 1999).

Future projections performed in 1999 complement the historical data showing that the operation of Salem has not led to a decrease in the abundance of species in the Delaware Estuary. Simulations with two different methodologies fully endorsed by the ASMFC, which use inputs from the NMFS, demonstrate that there is no difference in the behavior of the fishery stock with or without the operation of Salem. Figure 7 and Figure 8 illustrate representative results from the spawning stock biomass approach (SSB). <FN 25>

Figure 7. Results from SSB Modeling Comparing Potential Future Effects of I&E at Salem with a

Baseline Case: American Shad and Weakfish
[see hard copy for figure]

Figure 8. Results from SSB Modeling Comparing Potential Future Effects of I&E at Salem with a Baseline Case: Spot and Blueback Herring
[see hard copy for figure]

The two figures present the results of a Monte-Carlo type simulation of stock levels for American shad and weakfish and for spot and blueback herring under two scenarios: one with and one without the effects of I&E from Salem. The uncertainly assessment involves specifying input probability distributions for key parameters (such as stock-recruitment relationship) and using the randomly defined parameter sets to calculate probability distributions for fished populations compared to unfished populations. The shaded area depicts the stock level at which the stock could be in jeopardy of becoming unsustainable. These figures show that, as simulated, the probability distribution of the spawning stock relative to the point of potential jeopardy is not significantly affected by I&E at Salem, even for the two species (spot and blueback herring) for which decline has been observed.

Figure 9: Results from SSBPR Modeling Comparing Potential Future Effects of I&E at Salem with a Baseline Case.
[see hard copy for figure]

Figure 9 shows the results from a different approach, the spawning stock biomass per recruit method ("SSBPR"), which simulates the size of the stock (on the y-axis) for increases in the conditional mortality rate ("CMR") on the x-axis. The 30 percent biological reference point is the rate below which the stock cannot reproduce itself at the maximum sustainable yield, a rate which is often referred to as "overfishing." It is clear from the figures that even for large CMRs, the size of the stocks of alewife and American shad is not anywhere near the point of jeopardy and—more important—that there is no difference between the behavior of the stocks with or without the impact of Salem.

Overall, the historical data on fish stocks, and the future simulations based on two widely endorsed methods show that Salem poses no danger on the size of the stocks. This conclusion renders Freeman's irreversibility criterion inapplicable to the case of I&E at Salem and suggests that nonuse losses should not be valued above zero.

C. Evaluation: EPA's Nonuse Values Have No Conceptual or Empirical Support

Apart from the lack of support in the various citations for its development, EPA's use of the 50 percent rule is questionable on a number of other grounds. First, it does not appear in EPA's Guidelines. Second, as a benefit transfer approach, it fails to meet the criteria outlined in EPA's own guidance document, as described above in Chapter IV of this report. These problems with EPA's use of the "rule of thumb" are explained in greater detail in the following sections.

1. There Is No Basis for the 50 Percent Rule in EPA's Guidelines

EPA's Guidelines (2000) provide a thorough discussion of appropriate methods for valuing the effects of environmental policies. They make no mention of the 50 percent rule for estimating nonuse values.

2. The 50 Percent Rule Does Not Conform to EPA Guidelines for Benefit Transfer

As discussed earlier, in Chapter IV, EPA's Guidelines lay out three criteria for selecting studies to be used to perform benefit transfer analysis. Appropriate studies are those for which:

1. The basic commodities being valued are essentially equivalent;
2. The baseline and extent of the change are similar; and
3. The affected populations are similar.

These criteria provide an important assurance that the basis of the benefit transfer is relatively sound. Yet, the 50 percent rule used in EPA's 316(b) analysis does not meet these criteria. EPA's case study document provides only a cursory literature review, identifying a scant four studies (two of which are secondary studies) in support of its point estimate. The discussion of this issue in EPA's Delaware Case Study provides no basis for assessing whether the commodities valued are essentially equivalent, whether the baseline and extent of the change are similar, and whether the affected populations in the studies underlying the 50 percent rule are similar to those in the Delaware Estuary. A review of the four sources cited in Section A9-5 of EPA's case study document indicates that the two most recent studies cited (Sutherland and Walsh, 1985, and Sanders, et al. 1990) are focused on water quality and preservation of an ecosystem, not on changes in fish populations. For both of these studies:

1. The commodities being valued are different from those at stake in the Delaware Estuary. Sutherland and Walsh (1985) values "protection of water quality"; Sanders et al. (1990) value "protection of rivers" in Colorado. These values are much more global in scope than the more narrow commodity—fish and shellfish—being evaluated in the Delaware Estuary case.

2. The baseline and nature of the change are different. Sutherland and Walsh and Sanders et al. value preservation of an existing resource. In the Delaware Estuary Case Study, EPA is attempting to value improvement in a resource—namely, an increase in fish stocks in the Delaware Estuary.

3. The affected populations may not be similar. Both Sutherland and Walsh and Sanders et al. estimate nonuse values for populations in the Rocky Mountain West (Montana and Colorado). EPA does not even identify the affected (nonuser) population in the Delaware watershed, nor does it offer a specific reason to believe that it would be similar to nonusers in Montana and Colorado.

3. Evidence from the Delaware Suggests That Nonuse Values Are Not Likely to Be Important for I&E at Salem

As discussed earlier, Freeman (1993) develops two criteria that should both be satisfied in cases where nonuse values are likely to be important: (1) the resource in question should be unique; and (2) the damage to it should be irreversible. The evidence on the Delaware Estuary indicates that these criteria are not satisfied with respect to the key fish stocks in the Delaware Estuary and the impacts of Salem I&E. Thus, there is no evidence of any non-use values due to I&E at Salem.

D. Summary

In summary, EPA's estimates of nonuse values derive from an arbitrary approach that is poorly supported in the relevant literature and inconsistent with EPA's own guidance on how to conduct benefit-cost analyses in the context of policy decisions.

Absent a specific and sound empirical study of nonuse values in the Delaware Estuary, there is no basis for assigning a nonuse value to I&E changes at Salem.

VI. ESTIMATING THE EVALUATION OF THE EPA METHODOLOGY FOR ESTIMATING THE ECONOMIC VALUE OF FORAGE FISH BENEFITS

This chapter evaluates EPA's estimates of the economic value of forage fish losses due to I&E at Salem. We consider the methodologies used to value forage fish, the conceptual background, and evaluate the soundness of EPA's methodologies in the Delaware Case Study.

A. EPA's Methodologies for Valuing Forage Fish Losses due to I&E at Salem

In its analysis, EPA defines forage fish as all fish that have only indirect benefits for society—through their role as prey for other fish. Forage fish are not themselves fished, either commercially or recreationally. EPA uses two methodologies to value forage fish losses due to I&E at the Salem facility: (1) production foregone; and (2) replacement cost. Table 16 presents the EPA's results from both of these calculations.

Table 16. EPA Estimates of Forage Fish Losses due to I&E at Salem
[see hard copy for table]

Although the Delaware Case Study document is not fully explicit, EPA apparently developed midpoint estimates of forage fish losses at Salem by averaging the low production foregone estimate with the replacement cost estimate. The sections below describe the two methodologies.

1. Production Foregone

The production foregone methodology values forage losses "based on the dollar value of the foregone fishery yield resulting from these losses" (U.S. EPA 2002, p. B4-10). Forage species are converted into species that are commercially or recreationally relevant—those that have a direct market value. Market valuations of these species—taken from market prices or the literature—then provide dollar values for the losses.

2. Replacement Cost

EPA (2002, p. B4-9) describes the replacement cost of forage fish as having two components, the cost of raising the fish and the transportation cost. However, because of a lack of data, EPA does not consider the transportation cost. Thus, to generate the replacement cost figure, EPA estimates the cost of raising each affected forage species in a hatchery and then multiplies this number by the I&E level for each species. EPA then takes this number to be equivalent to the value of the forage fish losses at Salem.

B. Conceptual Background

Conceptually, forage fish contribute to use value (recreational and commercial) indirectly through their contribution to the stocks of those fish that are valued directly in commercial markets and for their share of the recreational catch. Thus, in principle, the appropriate way to value forage fish is to examine the effects of changes in their stocks on changes in stocks of fish that are valued directly. This approach is consistent—at least in principle—with EPA's "production foregone" approach. (See Stavins (2002) for further discussion of this point.)

C. Evaluation: EPA's Forage Fish Benefits Are Overstated by Including a Flawed Methodology—the Replacement Cost Approach—as One of Two Methods

Of the two methods EPA uses to value forage fish losses, one methodology—the production foregone method—seems consistent with sound economic principles. The second approach—the replacement cost method—however, is not a valid methodology. Indeed, the replacement cost method involves a fundamental error—it assumes that benefits are equal to costs—and should be rejected.

1. Additional Forage Fish Lead to Benefits to the Extent That They Increase Commercial and Recreational Catch

Economic benefits are the sum of producer and consumer surpluses. Thus, the economic benefits from forage fish come through their indirect impact on commercial and recreational values. That is, if forage fish increase commercial or recreational catches, then they have some economic value. Thus, an accurate model should consider how forage fish affect other species that have economic benefits that can be calculated directly.

2. The Production Foregone Method in Theory Could Lead to Valid Benefit Estimates

In concept, the production foregone method provides a valid methodology for evaluating the potential indirect benefits of forage fish changes. It attempts to measure how forage species affect populations that have direct economic benefits. Using valuations of these species, EPA can then estimate how much surplus is lost—both commercial and recreational—due to I&E forage fish losses at Salem.

This report does not assess the validity of EPA's biological estimates, which depend critically upon the accuracy of the scientific assessments of the linkages between changes in forage fish and changes in the populations of commercial and recreational species.

3. In Contrast, the Replacement Cost Method Is not an Economically Valid Benefit Methodology

The economics literature and the recent EPA Guidelines (EPA 2000) provide examples of methods that may legitimately be used to estimate benefits. Replacement cost is not among them. The replacement cost methodology purports to calculate the lost benefits from forage fish by estimating the cost of producing the lost species in a hatchery. However, replacement cost provides an estimate of the costs of undertaking an activity—hatching forage fish—that would be intended to have an equivalent result to ceasing or reducing I&E at Salem. This might be a worthwhile exercise if replacement of habitat or creation of new habitat were a potential policy alternative. If costs were used as a measure of benefits, the benefit-cost analysis would suggest all projects had a net benefit of zero.

Use of costs to measure benefits would make a mockery of benefit-cost analysis. There is no support for such a position in the economic literature. The approach cannot provide a valid measure of the willingness to pay for forage fish changes due to I&E at Salem.

D. Summary

Forage fish benefits should reflect the gains from the additional recreational and commercial fishing that are created. The production foregone method can provide a valid measure of these benefits, assuming that the underlying biological estimates are correct. In contrast, the replacement cost method is not a valid means of measuring benefits. It should be discarded from the Delaware Case Study.

VII. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the overall conclusions regarding the economic assessments in the Delaware Case Study. The chapter also provides recommendations for changes EPA should make in the Delaware Case Study before it issues its final Phase II rule.

A. Conclusions

We conclude that the "effects-by-effects" approach is a sound overall framework for evaluating the benefits of I&E at Salem on the Delaware Estuary. In this approach, the individual components of benefits are identified and quantified according to a three step process:

1. Identify physical effects (i.e., changes in fish populations).

2. Quantify the major physical effects (i.e., changes in populations of commercial fish, recreational fish, forage fish).

3. Estimate the dollar values of these physical effects.

EPA has followed this sensible overall approach in the Delaware Case Study.

Although the overall approach is sound, the economic values developed for the individual components have serious flaws. EPA developed individual benefit estimates for the following four categories of benefits:

1. Recreational benefits;
2. Commercial benefits;
3. Nonuse benefits;
4. Forage fish benefits.

The methodologies for all four of the assessments have weaknesses that make them unsuitable either as the basis for national estimates of the benefits of 316(b) alternative regulatory approaches or as models for those undertaking benefit-cost studies for individual 316(b) permits.

B. Recommendations

The following are recommendations following from our review of the economic issues related to the Delaware Case Study.

1. Before issuing a final 316(b) rule, EPA must revise the economic benefit methodologies in the Delaware Case Study and other case studies with similar deficiencies

It is important that the economic benefit methodologies in the Delaware Case Study be sound, both because they underlie estimates of the benefits of alternative 316(b) regulatory alternatives and because they are likely to be used by applicants and permit writers to evaluate specific 316(b) benefit-cost assessments.

2. For commercial fishing benefits, EPA should review the empirical foundations and revise its estimates

The commercial fishing benefits in the Delaware Case Study are overstated because they exaggerate the likely consumer and producer surplus due to changes in commercial catch. The values do not appropriately acknowledge the long-run tendency for producer surplus to be dissipated, which means that most additional gross ex vessel revenues do not constitute long-term benefits. Even more importantly, EPA uses a "multiplier" to translate changes in producer surplus into total "multi-market" surplus that is not justified. Such changes in multi-market surplus implies substantial changes in fish prices, and EPA has provided no information to support such a claim. Indeed, given the relatively small effect changes in I&E at Salem would have on overall supply, it does not seem likely that consumers would receive any additional consumer surplus gains.

EPA should revise its estimated range of potential commercial fishing benefits from Salem I&E to reflect long-term effects on producer surplus and the lack of any likely effects on fish prices.

3. For recreational fishing benefits, EPA should modify its application of the benefit transfer approach and revise (or ignore) its RUM study

EPA's recreational fishing benefits are based upon the benefit transfer approach and a RUM study carried out by EPA. The benefit transfer study should be reevaluated to consider using a more sophisticated approach that would allow the value per fish to vary with individual circumstances. The RUM study—which is used to value two of the relevant species—should be either ignored or revised to eliminate (or explain) apparent methodological problems.

4. For nonuse benefits, EPA should discard the estimates derived from the 50 percent rule of thumb

EPA's nonuse benefits are based upon a crude rule of thumb that has no validity and no applicability to I&E changes in the Delaware Estuary. Unless EPA has evidence of nonuser benefits, this category should be eliminated as part of the Delaware Case Study.

5. For forage fish, EPA should discard the replacement cost method and rely exclusively on the

production foregone method

Forage fish can provide benefits because of the effects they have on commercial and recreational species. EPA should base its estimate of benefits on the production foregone method and discard the alternative replacement cost method, which has no conceptual or empirical foundation as a measure of benefits.

Footnotes

21 Freeman (1979) and Fisher and Raucher (1984). Note that EPA erroneously cites this source as Freeman (1977). Despite its importance to EPA's nonuse benefits estimate, the Freeman review does not appear to be included in EPA's docket for the 316(b) proposed rule.

22 See U.S. EPA 2000, p. 83-84 for a discussion of CV, and NOAA (1993) for a discussion of methodological considerations in conducting a rigorous CV study.

23 EPA cites this source as Freeman (1977).

24 See, e.g., Clark (1990), p. 18-21.

25 This approach and the underlying justification for using it are reviewed in greater detail in PSEG (1999, p. 78-86).

EPA Response

The commenters' primary comments focus on four aspects of the valuation of benefits for the proposed rule. They are largely addressed in other comments as follows.

1) Recreational Benefits
For the analysis for the final rule, EPA modified the methods used to value recreational losses and benefits. All recreational benefits are now valued using a Random Utility Model (RUM). For EPA's response to comments on the recreational methodology, please see EPA's response to comments #316bEFR.075.504 and #316bEFR.041.452.

2) Commercial Benefits
EPA also modified the methods used to estimate commercial fishing benefits and losses. For EPA's response to comments on the commercial fishing valuation methods, please see EPA's response to comments #316bEFR.005.029.

3) Nonuse Benefits
EPA disagrees with the commenters' assertion that EPA's approach to valuing non-use benefits is not supported by EPA's Guidelines. See the response to comment #316bEFR.005.013 for a detailed response.

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003). Please see Chapter D1 of the final Phase II EBA document (DCN #6-0002) regarding break-even analysis. Also, see response to Comment 316bEFR.307.061 for a discussion of EPA's habitat-based approach to nonuse analysis.

4) Forage Fish Benefits
For the analysis for the final rule, EPA modified the methods used to value forage species. They are now valued using a trophic transfer method. Please see EPA's response to comment #316bEFR.005.028 and Chapter A5 of the Regional Analysis Document (DCN #6-0003) for details.

Additional discussion on the issue of nonuse values and their estimation can be found in response to comment 316bEFR.306.105.

Several other topics addressed in other comments are also relevant:

For EPA's response on comments regarding measures of uncertainty and confidence intervals, please see the response to comment #316bEFR.041.843.

Regarding the impact of I&E at Salem on Delaware Estuary fish populations, EPA disagrees with the commenter's assertion that there are no impacts. According to p. 65 of Appendix H of PSEG's own 316b study for its 1999 Permit Renewal Application for the Salem facility (DCN #1-3061-BE), the proportion of the baywide population of bay anchovy that is impinged and entrained annually at Salem ranged from 2% in 1982 to 28% in 1998. EPA maintains that a 28% impact on a fish stock is not insignificant.

Please refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003, DCN #6-1931).

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed W. Super

On Behalf Of:

Riverkeeper

Author ID Number:

316bEFR.076

Comment ID 316bEFR.076.001

Subject Matter Code MISC

Miscellaneous comment

Author Name Reed W. Super

Organization Riverkeeper

This comment was replaced by an updated version from the author. Please see 316bEFR.206.

EPA Response

Please see EPA's response to the comment referenced in the comment text.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed W. Super

On Behalf Of:

Pisces Conservation, Ltd.

Author ID Number:

316bEFR.077

Comment ID 316bEFR.077.001

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

A critical area in which the EPA has expended considerable effort is the estimation of entrainment and impingement deaths caused by cooling water systems. These estimates can vary considerably depending upon the assumptions made, and are a key area of weakness in the assessment of the economic value of the losses caused by cooling water extraction. There can be no certainty as to the magnitude of the losses as sufficient recent data on entrainment and impingement are unavailable. However, the EPA has probably underestimated the magnitude of the problem. Particular areas identified here, which could have caused an underestimate of losses, are itemised below.

EPA Response

This comment refers to Comments 316bEFR.077.003 and 316bEFR.077.005. Please see EPA's responses to these comments.

Comment ID 316bEFR.077.002

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

The effects of impingement losses have probably been underestimated both in terms of their impact on the populations and relative to entrainment. It is assumed that all impinged fish are age 1. “EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death.” (A5-2-1). This leads to a large underestimation of the number of age 1 equivalents killed by impingement at plants where adult fish are caught. Using white perch from the Salem case study as an example the number of age 1 equivalents killed by the station increased from 500,000 to over 37,000,000 when age structure was taken into account. Generally, by allowing correctly for age structure the impact of impingement on the populations was brought closer to the impact of entrainment.

EPA Response

Please see EPA's response to Comment 316bEFR.029.105 for EPA's assumptions about the age distribution of impinged fish for its final analysis for the Phase 2 rule.

Comment ID 316bEFR.077.003

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02
Methods to Evaluate I&E

In many localities there have been appreciable recent changes in the abundance of fish. Many species have increased but some, such as the American eel, have declined. For example, striped bass numbers in the Hudson have increased possibly 15-fold since the 1970s. These improvements from historically suppressed levels may result in an under-estimation of potential entrainment and impingement losses in future years if direct cooling is continued.

EPA Response

EPA recognizes that abundances of aquatic species, and therefore the numbers of organisms vulnerable to I&E, may have increased, decreased, or stayed the same at particular sites since the time of the available I&E studies. Unfortunately, it is uncertain how old I&E data can be adjusted to reflect current abundances, particularly given the many variables that influence biological populations and therefore the abundance of organisms vulnerable to I&E.

Comment ID 316bEFR.077.004

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Survival rates are key variables as they are used to estimate the total mortality as age 1 equivalent numbers. In some calculations the rates are probably too low, as they are based on historical data when populations were badly suppressed by environmental damage and over-exploitation. Changing the survivorship figures used in the age-1-equivalent calculations can have a large effect on the numbers of age-1-equivalents estimated to be entrained or impinged. Generally, more reliable estimates of age-1-equivalence would be obtained by increasing survival rates by 25%.

EPA Response

EPA agrees with the commenter that survival rates are critical parameters in EPA's I&E analysis. However, EPA maintains that the survival rates used in its analysis are reasonable based on the fisheries literature and other sources that are cited in the Regional Analysis Document (DCN #6-0003). EPA does not agree that survival rates should be increased by 25%.

The commenter suggests that survival rates must be higher if the population size is larger. EPA disagrees with this reasoning because (a) survival rates and population size are not strictly linked because other factors beside survival rates can affect population size; (b) insofar as population increases are linked to increased survival rates, they may respond to increases in survival rates for only particular life stages, not all life stages; and (c) it is not self-evident that all fish populations will be larger in the future than they were during the time that survival rates were estimated. The commenter did not provide data that would allow the Agency to change any survival rates or provide EPA with a basis for selecting an across-the-board 25% increase as an appropriate correction.

Comment ID 316bEFR.077.005

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02

Methods to Evaluate I&E

The amount of water pumped by the cooling water systems is a key variable as the rate of impingement and entrainment increases with volume. The impingement rates are particularly sensitive to flow as they increase non-linearly with the volume pumped. For many plants, particularly the nuclear stations, availability and output have increased through time. Some estimates of flow rate should be increased. For example for Salem a volume of 1722 MGD is assumed for the operational flow rate - this is much lower than the flow used when the power station is running normally. The flow for the last recorded year was 2612 MGD.

EPA Response

It was EPA's intention to evaluate I&E rates under "normal" operating conditions to avoid potential bias of the sort discussed by the commenter. For this reason, in all its analyses, EPA used average operational intake flows as reported by facilities in EPA's survey of the industry.

Comment ID 316bEFR.077.006

Subject Matter Code 10.01

Ecological Evaluation Methodology

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

No future value has been assigned to fish killed by power plants. These fish do have a value as their loss reduces the growth of the population. Reproductive value is proposed as a method of assessing future worth. Reproductive value is a measure of the contribution that an individual of known age would on average make to the next generation. A worked example is given for striped bass at Salem and the top species caught at Pilgrim. Using this method the value of striped bass caught at Salem was increased by $79,000, from $56,000 to $135,000 per year. Reproductive value calculations are presented for the common species caught at the Pilgrim facility.

EPA Response

The commenter proposes that EPA's analysis should include consideration of the reproductive value of fish killed by I&E. EPA has addressed the topic of reproductive value in its response to Comment 316bEFR.206.065.

Comment ID 316bEFR.077.007

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.04.01

Extrapolation of Case Study Ben. to National Level

The use of impingement and entrainment rates for the case study sites to estimate the losses at other power plants in the same water type are highly unreliable. The rate of capture of fish is exceedingly site-specific. The EPA has generally used data from plants that entrain and impingement appreciable numbers of animals to try to minimise the likelihood of under-estimation. However, this does not remove the uncertainty in the estimates.

EPA Response

The commenter refers to the case study analysis presented at proposal. EPA appreciates the commenter's concerns about the difficulties with data extrapolation. To improve the basis for extrapolation, EPA's final analysis evaluated many more facilities than for proposal (a total of 46), and extrapolated I&E rates within regions rather than waterbody types nationwide. Given that the goal of EPA's analysis was to develop estimates of impacts and benefits at the national scale and not site-specific estimates, EPA believes that its regional analysis for the final rule provided a reasonable basis for extrapolation.

Comment ID 316bEFR.077.008

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 6.05

Impacts to T&E species

The impacts on rare species are particularly difficult to assess, as power plant sampling has rarely been sufficiently intense and over long enough periods to detect the impingement of rare or threatened species. The situation is even more difficult with respect to entrainment when many thousands of common larvae may occur for every specimen of a rare species, making them almost impossible to detect. When sea turtles and other threatened species such as insects are considered in addition to fish, most marine, estuarine and Great Lake stations will occasionally kill rare or threatened species.

EPA Response

EPA agrees with this comment. The extent to which all Phase II existing facilities are taking threatened and endangered species is unclear because monitoring has not occurred at all of these facilities at intense enough efforts over long periods of time to detect the numbers that are killed as a result of impingement and entrainment. In order to help the permit writer to take into account possible impacts to threatened and endangered species when determining the best technology available for minimizing adverse environmental impact, the Impingement Mortality and/or Entrainment Characterization Study described in § 125.95(b)(3) in this rule must include taxonomic identifications of all life stages of fish, shellfish and any species protected under Federal, State, or Tribal Law (including threatened and endangered species) that are in the vicinity of the cooling water intake structure and are susceptible to impingement and entrainment.

Comment ID 316bEFR.077.009

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

The key factor in the future large-scale extraction of cooling water is likely to be the availability of technologies to reliably reduce or eliminate impingement and entrainment. The EPA gives a good summary of the present state of the available technologies, however, they significantly overestimate the effectiveness of some technologies. There is a tendency to take values reflecting exclusion performance when the technology is working as designed under optimal conditions. In practice, performance is likely to be far worse because of interference by factors such as fouling and predators.

EPA Response

EPA acknowledges that successful deployment of a technology does not necessarily predict the success or failure of the same technology at another location but disagrees that it has overestimated the effectiveness of any technology. The estimated reductions in impingement mortality and/or entrainment presented in Chapter 3 of the Technology Development Document are taken directly from the studies cited therein. EPA agrees that performance is related to a variety of factors and for this reason, among others, has opted for performance ranges instead of numeric limits.

Comment ID 316bEFR.077.010

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

On first consideration flow thresholds seem to offer an approach that can give considerable protection to aquatic life. However, the use of flow thresholds does not take into account species behaviour and habitat preferences. It is not just the amount but also the locality that matters - even the 5% threshold level could have significant effects if an intake and outfall are poorly sited.

EPA Response

EPA believes the design intake flow standard for riverine facilities in today's rule affords a level of protection for the source water body acceptable under most, if not all, stream conditions. Today's rule preserves the Director's (and States') authority to implement more stringent requirements to meet the requirements of applicable State and Tribal law, or other Federal law.

Comment ID 316bEFR.077.011

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 20.03

Spatial scale for entrainment trading

Several drawbacks to the process of trading are noted. If the purpose of trading is to protect individual populations it should have the following restrictions:

-It should only be permitted between sites situated on the same water body:

-The plants should all be impacting the same ecological community:

-Trading should occur for the same populations of common species at similar life stages. If this does not occur there is a danger that a single adult fish will be given a value equivalent to millions of eggs and traded for large levels of entrainment.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the spatial scale of trading. As noted in the preamble to today's final rule, although EPA has left the decisions regarding a potential trading program to the discretion of the Permit Director, EPA is likely to approve only those potential trading programs that allow trades within individual watersheds and among numbers of the same species. However, EPA will evaluate proposals for trading programs on a case-by-case basis to ensure that the trades allowed would result in environmental performance that is comparable to the reduction of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

Comment ID 316bEFR.077.012

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 20.04
RFC: Potential trading units/ credits

The EPA proposes three possible units of exchange, species density, species counts and biomass. There are considerable problems with all 3 possible units for trading and further clarification and definition is required.

EPA Response

This comment summarizes comment 316bEFR.077.052 by the same author. Please see response to comment 316b.EFR.077.052 which describes in detail the author's concerns regarding units of trading.

Comment ID 316bEFR.077.013

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Habitat enhancement schemes are always attractive because they can offer the prospect of real environmental improvement. However, there are no proven pathways by which Entrainment and Impingement losses can be mitigated by habitat enhancement methods. There is a tendency to trade sensible and worthwhile goals such as wetland enhancement against impingement and entrainment losses. However, there is little evidence to support the view that the improved wetland aids the populations most impacted by the power plants. The highest level of mortality on cooling water intakes tends to be for clupeid fish that are mostly pelagic, open water, species.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

Nevertheless, EPA does not want to preclude use of those restoration measures that are able to meet the all of the requirements of the final rule. Allowing use of such restoration measures provides permitting authorities and permit applicants with additional flexibility while still meeting the environmental requirements of the final rule.

Comment ID 316bEFR.077.014

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA Entrainment Estimates

Description of method used for Total Number

To calculate the entrainment levels at the various stations, the EPA take the data from each station in turn. The data often have been collected for each life stage entrained (egg, larvae, post-larvae, juvenile etc.). The total numbers of all the life stages are combined to give a total number entrained by that intake for a particular year. Several years are then combined to give a mean level of entrainment. On a site-by-site basis, adjustments are made to the years used to obtain the mean. For example, 1996 data are not used at Salem as the power station was not running for much of that year. For some stations the reported number of entrained animals has been adjusted to allow for survival. The EPA re-adjust the figures to assume 100% mortality. These calculations of the raw numbers of entrained animals are well done.

The method for calculating age 1 equivalence

To obtain a total number of age-1-equivalent fish for each site, the age-1-equivalents are calculated for each year and each life stage in turn. A mean value is then obtained. For entrained animals, normally only a few days or weeks old, this could be done by simply multiplying the number in the particular life stage by the probability of survival from that stage to age 1. However, as the exact age of animals when they are entrained is not known, a modified survival rate is applied to the first age transition. For example if an egg is caught just before it would hatch the survivorship probability of that egg to a larva is obviously much higher than a newly laid egg. This has the effect of increasing the age 1 equivalent number of fish. Again site-by-site adjustments are made to years used. These calculations of the age 1 equivalents of entrained animals are well done.

Issues Identified with Entrainment Methods

Are the years left out reasonable?

For Salem the EPA omit 1996 data. The station was shut down for most of this year, and hence the numbers of impinged and entrained fish were very low. Disregarding the figures from 1996 increases the mean catch of the station. It is reasonable to leave the year out of the analysis.

At Brayton the EPA disregarded the last decade’s fish numbers, as the populations were severely depressed. However there is a steady decline in numbers impinged throughout the study. The mean numbers for this station will therefore be underestimates.

For all other stations the EPA have used the available data reasonably. They have been fair in their selection of years’ data to be used in the case studies.

When the data are given with the assumed survived animals not counted - is the calculation of total mortality reasonable?

Where the survival factors for species entrained are not given in a report, an estimate of the effect is based on a probit method. This is used to back-calculate the effect of the survivorship factors applied to the data. The method does result in higher entrainment figures and is probably the best available.

EPA Response

The commenter asserts that I&E rates at Brayton Point are underestimated. EPA agrees that to the degree that I&E rates may have been reduced as a result of the effect of plant operations on species abundances near the plant, the commenter's point is valid. However, EPA maintains that the years of data EPA used to develop estimates at Brayton Point reflect the best set of available data that (a) included loss records for most species and (b) represent years prior to known significant declines of winter flounder stock.

Comment ID 316bEFR.077.015

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA Impingement Estimates

Description of method used for total number

Data are taken from each station and the total number of animals killed in each of the life stages summed for each year.

Description of method used for age 1 equivalents

For life stages below age 1, the numbers of animals impinged are multiplied by the survival probability through each of the life stages that the animal has to pass to get to age 1. Animals impinged at age 1 or higher were assumed to be age 1.

"EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death." (A5-2.1)

"The Equivalent Adult Model (EAM) is a method for expressing I&E losses as an equivalent number of individuals at some other life stage, referred to as the age of equivalency (Horst 1975a; C.P. Goodyear, 1978; Dixon, 1999), The age of equivalency can be any life stage of interest. The method provides a convenient means of converting losses of fish eggs and larvae into units of individual fish and provides a standard metric for comparing losses among species, years, and facilities. For the § 316(b) case studies, EPA expressed I&E losses as an equivalent number of age-1 individuals. This is the number of impinged and entrained individuals that would otherwise have survived to be age 1 plus the number of impinged individuals (which are assumed to be impinged at age 1)." (A5-3.1)

Having made this sweeping generalisation a rather curious adjustment is introduced to allow for the fact that fish may be caught over an entire year and thus are assumed to range from just age 1 to just below age 2. This adjustment has the effect of increasing the number of age-1-equivalents above the actual number impinged.

EPA Response

The majority of the comment is a restatement of portions of the EPA methods, and do not require a response. The commenter questions the method of using modified survival rates for application to the life stage in which I&E occurs. The commenter seems to have misinterpreted the motivation for the adjustment, the effect of the adjustment, and the definition of an age 1 equivalent. EPA believes the adjustment is warranted because it accounts for the fact that information about the precise age at impingement is not available. It is reasonable to expect that the estimated number of age 1 equivalents is larger than the number impinged because the definition of age 1 equivalents is the equivalent number of fish on the day they enter their second year. Impinged fish that are labeled "age 1" are actually between 1 and 2 years old, therefore one such fish represents more than one age 1 equivalent because it is older than a fish that is just entering the second year. Please see response to Comment 316bEFR.029.105 for a discussion of the assumptions about age of impingement used by EPA for its final analysis of the Phase II rule.

Comment ID 316bEFR.077.016

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 6.01
Overview of I & E effects on organisms

The effect of ignoring annual variation in flow.

The importance of flow

One of the key aspects that must be considered is the relationship between the number of organisms killed by impingement and entrainment and the location and size of the intake. It is apparent that within a single water body, the larger the volume pumped the larger the number of passively transported planktonic organisms that will be entrained. However, water bodies differ in their ecology and animal abundance and species differ in their preferred position within a water body, so it can be argued that the locality and position of the intake can have a large effect on the number of fish and other creatures captured. Living animals, particularly the larger fish and crustaceans that are powerful swimmers, do not behave like passive objects and thus their catch rate can vary in a non-proportional manner with the volume of water pumped. As will be shown below there is a clear tendency for catch rates to increase as a power function of the volume of water extracted, but there are some species that behave very differently. Wyman (1984), in a study of impingement at Lake Ontario power plants operating with different numbers of cooling water pumps, found that species responded differently. Alosa pseudoharengus and Osmerus mordax were apparently attracted to the water currents entering the intake and were caught in greater numbers per unit volume as the volume pumped increased. This response has often been observed but is usually explained by increased intake velocities leading to the zone where water speed exceeds the fishes' sustainable swimming speed being larger. Morone americana, Morone chysops, Dorosoma cepedianium and Perca flavescens were caught at a constant rate per unit volume irrespective of flow and Micropterus dolomieui were caught in lower numbers per unit volume as flow increased. It was concluded that this latter species avoided faster flowing waters and was thus proportionately more vulnerable to intakes with a reduced pumping rate.

One of the most comprehensive studies of the relationship between the volume of water pumped and the number of freshwater fish impinged and entrained in power station cooling water systems was that undertaken by Kelso(1979) for direct-cooled power plants on the Great Lakes. They analysed entrainment and impingement rates separately. Using data collected from 37 power plants, the number of fish impingement per annum (I) was related to power plant generating output capacity in Megawatts (Mwe) by the regression equation:

$\log10(I) = 0.414 + 1.844 \log10(Mwe)$.

The number of fish entrained per annum (E) was similarly related by the equation:

$\log10(E) = 2.103 + 1.658 \log10(Mwe)$.

From this analysis they concluded that for entrainment: "The 'harvest' is apparently influenced more by plant size than location within the great lakes" and impingement: " in general there is a significant influence exerted by power plant size".

The output capacity and the rate of water extraction by direct cooled power stations is positively correlated, irrespective of plant design and Kelso (1979) gave the relationship between cooling water extraction rate (C) in m3s-1 and capacity in Megawatts (Mwe) as:

C = -1.288 + 0.049 Mwe.

This empirically-derived equation obviously cannot be used to extrapolate water usage for plants much smaller than those included in the dataset, as it would predict negative water use. However, it is sufficiently reliable to be used to predict fish impingement and entrainment mortality at the working power stations that were studied.

Combining the above equations and converting water flow to gallons per second (G), the following equations relate impingement and entrainment rates to flow:

log10(I) = 0.414 + 1.844 log10(G+340.25)/12.944) and

log10(E) = 2.103 + 1.658 log10(G+340.25)/12.944).

Antilogging and simplifying the above equations gives the power curves:

I = 0.023(G+340.25)1.844
and

E = 1.816(G+340.25)1.658

respectively.

A clear example of the importance of the volume of water extracted on the number of fish impinged is given by Benda (1975) in a study of impingement at the Palisades Nuclear Power Plant, Lake Michigan, while operating with once-through and evaporative cooling tower closed cooling. The volume of water extracted in each mode was 8101 and 1226 gallons s-1 respectively. Annual estimates of fish impingement were approximately 452,577 and 7,488 for once-through and closed cycle respectively. However, the number of crayfish, Orconectes propinquis, actually increased under closed-cycle cooling (see above, Benda, John et al. 1975).

Recent increases in flow

Increased utilisation of installed capacity has resulted in increases in the mean flow at many plants. This is particularly the case for nuclear-powered stations, illustrated using Figure 1 below, from the EIA website:

http://www.eia.doe.gov/cneaf/nuclear/page/nuc_reactors/reactsum.html

Note that the installed generating capacity has not increased since the mid-1980s, while the output has continued to rise. (Figure 1)

[see hard copy for figure]

Figure 1 Generating capacity and output from US nuclear power plants.

Flow calculations for Salem

At Salem, the EPA give the number of fish caught at the station each year for the conditions at the plant that year. They then average this amount to give an estimate of the number that will be caught in the future. Flow issues do not seem to be taken into account at all.

In table B3-15 the EPA give the operational flow as 1722 MGD. This is much lower than the use when it is running at normal output (see figures B2.1 and 2). The EPA state in B3-5 paragraph 5 that the catch was much larger in 1998 as the flow was higher, and that the flow was expected to be at this higher level from then on. The costs for this plant should be based on this higher figure. This would produce an increase in the value of the catch at the station (see section 1.4).

In this example we will examine the effect that not using the different annual flow of a station has on the predicted number of fish caught in the future. As an example, the data from Salem are re-analysed to calculate the number of fish caught per MGD of water. This analysis predicts that the power station would kill on average 160% more age 1 equivalent fish by both impingement and entrainment that the EPA's estimate.

The power station has pumped differing amounts of water each year. The catch in age 1 equivalents is divided by the annual flow in each year to give the number of fish caught per MGD (Table 1). This is then used to predict how many age 1 equivalents the power station would kill per year if it were to run at 2612 MGD, since the EPA state in B3-5 paragraph 5 that the catch was much larger in 1998 as the flow was higher, and that the flow was expected to be at this higher level from then on.

The flow to predict the catch of the station was 2612 MGD. The predicted number of fish entrained as age 1 equivalents at Salem increased from 336,020,975 to 553,211,986 and the number impinged from 4,801,447 to 7,894,006.

[see hard copy for table]
Table 1. Total Salem catches of all species, excluding the Non RIS species, adjusted to 2612 MGD.

EPA Response

Please see response to Comment 316bEFR.041.037 concerning EPA's assumption that I&E is proportional to intake flow. As EPA notes in this response, for the purposes of EPA's national benefits analysis, it was not necessary for EPA to determine facility-specific, location-specific, or species-specific estimates of the relationship between intake flow and I&E. As the commenter's own analysis shows, in some cases it may be possible to determine a statistically significant relationship, while in other cases species may behave very differently. EPA's analysis was not concerned with analyzing these details.

Comment ID 316bEFR.077.017

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Is Age 1 equivalent a fair method?

Assessing the value of fish of differing life stages and ages is difficult. How do you compare the value of an egg of a striped bass with an eight year-old fish? To overcome this problem the EPA have used the adult equivalent method. They have projected the number of eggs, larvae and juvenile eggs to the equivalent number of age 1 fish. They do not take into account that older fish impinged are worth more than age 1 fish.

Age 1 equivalent methods only work given good information to base the model on. This includes:

1. Good estimates of entrainment and impingement numbers

2. Data split into the correct life stages

3. Accurate survivorship factors from stage to stage

Impingement and entrainment data quality

For the entrainment and impingement data, the data have been extensively corrected to account for problems found in the sampling methods, day/night variation, and seasonality. The corrections have all been applied to the data to improve their quality, before the age 1 equivalent method is undertaken. There are still many issues with the quality of the data used (see later sections of this document)

Data split into correct life stages

Entrainment data are split into age classes at nearly all stations. There are problems with the identification of some species at the egg and larval stages. The impingement data are sometimes collected with all the age classes separated, but the data are combined and treated as age 1 fish. This can have significant effects on the estimates of the value of the fish impinged. (See section 1.5.1)

Accurate survivorship factors

Many of the survivorship factors used in the calculation of age 1 fish are based on back-calculations assuming a stable population. This is a dubious assumption as there have been major environmental changes in the last 30 years. If, for example, the entrainment data are from the 1970s, before the Clean Water Act significantly improved water quality, the populations of fish could have been suppressed by the poor water quality. This would lead to a significant underestimation of the survival factors. The effect of errors in the estimate of these factors is discussed in section 1.6.2.

Underestimation of impingement due to age 1 assumptions.

All the impingement and entrainment calculations are made using as a measure of the total number of fish killed the age one equivalent value. The situation with respect to entrainment is reasonably straightforward. If a plant sucks through the cooling water system say 10,000,000 larval animals, then we cannot value these animals until they reach an age (size) at which they have passed through the period of high juvenile mortality and are at a size that fishermen can catch. The number of larvae is therefore adjusted by the mortality rate up to age 1. The survival rate could be 0.000001, in which case our 10,000,000 larvae are equal to 10 age one equivalent individuals. This is a useful way of dealing with the problem, as a larval fish has no market value whereas a one year old or older fish does, so by making the equivalency calculation we are allowing for mortality and the probability of reaching an age (size) where it is possible to assign a value. Perhaps more importantly, it provides an estimate of the number of individuals that would be lost to the reproducing population, so it is a fair way to proceed.

As the EPA are using age one equivalent calculations for young fish, they should also use them for fish older than age one to take into account impingement losses. They do not, as is made clear in the documentation:

From A5-2.1

"EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death."

From A5-3.1 Modeling Age-1 Equivalents

"The Equivalent Adult Model (EAM) is a method for expressing I&E losses as an equivalent number of individuals at some other life stage, referred to as the age of equivalency (Horst 1975a; C.P. Goodyear, 1978; Dixon, 1999), The age of equivalency can be any life stage of interest. The method provides a convenient means of converting losses of fish eggs and larvae into units of individual fish, and provides a standard metric for comparing losses among species, years, and facilities. For the § 316(b) case studies, EPA expressed I&E losses as an equivalent number of age-1 individuals. This is the number of impinged and entrained individuals that would otherwise have survived to be age 1 plus the number of impinged individuals (which are assumed to be impinged at age 1)."

It has been demonstrated in numerous impingement studies that for many species of fish there are large numbers of individuals above age one that are impinged. Just as the larval number was adjusted downwards to make an age one equivalent the older fish need to be adjusted upwards to give an age one equivalent. The size of the error that is introduced by the assumption that all fish impinged are age 1 is illustrated below using data from Salem.

The EPA estimate the number of age 1 equivalent white perch impinged at Salem as 540,109; re-calculation indicates that the correct value is 37,880,764 fish. White perch is a particularly clear example of an underestimate that occurs for all species that live for more than 1 year. This underestimate applies to many of the species caught at power stations. In the following calculations the figures for age 1 equivalent do not match the EPA figures exactly, as the monthly data used to adjust the totals by screen mortalities were not available. However, this is a small proportional difference and does not affect the outcome of the calculations.

The values of the survivorship for each life stage are given in Table 2. The final column shows the number of age 1 equivalents that a fish at a particular life stage represents. For example, it requires 13,500 white perch to enter the age 1 life stage for 1 eight year old fish to be produced.

[see hard copy for table]
Table 2. The survival factors (SJ) used to calculate the age 1 equivalents of white perch at Salem. SJ* takes into account the uncertainty of the age at which a individual is caught

Table 3 shows the unadjusted figures for white perch impinged at Salem as raw numbers and as age 1 equivalents using the assumption that all impinged adult fish are at age 1 (EPA method). The raw number is adjusted to take into account the unknown age at impingement.

[see hard copy for table]
Table 3. The raw numbers of white perch impinged at Salem and the age 1 equivalents.

The white perch spends much of its life in inshore waters where it is vulnerable to impingement. In Table 8 the numbers caught in each year class are given. It is evident that there are large numbers of older fish killed by Salem. As a fish above age 1 is equivalent to many age 1 fish, this age distribution can have a significant effect on the total number of age 1 equivalent fish caught at a power station. Table 9 shows the number of age 1 equivalents that the impinged fish of each age represent.

Ignoring the age structure of the white perch impinged results in an underestimation of the number of age 1 equivalents killed by Salem power station by two orders of magnitude. This effect will be found for all species of fish that are impinged at ages above 1. The relative effect will differ depending on the number of year classes vulnerable to impingement and the relative proportions of the age classes caught.

Age 1 Equivalent calculation for commonly impinged fish at Salem.

Table 4 shows the number of each age group of the commonly impinged fish caught at Salem. Table 5 expresses these number as a proportion of the total adult catch. It can be seen that for many species, the assumption that most individuals caught are age 1 is false. For example, over 90% of the catch bay anchovy is age 2 or over, 30% of blue crab, 80% of non-RIS forage species, 25% of striped bass and 42% of white perch.

[see hard copy for table]
Table 4 Numbers of fish caught at each age at Salem

[see hard copy for table]
Table 5 Proportion of the fish caught at each age at Salem

[see hard copy for table]
Table 6 Age 1 equivalent values of species of fish impinged at Salem (total number over all years). These are adjusted for the age at capture.

[see hard copy for table]
Table 7 Number of Age 1 equivalents total and mean caught in at Salem. Number of age 1 equivalents

calculated totals from report and change expressed as a percentage.

The number of age one equivalents of each of the age groups is given in Table 6. The total number of animals caught at Salem is used. No adjustments are made to account for the problem of 1996 flow rates. This has the effect of slightly lowering the mean number of age 1 equivalent fish killed by the power station. The survivorships used are based on figures given in the Salem input spreadsheet.

Table 7 shows the total and mean number per year of fish killed (age 1 equivalents) when the age of the fish is taken into account. The table also shows the values given in the case study (in table B3.3) for each of the species and the new higher value expressed as a percentage. The increases can be considerable.

There are several ways that catching older fish can cause very high age 1 equivalent values.

For long-lived species which spend a lot of their life in estuaries, such as the white perch, the increase is significant as some relatively old fish can be caught.

Some species, for example the bay anchovy and the non-RIS species, are caught mainly as older fish. This can result in a much larger number of fish caught in terms of age 1 equivalents than a simple total would suggest.

Species that are impinged at age 2 or more which have a very low survivorship from year to year also give high age 1 equivalents; an example of this is the blue crab. Only about 10% of crabs survive the first year and only 20% through the second. A two-year-old crab is equivalent to many individuals at the beginning of their first year of life.

For the species that are only caught at age 1, or have very few age 2 or more individuals caught, this method of calculation makes little difference to the overall total.

Morro Bay, California: another example of age structure importance

Here we present some examples of species that are caught at greater than age 1 from Morro Bay. Assuming that these are all age 1 would significantly underestimate the number of age 1 equivalent fish caught.

-Topsmelt, Atherinops affinis: the size frequency distribution suggests that almost all the fish impinged were 2 or 3 years old.

-Northern Anchovy, Engraulis mordax: about 50% of the catch were greater than 90 mm SL and presumably older than age 1.

-Plainfin midshipman, Porichthys notatus: the majority of the fish impinged were mature and thus two or more years old. This is to be expected as this species migrates into bays and estuaries to reproduce.

-Pacific sardine, Sardinops sagax: all the impinged fish were larger than the minimum size at maturity and were likely to be 2 or more years old.

[see hard copy for table]
Table 8. The numbers of white perch impinged at different ages at Salem

[see hard copy for table]
Table 9. The age 1 equivalents of impinged white perch when analysed using the age information given.

The effect of survival rate on age 1 equivalent calculations

In this example we will examine the effect of differing values for survivorship on the age 1 equivalent calculations. Data will be presented showing that the survivorship values used by the EPA are not the same as some published data. The two examples chosen show variations of up to 50%. Varying the survivorship values used in the age 1 equivalent model produces estimates of age 1 equivalents of up to 116 % higher.

First, we examine the survivorship values used by the EPA. Here we will look at two species where we have found published data for survivorship of species entrained at case study power stations.

To match published data some life stages have to be combined.

Table 10 shows the values obtained for the striped bass at Salem and by NOAA. The values at Salem are consistently lower that those found in the NOAA estimate - on average 48% of the NOAA figures.

[see hard copy for table]
Table 10. The proportion of striped bass that survive from one life stage to the next. Data from Salem and the NOAA technical report NMfs circular 443, Synopsis of Biological data on striped bass, Morone saxatilis (Walbaum). E M Setzler et al.

In Table 11 the survivorship estimates of Cunner (Tautogolabrus adspersus) calculated by the EPA and those quoted in Horst are presented. It can be seen that the Seabrook values are on average 72 % of the values quoted by Horst.

[see hard copy for table]
Table 11. The proportion of Cunner (Tautogolabrus adspersus) surviving from one age to the next. Data used by the EPA at Seabrook and estimations of the factors from Horst et al.- Effects of Power Station Mortality on Fish Population Stability in relationship to Life History Strategy.

As can be seen from the two examples above, differences of 50% in survivorship estimates are possible. By re-running the entrainment to age 1 equivalent model and adjusting the survivorship values we could examine the effect on the number of age 1 equivalent fish estimated. We adjusted the survivorship by 25, 50,75 and 100%. This was done across all the survival factors.

[see hard copy for table]
Table 12. The effect of changing the estimates of survival on the number of entrained fish in various species found at Salem.

Table 12 shows that a 50% increase in the estimates of survival can result in a 116% increase in the estimate of the age 1 equivalent number entrained.

The survivorship figures used in the EPA case studies are largely based on the assumption that the populations are in equilibrium. Because of this assumption, the data used to calculate these figures already have the effect of the power stations built into them. As conditional mortality rates from entrainment are often in the 10 - 25% range and the survivorship values can vary by significant amounts it would seem reasonable to err on the side of caution and increase all the estimates by 25%.

EPA Response

The commenter identifies many aspects of the EPA's I&E analyses that have uncertainty associated with them, e.g., estimates of I&E loss rates and species survival rates. EPA agrees that these kinds of uncertainty exist. However, EPA does not believe that the presence of uncertainty is surprising. Indeed it is expected in any scientific endeavor, and EPA has noted the same kinds of uncertainty and commented on possible ramifications in Chapter A6 of the Regional Analysis Document (DCN# 6-0003).

The commenter misrepresents the methods used by EPA by citing this sentence out of context:

"EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death."

This criticism is invalid for two reasons: (1) EPA did not use impingement loss rates as if they were identical to an age 1 equivalent--EPA adjusted the impingement loss rates appropriately to express them as age 1 equivalents; and (2) EPA has revised their method of estimating the age distribution of impinged fish to include ages younger than and older than age 1, as described in response to Comment 316bEFR.029.105.

The commenter provides a series of alternative example calculations aimed at assessing the effect of the assumed age 1 distribution of impinged fish. The purpose of these calculations is obsolete because EPA has revised their method of estimating the age distribution of impinged fish to include ages younger than and older than age 1, as described in response to Comment 316bEFR.029.105.

The commenter proposes that all survival rates should be adjusted upward by 25%. EPA believes this proposal is unsupported in general. EPA notes that such rates are unavailable for most facilities and species. Therefore, it is unknown how representative rates of 10-25% may be. Please see response to Comment 316beFR.330.028 for further discussion of this issue.

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Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 10.01.03
Data Issues

Old data

How intensively were the stations studied?

Salem is a well-studied station, with 21 years of data available, although there have been some changes in the way the samples have been taken over that period.

Pilgrim and Brayton are also well-studied with data from 1974. For Brayton, data are only used from 1974 to 1983, as the populations of fish declined after that time. They do not provide the data to show this effect. Seabrook has 8 years of data.

The other sites are restricted to 1 or 2 years of data, often from the 1970s.

EPA Response

EPA analyzed all I&E data presented in facility reports that was suitable for developing annualized estimates, with the exception of Brayton Point Station (BPS). As the commenter notes, EPA only evaluated 1974-1983 data for this facility. This time period was selected for several reasons: (1) year-round entrainment sampling of all species began in 1972 and ended in 1984; BPS began entrainment monitoring again in 1993, but only for winter flounder, (2) 1984 and 1985 were not considered because of the use of "piggyback" cooling during some of this time, (3) Unit 4 did not go into service until 1974, so data from 1972 and 1973 were not included, and (4) this time period is prior to a dramatic decline in fish populations beginning in 1985.

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Trends

Many fish communities have shown larges changes in recent years. In some habitats species are recovering after anthropomorphic impacts, others are still in serious decline. Here we present some data for the Hudson, New York, and Morro Bay, California, to demonstrate that significant changes have occurred over this period.

Hudson River, New York

Taking the Hudson River striped bass and atlantic tomcod as examples (Henderson and Seaby 2000), it can be seen that data from the 1970s would give very misleading results if applied to the area today. Figure 2 shows the number of various life stages of striped bass in the Hudson between 1975 and 2000. It can be seen that there has been a 15-fold increase in numbers over this time. This is related to the reduction in fishing pressure and the cleaning of the estuary.

[see hard copy for figure]
Figure 2: The abundance indices for the adult stock (CFM) and the larval (YSL) and post larval (PYSL) stages of striped bass. Note that all these indices show a similar trend and sequence of high and low abundance years.

The atlantic tomcod has been in steady decline over the last 25 years in the Hudson (Figure 3). Again, using data from the mid 1970s would lead to a serious misinterpretation of the impact of a station in the Hudson on the tomcod population.

[see hard copy for figure]
Figure 3: The change in estimated abundance of Atlantic tomcod at age 1. A linear regression has been fitted to the data to show the trend of declining number.

Morro Bay, California.

A comparison of impingement levels observed during the periods 1977-79 and 1999-2000 at Morro Bay, California, illustrates the large changes in fish abundance and thus rate of impingement that have occurred in American waters.

In this example there has been a loss of fish such as shiner perch, Cymatogaster aggregata, and bocaccio, Sebastes paucispinis, which were much more abundant in the earlier study. For shiner perch, the following account was given by Duke Energy (APPLICANT'S TESTIMONY ON GROUP IV ISSUES, Energy Resources Conservation and Development Commission Docket No. 00-AFC-12)

"During the 12-month sampling period of 1978, over 5,400 shiner perch were collected (Behrens and Sommerville 1982), while during this study (1999-2000) only 45 were collected. Over 75 percent of the shiner perch impinged during the previous study were newborns (Behrens and Sommerville 1982). Annual indices for young-of-the-year (YOY) shiner perch from the San Francisco Bay monitoring program show a decline from the early 1980s through the last data point in 1993 (CDFG http://www.delta.dfg.ca.gov/baydelta/monitoring/shper.html). This decline is attributed to loss of saltwater marsh areas that are recognized as important nursery areas for this species. Female shiner perch will enter coastal bays prior to giving birth to utilize saltwater marsh and eelgrass beds as nursery areas (Bane and Robinson 1970). The reduction in the area coverage of eelgrass beds in Morro Bay, especially in areas of the Bay that are closer to the intake structures (Tetra Tech 1999) may partially account for the reduced numbers of shiner perch in impingement collections."

In the case of bocaccio, the population along the Californian coast has declined significantly over the past decade, and management measures are in effect to regulate the take of this species. The reduction in impingement may therefore reflect a general decline in the abundance of the species.

Increased species richness and fish and crustacean abundance following plant closure – studies in the Bristol Channel, England

Regular long-term monitoring of fish and crustaceans impinged and entrained at Hinkley Point 'B' Power Station in the Bristol Channel, England has been undertaken for more than 21 years. Henderson & Seaby (2002) conclude "Fish abundance in the estuary is probably 3 times higher than that recorded in the early 1980s and there is also a clear trend for increased species richness" (Figure 4). They consider the reasons for this extraordinarily large increase and suggest that the reduction in power plant entrainment and impingement following the closure of a number of direct-cooled power plants from the late 1980s may be a contributory factor. The passages below are taken directly from their recent report, available from: http://www.irchouse.demon.co.uk/latestreports.html.

[see hard copy for figure]
Figure 4 The change in the number of fish species impinged per month between 1981 and 2002. The black trend line was fitted by linear regression

"Amongst a number of climatic and anthropogenic changes that may be contributing to the observed increase in species richness and abundance must be considered the recent closure of a number of direct-cooled power stations. Since sampling commenced in October 1980, Berkeley closed in 1989, Uskmouth in 1995, Pembroke in mid 1997 and Hinkley A in May 2000. All of these stations would have been killing fish and crustaceans that were members of the populations subject to capture at Hinkley B. It is highly unlikely that entrainment and impingement in power station cooling water systems would have changed species richness in the region because the estuary presents an open system that would receive a flow of recruits from other waters. However, if mortality rates are sufficiently high it is possible that direct-cooled power stations could reduce abundance by a detectable amount. Table 13 gives estimates of the number of fish > 3 cm in length that are captured per year by power stations in the Bristol Channel. The four power stations that have closed since 1989 were estimated to kill 3.44 x 106 individuals per annum. The number of small individuals that would have passed through the filter screens and been killed following entrainment has not been estimated, but would have been at least an order of magnitude greater. "

"…there are indications that the increase in abundance of some species has occurred since power station closure as would be anticipated if power stations had been having an effect on population size.

For example, Palaemon serratus (Figure 5) showed a reasonably stable mean population size until 1998 after which it has been increasing almost exponentially. There are also indications that the Common shrimp, Crangon crangon, may have recently increased in average abundance. Amongst fish, sprat, whiting, flounder and sand goby abundance have all increased since the initiation of power station closures.

[see hard copy for figure]
Figure 5 The change in abundance of Atlantic prawn impinged at Hinkley Point in the River Severn between 1981 and 2002.

Such coincidences cannot be considered proof of a causal relationship. However the Severn Estuary Data Set should allow a more rigorous statistical analysis to be undertaken within the next 18 months."

[see hard copy for table]
Table 13 Estimated number of fish killed on the filter screens of marine and estuarine power stations situated in the Bristol Channel.

EPA Response

EPA agrees with the commenter that some fish stocks affected by I&E have increased or declined substantially since the time facility I&E studies were conducted. Unfortunately, EPA's analysis was constrained by the available I&E data, which rarely provide information to determine if and how stock sizes have changed as a result of I&E. EPA agrees that new monitoring studies would help develop better estimates of current I&E.

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Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

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Data Issues

Exclusion of species

How were species selected for analysis?

The EPA first pick rare and endangered species that have been affected by the station. They then move on to commercial or recreationally caught species.

Finally they consider populations thought likely to be affected by the station. It is not obvious how a species is chosen to be ignored. From the numbers given EPA do, however, analyse all of the significant species present.

The Salem study is the only study where non-RIS species account for a high proportion of the total catch. Non-RIS species were between 30 and 60% of the total impingement and 10 to 40 % entrainment.

At Big Bend unidentified fish make up about a fifth of the total fish count while at San Francisco, Contra Costa and Pittsburg, about 15% of the entrained species are unidentified and about 2% of the impinged species.

Pilgrim gives full numbers of all species caught from 1990 onwards, while before that, from 1974, the non-RIS species are reported as one number. Brayton reports only 19 species caught, though there are unidentified species mentioned.

J.R. Whiting gives all the information for all species caught. Relatively few species are caught at this station. At Monroe unidentified species account for less than 1% of total numbers caught. In the Ohio study approximately 80 species are caught, but full data are given for a reduced set of species.

Did this affect the outcome?

Species that are not rare and have no commercial or recreational value are classed as forage fish. All forage fish appear to be treated the same in terms of value. They only come into play in the calculation of production foregone. Addressing each species individually is unlikely to make much difference at most stations. The exception is where the fish are rare or have a very local population. If the forage fish caught at stations can be shown to have a higher value then it might be worth treating them individually.

EPA Response

EPA did not eliminate any I&E data for any species for which data were available in case study facility documents. Unfortunately, if only a subset of the species potentially impinged and entrained were sampled by the facility, EPA could only evaluate those species. EPA agrees that the inclusion of unidentified organisms can complicate assessments and lead to misleading results. Identification of the appropriate "best technology available" requires scientifically valid monitoring studies that identify the organisms being impinged and entrained.

The Great Lakes

Impingement in the Great Lakes.

The two case study stations are dominated by clupeids (over 90%). Table 14 shows the different types of fish impinged at two case study sites and several other power stations in the Great Lakes (as raw numbers) (data from Sharma, R. K. and Freeman, R. F. 1997, Survey of fish impingement at power plants in the United States. Argonne National Laboratory). The stations are ordered in the table by the abundance of clupeids.

At most stations on the Great Lakes, clupeids are the major species caught (Figure 6), however, at Oak Creek the smelt species make up over 17% of the total catch. Similarly over 18% of impinged fish at JP Pulliam and DE Karn are Perch species. Palisades, a closed-cycle cooling station, mainly catches sculpins whereas at Big Rock and Kewaunee, both once-through systems, smelt species are impinged in large numbers.

[see hard copy for table]
Table 14. Proportion of the major species caught at power stations on the Great Lakes. All species with more than 100,000 individuals caught at the case study stations and any species with more than 10 % of the other stations are included.

Entrainment in the Great Lakes.

From data given in Kelso and Milburn (1979 no. 453) (Figure 7) it can be seen that entrainment at power plants in each of the Great Lakes is very different. In Ontario, Detroit River and Michigan, clupeids are the dominant group entrained. In Lake Erie it is smelt and in Superior it is the percids. In Huron, smelt and the clupeids are entrained in equal measure.

The two case study stations are on Lake Erie. Kelso and Milburn's (1979) data would suggest that the species entrained would be predominantly smelts, however the case studies are dominated by clupeids, with more than 85% of the total catch. It can be seen from this that extrapolating from the case studies to other stations on Lake Erie would produce a very different result from that found in Kelso and Milburn (1979). Extrapolation to power plants situated on different lakes is even more liable to error.

Extrapolation to all the Great Lakes stations from the case studies is therefore likely to produce an extremely poor match with reality.

Estuaries

The Salem case study is intended to be representative of other estuaries. To examine this we looked at the nearby Hudson estuary and compared the major groups of fish impinged and entrained at each station.

Impingement in Estuaries

Data were obtained for Salem (the case study), Danskammer, Roseton (State Pollution Discharge elimination system permits for Bowline Point Indian Point 2 & 3 Roseton Steam Electric Generating Stations 2000) and Albany (PSEG Power New York Inc's Bethlehem Energy Centre SPDES Modification 2002). The data were classed into five groups - others, bay anchovy, drums, Morone spp and clupeids (Figure 8).

The graph shows that Salem is a poor model station for the Hudson. All the Hudson stations impinge mainly clupeids and Morone spp. whereas Salem impingement is dominated by bay anchovy, drums and the group Others. The Others at Salem include the RIS and non-RIS forage fish plus others that did not fit the above classes.

Entrainment in Estuaries

Data were obtained for Salem (the case study), Bowline, Indian Point, Roseton (State Pollution Discharge elimination system permits for Bowline Point Indian Point 2 & 3 Roseton Steam Electric Generating Stations 2000) and Albany (PSEG Power New York Inc's Bethlehem Energy Centre SPDES Modification 2002). The data from each station were classed into four groups, others, bay anchovy, Morone spp. and clupeids and plotted (Figure 9).

The picture is more complicated for entrainment than it is for impingement. Salem primarily entrains bay anchovy (90%). This is similar to Bowline and Indian Point, but both these stations also entrain significant numbers of clupeids and Morone spp. The species composition of entrained fish at Salem is completely different from Roseton and Albany, which are dominated by clupeids and Morone spp.

The presence of eggs, larvae and young fish is very dependent in estuaries on the exact salinity conditions, flow rates and habitats present.

Implications of extrapolations from case studies to other stations

As can be seen from these examples, extrapolating the catch of fish from one station is prone to many errors. As a result, the costs calculated for a case study will not be directly comparable with any other site. For example, using Salem as a model for the catch at Roseton would result in a completely inaccurate estimation of the value of the lost fish. At Salem the majority of all the fish killed are bay anchovy, which has very little commercial value. The majority of the fish entrained and impinged at Roseton are the valuable Morone spp. and clupeid species. Using Salem as the model for the Hudson Estuary would significantly underestimate the values of the fish killed.

[see hard copy for figures]
Figure 6 Proportion of the different types of fish impinged at Great Lake power plants.

Figure 7 Proportion of different groups of fish entrained at power stations at each of the Great Lakes. The numbers of stations used are in brackets.

Figure 8. A comparison of the proportion of entrained fish from the case study at Salem and stations in the Hudson River.

Figure 9. A comparison of the proportions of entrained fish from the case study at Salem and stations in the Hudson River.

EPA Response

EPA recognizes the limitations to extrapolation that are addressed by the commenter. The only real solution to such difficulties is to evaluate more facilities in an effort to capture loss rates for as many species as possible. To this end, EPA evaluated many more facilities for its final analysis, including Hudson River facilities. Nonetheless, extrapolation was still necessary given the hundreds of facilities in scope of the rule, and the large number of these facilities that have not conducted impingement and entrainment studies. To further address this issue, EPA extrapolated I&E results only to facilities within the same region. Please also see EPA's response to Comment 316bEFR.041.041 on its extrapolation approach.

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Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Calculating the worth of commercial species impinged and entrained

The worth of an individual lost to a population can be assessed in terms of the immediate loss to the other species, or man, which might have consumed the individual, or in terms of the future loss caused by the loss of reproductive potential.

In the EPA's calculations, the commercial species killed by entrainment and impingement are valued by calculating the age 1 equivalent number killed and multiplying it by the proportion of the population taken by commercial fishing and their market value. This only considers the immediate loss and places a value on only a proportion of the number killed. This is felt to be an extremely significant omission, liable to underestimate the value of fish killed severely.

The fish killed also represent a loss in reproductive potential to the population and thus represent a future loss to the ecosystem and fishermen. The average contribution of an individual to future generations changes with age, so that the contribution of an egg is much less than that of a one year old fish. This is because fish at or close to reproductive age are no longer subject to high mortality rates and will soon produce eggs. Fisher defined a quantity, termed the reproductive value, V, to measure the extent by which an individual of age x contributes to the next generation.

To calculate the reproductive value of fish of age a, we need a table of age-specific survival and mortality rates. If we assume that the population size is stable then the reproductive value is given by:

[see hard copy for equation]
where l(x) is the survival to age x and m(x) is the fecundity at age x.

If the population is growing or declining then the expression is a little more complex, as it includes a term to describe the change in population number. In practice, the above description should give us an approximate measure of the worth of an individual in terms of future eggs contributed to the population that is accurate enough for the estimation of the value of the loss to the population. The reproductive value of a newly produced egg is assumed to be 1, and all later ages have a reproductive value expressed as the number of eggs that would be produced on average over the rest of their lives.

Having calculated the reproductive value for age 1 fish we can use the estimated number of age 1 equivalent fish killed by impingement and entrainment to calculate the lost egg production they represent. This total lost production of eggs can then be converted into age 1 equivalent reproductive value by multiplication with the survival rate to age 1. This age 1 equivalent reproductive value gives the true loss over time to the population of the age 1 equivalent animals killed. The economic loss can then be calculated by multiplying the age 1 equivalent loss by the unit monetary value.

One important general observation is that reproductive value tends to increase until an age is reached that is close to when all the fish have reproduced once, and then tends to decline for older age groups.

Striped bass at Salem as a worked example

These calculations will be illustrated using the striped bass at Salem as an example. At Salem the average numbers of entrained and impinged fish (excluding 1996) were 419,505 and 7,200 respectively. When reduced by the 18% lost to commercial fishing, the values were 343,994 and 5,904. Thus the total number of individuals as age 1 equivalent that were not valued was 347,898. It is these fish for which we will calculate a reproductive value and thus estimate the value of their loss to the population.

Table 15 shows the age-specific fecundity and survival of striped bass and the calculated reproductive value at age(x). The change in reproductive value with age is plotted in Figure 10, which shows a typical maximum at an intermediate age in the life cycle.

The total lost production (expressed as numbers of eggs) was calculated by multiplying the reproductive value of age 1 fish (6,515 - see Table 15) by the number of age 1 equivalents caught at the station. This product was then adjusted to an age 1 equivalent number using the survival from age 0 to age 1. These calculations are shown in Table 16. This shows that the 347,898 fish not valued as age 1 equivalents have a future age 1 reproductive potential of 596,142 age 1 equivalent fish. Thus the value of the uncounted fish is the economic value of 596,142 age 1 equivalent fish.

In summary, the EPA calculations are based on the value of 18% of about 420,000 age 1 equivalent fish with a value of about $56,000. Using lost reproductive value we have a future loss of 596,142 individuals which has a value of about $79,000 plus the immediate loss of $56,000 giving a total annual loss of about $135,466 per year.

These calculations can be undertaken for all the commercial species plus many others and will allow a full valuation to be made of the loss.

Pilgrim - a worked example of a site

To illustrate the method the most frequently-encountered species at Pilgrim were chosen. The reproductive values of the top 7 species impinged and the top 5 species entrained were calculated using the same method as the Salem above example. The results are given in Table 17 & Table 18.

[see hard copy for table]
Table 15.The age-specific fecundity and survival of striped bass and the calculated reproductive value at age(x).

[see hard copy for figure]
Figure 10. The change in reproductive value with age for striped bass

[see hard copy for table]
Table 16. The age 1 equivalent values for Striped Bass (+ 58% Morone spp.) from Salem (Tables B3-3 and B3-8), multiplied by the reproductive value to find the total number of eggs lost in the future, shown as age 1 equivalents. (From egg to age 1 factor = 0.0002615).

[see hard copy for table]

Table 17. The age 1 equivalent and reproductive values for the top 7 species impinged at Pilgrim.

[see hard copy for table]
Table 18. The age 1 equivalent and reproductive values for the top 5 species entrained at Pilgrim.

EPA Response

The commenter proposes that EPA's analysis should include consideration of the reproductive value of fish killed by I&E. EPA has addressed this topic in its response to Comment 316bEFR.206.065.

Comment ID 316bEFR.077.023

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03
Available I&E technologies

Technologies for reducing Impingement and Entrainment

Modified travelling screens - 'Ristroph Screens'

Efficacy of Cooling Water Intake Technologies Chapter 3 adequately summarises the effectiveness of Ristroph screens and fish return systems to reduce fish impingement mortality. The report notes that their effectiveness is highly variable but that at least a 70-80% reduction in impingement can be achieved over conventional travelling screens. In practice this figure is probably higher than will actually be achieved, for two reasons. First, it will depend on the species mix at the particular site and, as will be discussed below, some species of fish are much more easily hurt than others. Second, the need to fit modified screens into existing intake structures may result in less effective performance.

The actual reduction that can be achieved will depend on the dominant species for the locality. Generally clupeid fish are by far the most abundant species and these are particularly vulnerable to damage following contact with surfaces. Further, there are likely to be considerable differences in survival between clupeid species e.g. survival values quoted in Chapter 3 show bay anchovy 20-72%; herring 78-82%; alewife 15-44%.

Fish species	Survival %
Bay Anchovy	77
American shad	65
Blueback herring	74
Striped bass	91
White perch	86
Atlantic tomcod	83
Alewife	38

Table 19. 8 hr survival rates for Indian Point (Fletcher, 1990)

Table 19 suggests that an intake situated in waters where alewife were one of the most abundant species caught would be unlikely to achieve 70% reduction in average impingement mortality. The effect of the species mix on the average survival that can be achieved in practice can be appreciated from a consideration of the data for Salem. Bay anchovy are by far the most abundant species impinged and on average represent about 50% of all impinged individuals. The next most abundant species is weakfish, which contributes about 22% of all individuals impinged. Thus these species, with recorded survivals at Salem for bay anchovy of 20 - 72% and weakfish of 18 - 88%, represent about 72% of all impinged fish, and will effectively determine the average survival. It is clear that this value is unlikely to reach 70% and could on occasions be much lower.

An additional factor reducing the likelihood of 70 to 80% survival rates is that the data presented in Table 14 above are 8 hr survival rates, and may not be of sufficient duration to predict the long-term survival of fish. It has been found that stressed and damaged fish can take a number of days to die. There is also the problem with all fish return systems that exhausted, disorientated and damaged individuals can be picked off by predators on their return to the main water body.

Further doubt on the effectiveness of screens with modified Ristroph features comes from studies undertaken at Roseton units 1 & 2. This site has six conventional screens and two modified dual-flow screens. One of the modified screens also has a flow-straightening device. Testing of the dual flow screens found that while post-impingement survival rates were higher than at the conventional screens, they were not as high as those observed at the Indian Point or Arthur Kill intakes. It was suggested that this was linked to the pattern and magnitude of the water velocity close to the screens. Velocities were increased because the modified screens had a reduced filtering area. This was the inevitable outcome of fitting modified screens without major structural alteration to the intake system (DEIS for Bowline Point, Indian Point & Roseton GS, VIII-29).

EPA Response

EPA has not presented any of the studies cited in Chapter 3 of the Technology Development Document with the intent that the results can or should be replicated elsewhere. EPA recognizes the variability between sites and locations and thus has not pre-approved any technology for BTA (except cylindrical wedgewire for compliance alternative 4). Traveling screens modified to include fish handling and return systems are among the most widely deployed and studied intake technologies on the market today. They have a demonstrated success in reducing impingement mortality that is backed by nearly three decades of study. EPA has included this technology as one of many that are available to facilities in meeting the requirements of today's rule.

Comment ID 316bEFR.077.024

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Cylindrical wedgewire screens

Wedgewire screens have a proven ability to reduce both impingement and entrainment mortality at low volume intakes (1 to 50 MGD). Their effectiveness is related to (1) the slot width, (2) through-slot velocity, (3) existence and strength of ambient cross flow to carry organisms away from the screen, (4) the amount of biofouling and (5) the amount of ambient debris. As the EPA note, they are an unproven technology for protecting once-through intakes that typically pump volumes in excess of 100 MGD. As will be discussed below, the effectiveness of wedgewire screens is linked to water velocity across the screen and this has not been quoted in the EPA discussion of effectiveness.

Wedgewire screens with slots widths of 5 to 10 mm have been used to effectively eliminate impingement at freshwater cooling water intakes. They have not been used at marine or estuarine facilities probably because of fears that biofouling and screen blockage would lead to operational problems. Small-scale trials of Johnson wedge-wire screens at Fawley, England, in the 1980s showed that standard steel wedge-wire screens developed a fouling community (Bamber and Turnpenny, 1986). Even a Johnson 715 alloy (70% Cu: 30% Ni) screen that leached copper and thus poisoned organisms that had settled, experienced some fouling.

To reduce entrainment of fish eggs and larvae appreciably the screen slot widths need to be in the range 0.5 to 3.0 mm. Weisberg et al. (1984) & (1987) found that a 3 mm slit width excluded about 50% of bay anchovy and naked goby larvae in the 5 to 6 mm long size class. A 1 mm slot width gave almost complete exclusion of bay anchovy greater than 8 mm in length and naked goby greater than 7 mm long. To give good protection to the very small larvae a slot width of 0.5 mm is required.

A 0.5 mm slot width will only be highly effective for larval exclusion when used with a suitable intake velocity. At a velocity of 7.5 cm/s this width will exclude larvae less than 6 mm in length. However, at a velocity of 15.0 cm/s (0.5 fps) about 60% of larvae less than 7.0 mm in length were entrained.

The reduction of egg entrainment is related to the size of the egg. However, eggs are not rigid and eggs greater than 0.5 mm in diameter will pass across a 0.5 mm slot. Data on the entrainment of marine fish eggs via a 0.5 mm slot width screen with a velocity of 7.5 cm/s are presented in Table 20.

Species	Egg diameter mm	% Exclusion
Tautog	0.7-1.14	80
Bay Anchovy	0.65-1.24	84-75
Windowpane flounder	1.0-1.4	96-93
Atlantic Menhaden	1.0-2.0	100
Weakfish	0.9-1.1	100

Table 20. Entrainment of marine fish eggs via a 0.5 mm slot width screen with a velocity of 7.5 cm/s (Sunset Energy Facility proposal for Brooklyn New York)

A species of particular importance in many estuaries is the striped bass. This species has a relatively large egg (2.4 to 3.9 mm diameter) and thus egg entrainment would almost certainly be eliminated by slot widths in the range 0.5 to 1.0 mm. However the striped bass yolk sac larvae range in length from 2 to 7 mm which would suggest that some young larvae would be entrained with even a 0.5 mm slot width, and only very limited protection would be offered by a width > 1.0 mm.

It is clear that the reduction in entrainment possible using wedge-wire screens will be determined primarily by the slot width, the water velocity across the screen and the mix of species present at the particular locality. The performance values quoted in Chapter 3 – 'Efficacy of cooling water intake structure technologies' indicate exclusion efficiencies of eggs and larvae at or above 90% for a 1 mm screen width (Logan 90%; Seminole 99% reduction; Chalk Point 90%). In localities where the eggs of fish such as the bay anchovy are present, or yolk-sac striped bass are abundant, a 1 mm screen width would not be able to achieve this level of efficiency with any realistic intake velocity. Further, in fully marine localities there are species with egg diameters well below 1 mm. It is therefore unlikely that 90% exclusion could be achieved by a 1 mm screen width at many estuarine sites. At marine sites this level of exclusion would be even more unlikely to be achieved because of the presence of even smaller eggs and larvae and the probability of biofouling.

A more realistic appraisal of the level of entrainment exclusion that could be achieved with a velocity of 7.5 cm/s across the screen would be in the order of 90% for a 1 mm screen width in flowing rivers, 90% for a 0.5 mm screen width in lakes and 80-85% for estuarine sites with a 0.5 mm screen width. There are no data upon which to base an assessment for an intake situated on the ocean, but it would likely be below that for an estuarine intake because of the small size of some marine fish eggs and larvae and problems of screen blockage. Biofouling at ocean and lower estuarine sites is likely to be an insuperable problem, which at best would result in regions of high cross screen velocities. It should be noted that in some localities, such as bays and inlets with small tidal ranges there may be insufficient cross-flows to sweep debris and impinged organisms off the screen surface.

EPA Response

EPA appreciates the data submitted by the commenter and notes the inclusion of cylindrical wedgewire technology as BTA for facilities meeting certain criteria and opting for compliance alternative 4.

Comment ID 316bEFR.077.025

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Fine mesh travelling screens

The incidence of entrainment can be greatly reduced by the use of 0.5 to 1 mm mesh travelling screens. However, this does not mean that the mortality of young fish is proportionately reduced as the eggs and early stages are now liable to impingement damage. The EPA Chapter 3 discussion may give a misleading impression of the effectiveness of these devices by quoting the reduction in entrainment rather than the increase in survival. Survival on such screens is highly species-specific with clupeid and other pelagic fish such as bay anchovy and Alosa species having low rates of survival. Taft et al. (1981) report laboratory studies of the effects of impingement on fine mesh screens for the larval stages of striped bass, winter flounder, alewife, yellow perch, walleye, channel catfish and bluegill. Survival was highly variable and dependent on water velocity across the screen and the duration of impingement. The highly species-specific nature of survival of impinged larvae was also noted by McLaren & Tuttle (1999).

Fletcher (1990) also noted that the mortality on fine mesh screens is related to the amount of debris retained by the screen. This would suggest that fine mesh screens would not be effective in all waters. Fletcher (1992) reports a study of the effectiveness of fine mesh screens to reduce losses of early life stages of striped bass. The results showed that survival was influenced by mesh size, water velocity and exposure time. It was concluded that impingement resulted in high mortality for young larvae and many larvae that initially survived impingement subsequently died. The results suggested that striped bass up to 8.4 mm long are too delicate to survive impingement.

Given the high maintenance of fine screens together with the known high impingement mortalities of many species these devices cannot be considered a useful protective measure.

EPA Response

EPA agrees that proper operation and maintenance are essential to the optimal performance of fine mesh screens but disagrees with the commenter's assertion that they cannot be considered a protective measure. EPA has not determined any technology to be universally applicable to all facilities under all circumstances in today's rule. Instead, EPA maintains a desired flexibility for facilities to meet the performance objectives by opting for one of several design and control technologies, operational measures, and/or restoration measures. While fine mesh screens, or any technology for that matter, may not work at one facility, they may prove successful at another. For this reason, EPA has neither prescribed nor prohibited any single technology from the suite of alternatives available to facilities.

Comment ID 316bEFR.077.026

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03
Available I&E technologies

Barrier nets

Under appropriate conditions barrier nets can be effective devices to reduce fish impingement. To be effective there must be limited debris in the water, a low incidence of biofouling, relatively low water velocities and sheltered conditions with low wave action, low current velocities, etc. The last of these requirements excludes their use at open water ocean sites. In estuarine conditions the EPA assessments exaggerate their effectiveness. The following is described for the barrier net deployment at Bowline Point GS on the Hudson Estuary.

"The Bowline Point Station (New York) has an approximately 150-foot barrier net in a v-shape around the intake structure. Testing during 1976 through 1985 showed that the net effectively reduces white perch and striped bass impingement by 91 percent. Based on tests of a "fine" mesh net (3.0 mm) in 1993 and 1994, researchers found that it could be used to generally prevent entrainment. Unfortunately, species' abundances were too low to determine the specific biological effectiveness."

This account gives the impression that the 3 mm net was useful for reducing entrainment. In fact as Lawler, Matusky & Skelly Engineers (1997) report in 1993 the net clogged with fine suspended silt and sank. In 1994, even when the net was sprayed to remove clogging it fouled with the algae Ectocarpus causing two of the support piles to snap and the evaluation to end. They concluded that 3 mm barrier nets can only be considered an experimental device.

The available data would suggest that barrier nets can be effective at reducing impingement mortality at intakes situated in lakes and sheltered waters. Fine barrier nets capable of reducing entrainment have not been successful at estuarine sites and Chapter 3 gives a misleading impression of the effectiveness of the 3 mm net at Bowline Point.

EPA Response

EPA does not believe the summary of data for Bowline Point is misleading, nor does it consider barrier nets to be an experimental technology. Bowline Point in New York, JP Pulliam in Wisconsin, JR Whiting in Michigan, and Chalk Point in Maryland have all successfully deployed barrier nets as part of an effective strategy to reduce impingement losses, some for as many as 25 years. For further discussion of the effectiveness of barrier nets, see Chapter 3 of the Technology Development Document.

Barrier nets have a proven performance record but, like all technologies, must be deployed with consideration of the local conditions at each facility. Ideally, barrier nets are located in areas not subject to commercial traffic, fast currents, or high wave action. In many instances, barrier nets are deployed seasonally to reduce impingement of migrating species. Seasonal deployment, such as that at Chalk Point, can be a cost-effective means of meeting the requirements of today's rule.

Comment ID 316bEFR.077.027

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Microfiltration

The only microfiltration system considered is the Gunderboom and the report makes it clear that the only data available come from the observations at Lovett GS. It is concluded that 'Entrainment reductions up to 82 percent were observed for eggs and larvae and these levels have been maintained for extended month-to-month periods during 1999 through 2001.'

This statement is a clear exaggeration of the observed effectiveness of the Gunderboom at Lovett GS. Overtopping, tunnelling and rips have been observed during testing. For example, in the Lovett evaluation report for 1999 it is stated that "the divers documented a substantial gap along the bottom of the boom. The gap extended along the bottom of the boom for approximately 3 m and ranged in depth from 0.5 to 0.6 m".

[see hard copy for figure]
Figure 11 The ratio of entrained larvae and eggs at Unit 3 and Unit 4 of Lovett during trials of the Gunderboom.

It is clear in Figure 11 of the Lovett 2000 report (above) that there was a gradual increase in entrainment through time. Further, there was also a series of events between May and August 2000 that resulted in short-term total failures. The efficiency of the Gunderboom was assessed by comparing the level of entrainment at unit 3 (protected by a Gunderboom) to that at unit 4 (unprotected). Thus a ratio above 1 for the number of fish entrained at unit 3 to unit 4 shows that the boom was offering no protection. To achieve 82% effectiveness or better the ratio would need to be smaller than 0.18. As shown in the figure below this level of efficiency was only achieved for a short period during May 2000. It is therefore incorrect to conclude that it was achieved for extended month-to-month periods during 1999 through 2001. In fact from late July 2000 the Gunderboom was completely ineffective at reducing entrainment.

EPA Response

The aquatic filter barrier technology (Gunderboom) has shown promise at Lovett Generating Station in reducing both entrainment and impingement. EPA notes that some of the difficulties in maintaining the integrity of the system have reduced the overall effectiveness of the barrier, but ongoing research and modifications by Gunderboom, Inc. have lowered the failure rate for screen panels and provided a more consistent exclusion rate over time.

EPA notes that while the Gunderboom technology has shown significant promise for reducing both impingement and entrainment, in its current state it is unlikely to be widely deployed at Phase II existing facilities due to more intensive maintenance requirements as well as specific waterbody requirements (large area, limited wave action,). EPA does not, however, believe that the Gunderboom technology should be unavailable to Phase II existing facilities if the technology can be successfully deployed.

Comment ID 316bEFR.077.028

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Louver

Chapter 3 concludes that "Overall, the above data indicate that louvers can be highly effective (70+ percent) in diverting fish from potential impingement. Latent mortality is a concern, especially where fragile species are present."

Louver systems have been studied at hydroelectric facilities with migratory species in rivers; they have been little studied at steam generating plant and require further large-scale evaluation before the view that they are highly effective or capable of preventing more than 70% of potential impingement can be accepted.

EPA Response

EPA agrees that the data available for louvers are less detailed than for more widely deployed technologies and did not base the performance standards on the efficacy of this technology. EPA has not, however, excluded louvers from the suite of design and construction technologies available for facilities to meet the performance standards of today's final rule. The data EPA has evaluated for louvers (see Chapter 3 of the Technology Development Document) show promise in reducing impingement under certain circumstances but does not believe many Phase II existing facilities will opt for this technology given the level of construction required.

Comment ID 316bEFR.077.029

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Angled screens

Chapter 3 concludes "Similar to louvers, angled screens show potential to minimize impingement by greater than 80 to 90 percent." This conclusion may give a misleading impression of the proven ability of such systems. There is no evidence that such high levels of impingement reduction would be achieved in practice.

EPA Response

EPA agrees that the data concerning angled screens are less detailed than for other more widely deployed technologies but disagrees with the commenter's assertion that the technology is unlikely to achieve high reductions in impingement. EPRI recently completed an angled screen study, (see Chapter 3 of the Technology Development Document for a discussion of this study) which showed significant promise for the deployment of angled screens. EPA also notes that many of the facilities that have incorporated angled screens into their cooling water intake structures have also used additional design and construction technologies (e.g. lift baskets, fish elevators) to provide comprehensive protection against impingement losses.

Comment ID 316bEFR.077.030

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Velocity caps

To claim that velocity caps have been successful in minimizing impingement is an exaggeration. They have been found to reduce impingement by 50 to 80% when compared with an unprotected intake. However, it should be noted that this reduction is usually only observed for pelagic species. Other fish and crustaceans may still be caught in large numbers.

EPA Response

EPA disagrees that velocity caps have not been successful in minimizing impingement. EPA points to San Onofre Nuclear Generating Station, El Segundo, and Huntington Beach Stations in California, as well as Seabrook Station in New Hampshire that have seen significant reductions in impingement of pelagic species in part due to the use of velocity caps. EPA notes that velocity caps are often used in conjunction with other technologies to provide comprehensive protection for all species. Deployment of any technology, including velocity caps, cannot be assumed to be universally protective of all species that may be impinged or entrained and may need additional design and construction technologies, operational measures and/or restoration measures to meet the requirements in today's final rule.

Comment ID 316bEFR.077.031

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03
Available I&E technologies

Porous dikes

Chapter 3 gives a fair summary of the present state of knowledge.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.077.032

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Behavioural barriers

The EPA conclude that "Many studies have been conducted and reports prepared on the application of behavioral devices to control I&E, see EPRI 2000. For the most part, these studies have either been inconclusive or shown no tangible reduction in impingement or entrainment." This is certainly a fair assessment of the situation and we know of situations where sound deterrent systems have actually increased impingement. It is therefore rather surprising to read in the final sentence that "Overall, the Agency expects that behavioral systems would be used in conjunction with other technologies to reduce I&E and perhaps targeted towards an individual species (e.g., alewife)." This would suggest behavioral barriers could be usefully implemented. Except perhaps in the case of alewife there is little evidence that such systems reduce impingement and there is no evidence that they reduce entrainment at all.

EPA Response

EPA believes that there are instances where behavioral barriers can be successfully deployed in concert with other design and construction technologies to realize an overall facility reduction in impingement mortality. Data collected and reviewed by EPA have shown limited effectiveness for these technologies (strobe lights, electric barriers, sound systems), which is usually limited to the adults of one or two targeted species. Such effectiveness, however, may be all that is necessary for a facility that experiences the majority of its impingement events with one or two species of fish. In these cases, the behavioral technology may be all that is necessary to meet the requirements of today's rule.

Comment ID 316bEFR.077.033

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 7.03

Available I&E technologies

Other technological alternatives

The heading holds a number of techniques that might be considered simple good practise rather than fish protection technologies.

The fitting of variable speed pumps can reduce the amount of water consumed compared with one-speed pumps and can therefore result in a reduction in the quantity of life entrained and impinged. However, the effectiveness will depend on the coincidence in time of the periods when the young fish are most abundant, the plant has the highest demand for electricity and the source water is warmest. In practice, for some localities the proportional reduction in fish killed will be less than the reduction in the volume pumped because demand, water temperature and young fish abundance all peak during the summer. Therefore the 10-30 % reduction claimed may not be achieved in practice and is more likely to be at the lower end of the estimate.

Continuous screen operation is probably useful as it reduces fish exhaustion prior to their return.

EPA Response

EPA agrees that variable speed pumps are an effective technology in reducing entrainment and impingement events at those facilities that experience seasonal impacts. Pump operations can be reduced during migratory or spawning seasons to avoid the increased impacts that might have occurred with traditional circulating water pumps. Such operations can be incorporated into an NPDES permit requirements to restrict intake flow and achieve the desired reductions in impingement and entrainment. Data evaluated by EPA has demonstrated the connection between reduced flow and reduced levels of impingement and entrainment.

Higher survival of impinged organisms has been demonstrated on systems whose screens are rotated continuously, but continuous operation is not necessary to achieve survival rates in line with the performance standards of today's rule. If a facility opts to install such a system, or already has one in place, the optimal rotation interval, which may include continuous rotation, should be investigated prior to determination of final operational criteria.

Comment ID 316bEFR.077.034

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

5% flow threshold for rivers

This proposal is based on the concept that the proportion of eggs and larvae and juvenile fish entrained from a population is directly proportional to the volumetric proportion of the habitat that is pumped through the cooling system. This will rarely be the case because larvae and juvenile fish are not randomly distributed throughout the water. For example, the common eel Anguilla, which migrates up East coast rivers as elvers, often travels close to the bank, sometimes in ribbons of thousands of individuals. For such species the position of the intake is an important factor in determining the level of entrainment. It is therefore essential that the 5% threshold is never taken as a sufficiently protective measure to protect fish, hence allowing poor design and placement of intakes. Given good intake design, the proposed threshold has merit and, as will be discussed below, is probably superior to some of the alternative withdrawal thresholds.

There are concerns relating to the use of mean annual flow, as the level of protection given to the fauna would be far from certain. The use of mean flow could result in a far higher proportion than 5% of the flow being taken during seasonal or unusual periods of low flow. If an animal is to be afforded good protection, then all of its life stages must be protected. Using average flows as the basis for 5% threshold calculations may result in variable levels of protection through time and could produce high mortalities during low flow periods sufficient to negate any protection afforded at other periods. It is common for regions to suffer extended periods of drought lasting one or more years when river flows may be well below the long-term average. During such periods the plants would presumably still be able to extract at a rate determined by the mean annual flow prior to the drought; this could be particularly damaging.

EPA Response

EPA believes the design intake flow standard for riverine facilities in today's rule affords a level of protection for the source water body acceptable under most, if not all, stream conditions. Today's rule preserves the Director's (and States') authority to implement more stringent requirements to meet the requirements of applicable State and Tribal law, or other Federal law.

EPA has retained in the final rule the 5% threshold based on design intake flow, rather than actual flow, for several reasons. Design intake flow is a fixed value set based on the design of the facility’s operating system and the capacity of the circulating and other water intake pumps employed at the facility. This allows a clear and timely classification of facilities. The design intake flow does not change, except in those limited circumstances when a facility undergoes major modifications or expansion, whereas actual flows can vary significantly over sometimes short periods of time. EPA believes that an uncertain regulatory status is undesirable because it impedes both compliance by the permittee and regulatory oversight, as well as achievement of the overall environmental objectives. Further, using actual flow may result in the NPDES permit being more intrusive to facility operation than necessary since facility flow would be a permit condition and adjustments to flow would have to permissible under such conditions and applicable NPDES procedures. It also would require additional monitoring to confirm a facility's status, which imposes additional costs and information collection burdens, and it would require additional compliance monitoring and inspection methods and evaluation criteria, focusing on operational aspects of a facility.

5% of mean flow during the spawning season. This proposal would likely be less protective of juvenile fish and would offer no protection to small migratory fish such as eels and lamprey that can be subject to entrainment and might not be moving past the intakes during the spawning season. It would presumably allow a far larger proportion of the mean flow to be taken outside of the spawning season, resulting in far greater damage to populations than would be the case with the 5% flow threshold.

EPA Response

Please see response to comment 316bEFR.046.010.

Comment ID 316bEFR.077.036

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 14.02

RFC: Alt. thresholds for entrainment (E) controls

10% to 15% of mean annual or spawning season flow. These options are considerable less protective of the fauna than the 5% preferred option and should be avoided.

EPA Response

Please see response to comment 316bEFR.046.010.

Comment ID 316bEFR.077.037

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 14.02

RFC: Alt. thresholds for entrainment (E) controls

25% of the 7Q10. The flow of most US surface waters is highly seasonal and varies considerably between years so it is possible that the 7Q10 minimum constraint would give a lower constraint than the 5% of average flow threshold. In drought years this constraint would effectively allow a reduction in the level of environmental protection over that offered in more typical periods. Over the usual life of a power plant of 40 years or more it is likely that there will be periods when flow is lower than the 7Q10 and thus, for short periods, even more than 25% of the flow could be removed. The problem from the ecological viewpoint with this proposal is that during extreme droughts, when the aquatic life is already stressed, the impact from water extraction (and discharge) would be particularly high. This could result in considerable ecological damage from which it might take the river fauna a number of years to recover. It is unclear if this option is better or worse than the 5% annual average. It is certainly much more difficult to quantify.

EPA Response

EPA has opted not to include the 25% 7Q10 threshold in today's rule and instead adopts the 5% mean annual flow threshold. Based on comments received at proposal, EPA believes the 5% threshold to be sufficiently protective for freshwater streams and rivers. The 7Q10 threshold would achieve only marginal increases in the protection of aquatic species compared to the 5% threshold while imposing unnecessary costs on Phase II existing facilities.

Comment ID 316bEFR.077.038

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 16.01
RFC: Regulating limited capacity facilities

15% Capacity utilisation cutoff

This proposal would remove plants that operate for less than 55 days per year from the need to reduce entrainment. Providing such plants are usually operated during mid summer and mid winter this is probably a reasonable concession. However, there are ways in which it could result in far higher entrainment levels than is implied in the proposed rule.

First, the 15% is “over the course of several years”. This would allow a plant that meets an average of 15% to be used for far more 55 days in some years. This in turn could result in large entrainment losses for some years.

Second, it is implied that the 15% of available operating time would be taken as one or two blocks: “the plants typically operate during two specific periods: extreme winter and extreme summer demand periods”. The implication is that this pattern reduces the need for entrainment protection as these periods correspond to periods of naturally low entrainment, which they often do. However, it is possible to envisage other patterns of operation that would result in 15% availability and which would result in far higher entrainment losses. For example, a plant could be used to meet peak morning and evening demand only.

Third, there is no assurance that the 55-day period of operation would not correspond to periods of high larval fish abundance. Indeed, in a worst possible scenario a plant with 15% utilisation could kill almost as many organisms by entrainment as a plant with a 60-80% utilisation. To illustrate the point the Table 21 shows the conditional mortality rates for abundant larval fish at the Indian Point Power station in the Hudson estuary, NY (reproduced from the Indian Point Draft DEIS).

[see hard copy for table]
Table 21. The conditional mortality rates for abundant larval fish at the Indian Point Power station in the Hudson estuary, NY. (Entrainment CMR x 1000). (Reproduced from the Indian Point Draft DEIS).

Note that almost all the larval entrainment occurs over two periods, 23-Feb to 28-Mar and 17-May to 25-July. If the plant were used in both these periods, even a 55-day utilisation could produce high levels of entrainment. It should also be noted that February and July are often months when electricity demand is at a peak so such an outcome is quite possible.

The above considerations indicate that a simple 15% threshold would not necessarily give the level of entrainment protection that the modest level of utilisation might suggest. If a low-utilisation plant kills a large number of organisms by entrainment then the fact that it is not used for the majority of the time should not exclude it from taking protective measures.

EPA Response

See response to comment 316b.EFR.330.032 and 316b.EFR.038.024.

Comment ID 316bEFR.077.039

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 16.02

RFC: Alternative standards for I mortality only

Alternative thresholds

All the alternative thresholds proposed are higher than 15%. Given the stated concerns about the 15% level there are even more grounds for concern that higher threshold levels could allow excess entrainment.

EPA Response

The Agency has determined, in part due to comment 316b.efr.077.038 that raising the threshold above 15 percent would not be prudent for the final rule.

Comment ID 316bEFR.077.040

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

A summary of methods of aquatic habitat creation, restoration and modification

There is a very wide range of methods available to man for modifying, restoring or creating habitat; covering the full spectra of scale, target species, habitat type, antiquity and, ultimately, effectiveness. Below are listed some means of altering the physical and biological characteristics of an ecosystem; divided into habitat- (H) and species-related (S) measures. It is of course likely that a combination of measures would be used to address different aspects of an ecological problem.

a. Creation

-Saltmarsh and wetland creation: managed retreat from protected areas by breaching of existing sea defences, or creation of new creek systems. Creation of entirely new reclaimed land by dumping of spoil, or encouragement of silt deposition and stabilisation. (H)

-Artificial reefs: disposal of fly ash, tyres, etc, sinking of old ships, oil rigs. (H)

-Creation of new river channels; permanent or temporary diversion of flow. (H)

-Translocation of animal or plant species – to new non-threatened habitat or to replace organisms lost/damaged. (S)

-Dune planting and stabilisation. (H) & (S)

-Quarry pit restoration for e.g. bird species or angling. (H)

-Flooding of low-lying farmland to create water meadows (H)

b. Restoration/modification

-Physical cleaning, removal of oil, debris, contaminated silt etc; biological or chemical cleaning methods. (H)

-Dredging to restore estuarine habitat lost to siltation (H)

-Removal or modification of large-scale river obstructions: weirs, dams etc. (H)

-Removal, addition or modification of small-scale features, such as litter banks or debris dams, bank profiling, meanders, riffles/pools, adding obstructions, pinch points, bed widening, reedbed and bankside planting, weed-cutting, removal of shading vegetation. Provision of shallows for breeding and juvenile fish. (H)

-Culling or discouragement of damaging species, such as geese: herbicides to remove alien plant species – water hyacinth, Crassula, etc; biological control species. (S)

-Stocking with increased numbers of existing species, or with new, higher-value species. (S)

-Grazing by farm stock, fencing off (alternatively, removal of fencing to allow natural trampling of banksides by animals). (H)

-Regulation of salinity, water depth, sedimentation, by sluice gates; augmentation of flow. (H)

-Closing (or opening) of channels; building of protective barriers, wave screens to protect fragile inshore habitats. Groynes & breakwaters to prevent erosion of beach substrate. (H)

-Changes in input to food chain; removal of organic input from sewage works, agricultural run-off etc. (H)

-Building of fish-passes and ladders. (S)

-Cleaning, de-silting or addition of fish spawning areas such as gravel beds. (S)

EPA Response

EPA agrees with the commenter that there are many methods of restoration. All restoration measures used for the purposes of the final rule must meet all of the requirements described in the final rule.

Comment ID 316bEFR.077.041

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Defining and assessing ecological equivalence

Having identified habitat enhancements that can be employed, the key is to assess how much enhancement, and of what type, is necessary to offset a given scale of ecological harm caused by impingement and entrainment losses. It is clear that like-for-like replacement can occasionally be achieved. For instance, if a power station is built on reclaimed saltmarsh, then a similar area of adjacent saltmarsh can be created or restored. Similarly, an area damaged by thermal discharges could be compensated for by restoration nearby. However, like-for-like restorations for impingement / entrainment are impossible on the community level, implying that a means of assigning equivalence to such losses is necessary.

The principle of Habitat Equivalency Assessment (HEA) demands that

-both a scale or multiplier, and a measure common to both damaged and replacement habitats, exist, and that

-the damage to the original habitat be measurable.

“For compensatory restoration actions, the scaling question is: what scale of compensatory restoration action will compensate for the interim loss of natural resources and services from the time of the incident until full recovery of the resources? The scale of compensatory restoration actions is conditional upon the choice of primary restoration actions. … Necessary conditions for the applicability of HEA include that (1) a common metric (or indicator) can be defined for natural resource services that captures the level of services provided by the habitats and captures any significant differences in the quantities and qualities of services provided by injury and replacement habitats, and (2) the changes in resources and services (due to the injury and the replacement project) are sufficiently small that the value per unit of service is independent of the changes in service levels”. - (NOAA, 1995).

According to this principle, therefore, it is possible to place a value on the resource that is damaged or lost, and create or improve habitat with an equivalent value. For example, if X thousand of a particular species die each year, then their loss can be offset by creating enough habitat to support X thousand more. In most cases, this implies the creation or restoration of estuarine and wetland habitat. It should be noted that almost all examples of habitat equivalency analysis are concerned with the replacement of past damage, such as compensation after oil spillage. It is also evident that a considerable time-lag is likely, between the original damage and the establishment of the new resource at its full potential.

NOAA’s Habitat Equivalency Analysis (HEA) states: “The principal concept underlying the method is that the public can be compensated for past losses of habitat resources through habitat replacement projects providing additional resources of the same type”. (NOAA, 1995). Thus the origin of the concept appears to be as compensation for finite, existing, discrete and quantifiable losses, rather than justification for continuing and future loss.

EPA Response

For a discussion of the use of out-of-kind restoration, see EPA's response to comment 316bEFR.206.055. All restoration measures must meet all of the requirements of the final rule.

Comment ID 316bEFR.077.042

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 11.06
RFC: Performance/effectiveness of restoration

Measuring the success of a restoration project.

Probably the most appropriate and complete list of principles for successful restoration is set out by the partnership of Restore America's Estuaries and the Estuarine Research Federation, (RAE-ERF 1999).

RAE-ERF guidelines for successful restoration of estuarine habitat include:

-Preservation of existing habitat is critical to the success of estuarine restoration

-Estuaries can be restored only by using a long-term stewardship approach and developing the constituencies, policies and funding needed to support this

-Restoration plans should be developed at the estuary and watershed levels to set a broad vision, articulate clear goals and integrate an ecosystem perspective

-Project goals should be clearly stated, site specific, measurable and long-term – in many cases greater than 20 years

-Success criteria for projects need to include both functional and structural elements and be linked to suitable local reference habitats

-Site plans need to address off-site considerations, such as potential flooding and salt water intrusion into wells, to be sure projects do not have negative impacts on nearby people and property

-Scientifically-based monitoring is essential to the improvement of restoration techniques and all-over estuarine restoration

-Ecological engineering practices should be applied in implementing restoration projects, using all available ecological knowledge and maximising the use of
natural processes to achieve goals

-Long-term site protection is essential to effective estuarine habitat restoration

-Public access to restoration sites should be encouraged wherever appropriate, but designed to minimize impacts on the ecological functioning of the site.

EPA Response

EPA believes that some of the principles from habitat restoration are useful for the purposes of the final rule, which focuses on the restoration of aquatic organisms. This is true for two reasons. One, habitat restoration is one means of restoring aquatic organisms. Two, some of the principles from habitat restoration can be generalized to restoration of various types of biological entities, whether habitat or organism. EPA has incorporated requirements for monitoring, adaptive management, and peer review into the final rule which reflect some of the principles the commenter mentions above.

Examples of existing projects.

a. Delaware Bay Estuary Enhancement Program.

The best-known example of large-scale ecosystem replacement is the Estuary Enhancement Program (EEP), carried out by PSEG to mitigate impingement / entrainment losses at the Salem CWIS.

"As an alternative to the construction of two natural draft cooling towers, PSEG proposed the EEP, an ecosystem-scale restoration project, to replace the species of concern [weakfish (Cynoscion regalis); spot (Leostomus xanthurus); white perch (Morone americana); and bay anchovy (Anchoa mitchilli)] lost in the cooling system. Based on the positive correlation between the primary production of salt marshes and the secondary production of nekton, an aggregated food chain model was employed to estimate the required area of tidal salt marsh needed to offset the loss of the major species of concern in the Bay. From the model, over 5,040 ha of diked salt hay (Spartina patens) marsh and common reed (Phragmites australis) degraded brackish marsh was proposed for restoration, enhancement and protection". - (RAE-ERF, 1999)

PSEG's project eventually totalled 20,500 acres (8,300 ha). As well as wetland restoration, fish ladders have been built to allow upstream migration of river herring, and stocking of the waters upstream with herring has taken place. The new fish ladders "open more than 100 miles of river, and 700 acres of ponds to additional spawning habitat for the river herring".

Whether, on the other hand, these measures truly replace, year-on-year, that which is lost to the CWIS at Salem, or simply replace it with something of roughly equivalent value – which may, arguably, have been provided by another benefactor had circumstances differed – is an interesting point. It is worth noting in passing that opening 100 miles of river habitat to spawning herring is very far from a guarantee that spawning will take place. Similarly, there are well-documented disadvantages associated with replenishing wild stocks with reared fish.

In summary, the project sought to replace lost productivity, rather than address losses at source of particular species, such as the bay anchovy. It is unclear whether the theoretical enhanced productivity in the restored saltmarsh will in fact move through the food web to increase the number of bay anchovy, and other pelagic spawning species. What is more, the increased productivity could favour other species less sensitive to impingement and entrainment than the anchovy, resulting in a change in the species balance and increased predation on the target species.

While the Delaware Bay EEP is "the largest privately-funded restoration in the world" (NJDEP 2001), there is strong evidence that it does not, and was not intended to, fulfil its stated aim of equivalency with the losses at the Salem plant.

The New Jersey Dept. of Environmental Protection document 'Frequently Asked Questions Regarding the Salem NJPDES Permit' makes the following points:

-“While many commentators praised the environmental benefits of the wetland restoration program, some commentators expressed specific concern regarding the continued need to use herbicides to meet restoration goals for portions of the Alloways Creek site”. (When called on the matter, PSEG stated that they would cease utilizing herbicides to ‘manage’ Phragmites-dominated marshland, and “purchase approximately 1,000 additional acres to ensure compliance with the permit conditions”).

-The final success criteria of the various parts of the site are still a very long time in the future, falling due between October 2008 and October 2011. Compliance is determined by the Department’s review of aerial photography, and “Currently the permittee is in compliance with the approximate 9% coverage of Spartina and other desirable marsh vegetation per year”.

-“The ultimate goal of the wetlands restoration program is to restore these diked or Phragmites-dominated wetlands to Spartina wetlands.

-In reply to the question: ‘Does the proposed draft permit authorize the use of glyphosate at the wetlands restoration sites?’: “No. To receive permission to apply glyphosate, the permittee must apply to the Department’s Land Use Regulation Program for a land application permit or permit modification … The Department continues to encourage minimization of the use of glyphosate on the wetland restoration sites. Once the proper hydrological regime is established in an affected area, the Department’s goal is for native wetland vegetation such as Spartina alterniflora to out-compete Phragmites. In the event that the Department determines that a repetitive application of glyphosate is the only available method for Phragmites control, PSEG will be required to eliminate the “failed” acreage from the program and to provide other wetland or upland acreage to meet the NJPDES permit requirements.”

-In reply to: ‘Is PSEG required to produce the same number of fish on the preserved or restored wetlands that are being lost at the intake structure?’: “In its 1994 permit, the Department determined that PSEG’s voluntary proposal to restore or enhance a minimum of 10,000 acres of wetlands in the Delaware River Basin would further minimize the effects of Station-related operations. This acreage value was intended to increase detrital production (finely divided particulate matter available for consumption by aquatic life) to the Delaware Estuary as well as provide additional fish habitat. This acreage value was not intended to replace the losses at the intake structure at a one to one ratio. The Department reaffirmed this acreage value in its July 29, 2001 final permit. However, the permittee did provide analyses in its application to estimate the range of numbers of fish produced on the formerly diked wetland restoration sites. Due in part to the fact that the permittee continues to make general statements about the level of fish productivity from wetlands restoration as a factor in fish population trends, the Department has determined that the quantification of fish production is important in a general sense. Therefore, the Department included a requirement in the June 29, 2001 permit to require the permittee to provide estimated production levels at the wetland restoration sites. Again, it is important to note that these sites are still evolving and not yet complete which has a bearing on the production amounts.”

While the replacement of Phragmites with Spartina continues, studies of isotope transfer through the Delaware Bay food chain suggest that Phragmites contributes to the nutrition of white perch and bay anchovy, two of the key species of concern.

"At upper estuary locations, Phragmites australis appeared to contribute to the nutrition of white perch and bay anchovy …, whether they were captured in salt marshes or in the open bay. This was especially true for white perch collected from the two upper estuary marshes where the signatures for all three isotopes were not significantly different, and the fish could not readily be distinguished … However, another C3 plant was also present in Mad Horse Creek, Amaranthus cannibus, which has a carbon signature similar to that of P. australis, about -23.7‰ (34S =13.0‰) (Stribling and Cornwell 1997). Together, these macrophytes comprised about 10 to 15 % of the coverage of the marsh plain, virtually all of it adjacent to tidal creeks. It is possible that plants growing along creek banks may contribute disproportionately to nutrient flow into finfish …". Weinstein, Litvin et al. p.18 Whether the other plant species mentioned, A. cannibus, occurs on the 'new' Spartina marsh, and how it is affected by the considerable use of glyphosate to control Phragmites, is not clear.

Furthermore, the following flaws in PSEG's model are pointed to on the 'Clean Ocean Action' website, produced by the New Jersey Environmental Federation:

-"any 'new fish' that are produced by the converted saltwater wetlands may increase the number of some fish species found in the bay. In turn, this will also increase the number of fish that will become impinged, entrained and killed by the power plant. Thus, there are more fish in the water, there are more fish going to be destroyed by the nuclear power plant. PSE&G can not protect "new fish" produced by this proposal without greatly reducing the water intake of the power plant;

-The wetland mitigation of the "Estuary Enhancement Program" does not create any new marshlands; it just changes the marsh from freshwater wetland to a saltwater wetland. In this process the net gain of wetlands is zero. The salt-hay farms that are to be converted in this mitigation process do provide nutrients and vegetative material to the Delaware estuary during peak flood tides throughout the year. … The change in productivity in this mitigation process is not large enough to compensate for the adverse impact that the cooling system of the SNGS is having on the environment. While productivity is not as high as a saltwater wetland, a freshwater wetland will provide an important habitat to many species like painted turtles, tadpoles, black rails, cattails, black ducks and mosquitofish. PSE&G attempts to balance an environmental equation. They stated that the productivity (based on their theoretical model) of the new salt marsh is greater than the negative impact of the cooling system. Based on this PSE&G gained approval for its permit. But, PSE&G leaves out the lost productivity of the destroyed freshwater marsh [from its productivity calculations]. In either case, the destruction of a freshwater wetland to create a saltwater wetland does not seem like a viable solution to killing fish via the water intake system of the power plant;

-the "Estuary Enhancement Program" has had a negative impact [on] other species, most noticeably the horseshoe crab. Since 1993 there has been a dramatic decline in the population of horseshoe crabs. While commercial fishing is the primary factor that has impacting (sic) the population, the "Estuary Enhancement Program" located at Thompson's Beach has caused the death of hundreds of thousands of horseshoe crabs over the past couple of years".

PSEG's Gerald Lauer states

"I have found that the loss of even large number of small organisms and early life stages of fish species are not determinative of a potential for adverse impact." - (COA 2002).

This statement is at odds with the NJDEP's own:

"It is important to note that the Department views the term "adverse environmental impact" in the context of the Clean Water Act as meaning the loss of one fish through a cooling water intake structure. In other words, in the Department's view it is irrelevant whether the losses at an intake structure include one fish or a million fish. Either way the Department requires the permittee to implement any technological measures for which the costs are not wholly disproportionate to the environmental benefits".

The points above make it reasonably clear that the EEP was not considered as a direct equivalent to the losses through impingement and entrainment. Meanwhile, the policy of eradicating Phragmites marsh, seemingly central to the program, is not wholly beneficial, relying on heavy use of herbicides. PSEG appear not to quantify levels of increased production in the wetland restoration areas, and the judgment of their eventual success is still a long way in the future. Finally, various aspects of the calculations employed by PSEG are called in to question.

EPA Response

EPA agrees with the commenter that there are uncertainties associated with the performance, design, assessment, and implementation of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

For a discussion of the role of restoration in the final rule, see EPA's response to comment 316bEFR.056.003 and the preamble to the final rule.

Morro Bay.

Interestingly, it was exactly this lack of equivalency that resulted in the rejection by the California Energy Commission staff of habitat enhancement measures for Morro Bay, California. As in the case of Salem, the habitat enhancement measures were clearly beneficial. It was proposed to attempt to reverse the loss of estuarine habitat through sedimentation. However, it was unclear as to whether these enhancements would directly aid the species most affected by impingement and entrainment. The conclusions were as follows:

"… staff believes it is less appropriate and is not our preferred approach to mitigate the marine impacts for MBPP for the following reasons:

1. It does not directly eliminate or reduce the adverse impacts caused by once-through cooling, which are causing ecological damage/losses to the ecosystem in a protected State and Nationally designated Estuary, that is in decline. Staff believes that it is preferable to avoid impacts than to attempt to mitigate them after the fact;

2. New USEPA regulations on cooling water intakes, and the special status of the Morro Bay Estuary, reinforce the need to eliminate the adverse impacts of once-through cooling;

3. The acquisition of suitable habitat adjoining Morro Bay and in the supporting watershed may be challenging;

4. The restoration of in-situ (in-kind habitat) in Morro Bay may be challenging;

5. The long-term nature of the impacts associated with the Applicant's proposed once-through cooling will result in continuing and increasing (because the estuary is in decline) impacts for decades;

6. The uncertainty and difficulty of determining if mitigation is ultimately effective and complete many years after licensing; and

7. The extensive annual monitoring of the health/improved productivity of the bay/estuary that would be needed for the life of the project with the possibility of modifying/increasing the mitigation to be more effective as needed".

(California Energy Commission, 2002).

EPA Response

EPA does not believe restoration measures will be a feasible alternative for every permit applicant.

For a discussion of why EPA wishes to allow restoration measures despite associated uncertainties, see EPA's response to comment 316bEFR.077.013.

Comment ID 316bEFR.077.045

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Conclusion

From these case studies we can see quite clearly the limitations of habitat enhancement as a means of mitigation for entrainment/impingement.

-Habitat equivalency analysis is primarily aimed at offsetting past losses or damage, rather than continuing loss;

-Considerable uncertainty exists as to whether equivalence can be focused on actual species harmed;

-Potential lack of availability of sufficient habitat to adequately offset losses or damage.

There is, then, a strong argument that the Delaware estuary improvements are not a direct compensation for CWIS losses, since

-Only losses due to impingement have been reduced at source, and damage to the original ecosystem will continue;

-Many of the losses in the original habitat have no direct equivalent in the restored ecosystem, which is aimed at mitigating damage to the Species of Concern (in the 1998 raw figures, the 4 species of concern amount to only 53% of the estimated total production foregone), and so only a part of the damage is addressed. Crucially, increased productivity in the restored area does not inevitably lead to improvements in numbers or condition of the target species – and may even exacerbate their problems.

-Concerns have been raised over the considerable use of glyphosate herbicide to control Phragmites.

-The eradication of Phragmites has been shown not to be wholly beneficial, and the program may have had a negative impact on other estuarine species.

-Aspects of PSEG's calculations of future productivity required are called in to question; in particular that the gains from 'new' saltmarsh were not balanced by the lost productivity from the old habitat it replaced.

-The criteria of final success of the project remain some years in the future, and firm evidence of increased productivity is not forthcoming from PSEG.

-Most crucially, the goal of the EEP was not specifically to provide equivalence to the losses at the Salem plant.

EPA Response

EPA believes permit applicants and permitting authorities should consider the net environmental impacts of a restoration measure when assessing its feasibility.

For a discussion of why EPA wishes to allow restoration measures despite associated uncertainties, see EPA's response to comment 316bEFR.077.013.

Comment ID 316bEFR.077.046

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Other projects.

Other habitat replacement projects aimed directly at the mitigation of impingement / entrainment losses are few – perhaps for the reasons outlined above, and due to the large scale of habitat provision necessary to sustain a breeding population capable of supporting such high losses. While PSEG have been able to alter over 20,000 acres of habitat; many other utilities would not have sufficient funds to provide this level of reparation, and large enough areas of habitat to be restored or created may well not exist close enough to the facility to be deemed truly a replacement for losses. It has been calculated, for instance, that the intertidal zone production of an extra 8 miles of coastline would be required to replace the losses of goby (Gobiidae) species at Morro Bay power station, California.

EPA Response

EPA agrees with the commenter that space limitations may make restoration measures infeasible for some facilities.

For a discussion of the use of out-of-kind restoration measures, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.077.047

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

How successful is habitat replacement?

a. Success of current schemes

Ongoing wetland and estuarine restoration schemes are documented by RAE-ERF (1999) in the Gulf of Maine, North Carolina, San Francisco Bay, Tampa Bay and Virginia's Lafayette River. These are on a considerably smaller scale than the Delaware Estuary EEP.

Of the Gulf of Maine project RAE-ERF say:

"Restoration efforts include mitigation projects to compensate for permitted impacts and proactive projects to increase the amount and quality of coastal habitats. Despite this emphasis, the overall effectiveness of tidal wetland restoration in the region is uncertain. Contributing to this uncertainty are a lack of comprehensive baseline information on sites available for restoration, widely varying degrees of restoration project monitoring, inconsistencies in monitoring data collection and a paucity of scientifically-defensible standards and criteria for determining restoration success". - (RAE-ERF, 1999).

In Virginia, the target was the once-prolific oyster reefs of Chesapeake Bay:

"In 1998, the Chesapeake Bay Foundation (CBF) joined forces with the Norfolk Rotary Club, the Virginia Marine Resources Commission (VMRC) and Old Dominion University (ODU) to begin restoring the depleted oyster population of Virginia's Lafayette River. Recognizing that a healthy bay and a healthy economy are inextricable linked, the Norfolk Rotary Club raised $28,000 to put toward the construction of two oyster sanctuary reefs. Using the funds as leverage, CBF and VMRC attracted additional funds to complete the reefs.

ODU scientists helped determine the best locations for the reefs based on circulation patterns, sediment and water quality considerations to maximize larvae survival and spat settlement. Once the sites were chosen, VMRC constructed the reefs by piling shell material to simulate historic inter-tidal oyster reefs. The three-dimensional reef design was based on research conducted by the Virginia Institute of Marine Science which shows that placing oysters higher in the water column improves their health. CBF helped stock the reefs through its oyster gardening program, in which citizens and schools raise oysters in floating cages to protect them from sedimentation and predation.

With the help of hundreds of volunteer oyster gardeners, CBF has transplanted nearly 250,000 oysters the Lafayette River and other oyster reefs in Virginia. So far, the project has resulted in a tremendous increase in the oyster population in the Lafayette River—the number of new oysters around the reef and up to one mile away has grown 23-fold. The Lafayette River oyster restoration project represents just one example of massive restoration efforts now taking shape in Virginia and Maryland. The goal now is to achieve a ten-fold increase in the number of oysters in the Chesapeake Bay over the next five years". - (RAE-ERF, 1999).

Elsewhere, researchers at the University of Rhode Island are attempting the restoration of offshore eelgrass (Zostera sp.) beds, albeit with limited success:

“Anything close to 50% survival in the field would be an unqualified success. Dr. Robert Orth of the Virginia Institute of Marine Science has worked with seed-based eelgrass restoration in the Chesapeake Bay for over 10 years. In his experience, survival rates only approached 50% when the seeds were contained in burlap bags. Moreover, attempts by his lab to use an underwater planting sled did not exceed the 5 - 15% survival rate achieved when the seeds were simply thrown over the side of the boat”. - (EPA, 2001b)

The success of a typical habitat restoration scheme on a small river system was analysed by Langford et al. (2000). In the late 1990s, habitat modification was undertaken on several rivers in Southern England.

“The techniques were mainly classified as “substrate redistribution” (bed re-profiling, weirs, flow diversion, narrowing) or “substrate augmentation” (introduction of gravel beds). Many reaches were fenced to exclude stock and reduce grazing pressure.

Between 1996 and 1998 surveys showed increased fish populations in restored reaches. Analysis of these data showed increases to be statistically significant for salmonids and some coarse fish in all three rivers.

In 2000, surveys were commissioned … to assess the effects of the restoration work on other biota, namely plants and invertebrates. Total species richness of plants was lower overall in restored than in unrestored reaches. This was a result of significantly lower numbers of bankside and terrestrial species in fenced reaches. Aquatic species showed similar diversity in restored and unrestored reaches … There was a non-significant difference in Ranunculus cover between unrestored and restored reaches though this was probably a result of better flows than in [previous] dry years. In all streams the greatest influence on instream weed was shade … There were no significant differences in invertebrate diversity between restored and unrestored reaches. Diversity of invertebrates in marginal river habitats was significantly greater than in midstream habitats and the species compositions differed … There were no separable effects of restoration on the marginal and midstream invertebrates”. - (Langford et al., 2000)

EPA Response

EPA believes there are uncertainties associated with restoration measures and that restoration science continues to develop. For additional discussion of uncertainties, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.077.048

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Unexpected effects.

Some restoration measures can prove to have worse environmental impacts than the problem they were intended to solve. For instance, following the removal of dams or weirs, or changes in their regime of water flows, increased current velocity downstream can scour sand and silt, disrupt spawning areas, remove nutrients, and damage fragile banks and shallows. It can also release contaminants locked in the accumulated silt layer behind the obstruction, or lead to physical choking by silts.

Following severe erosion problems caused by flow fluctuations at the Glen Canyon dam on the Colorado River, efforts were made to restore beaches and other features of the river; firstly by limiting variations in flow, and secondly by more extreme measures:

“[After limiting flow variations] the center found that conditions on the river were deteriorating alarmingly. Whole beaches had disappeared. Four species of native fish had become extinct. An Asian tapeworm appeared; it now infects most native fish that survive. Rainbow trout, now spawning naturally in the wild, increased their numbers sixfold, so that some parts of the river contained 17,000 trout per mile. Steadier flows apparently increased their survival rates but reduced their food resources, so they became smaller and thinner.

In the spring of 1996 … researchers tried out their first big experiment using the Glen Canyon Dam. For one week, they released 45,000 cubic feet of water per second, using special spillways. They figured the high water would lift sand stored on the bottom of the river and deposit it onto beaches.

While the experiment looked like a huge success at first, it quickly went awry. A year later, most of the sand was gone. "We made a huge mistake," said Dr. Theodore Melis, a sediment expert at the research center. The sand that built the beaches, it turned out, had come not from the river bottom but from existing beaches and eddies. Then fluctuating flows continued to erode sand as before. Two different experiments in 1997 and 2000 also failed to make beaches or retain sand.

Meanwhile, the rainbow trout continue to proliferate, said Dr. Lew Coggins, a fisheries biologist at the center. As many as a million rainbow trout are now in the river, eating midges, plants and possibly a native fish called the humpback chub. Ten years ago, some 8,300 adult chub lived in the river; today there are only 2,100 large enough to spawn. Biologists worry that this may not be enough to sustain the population”. - (Blakeslee, 2002)

EPA Response

EPA believes permit applicants and permitting authorities should consider the overall environmental impact of a restoration measure.

For a discussion of the uncertainties associated with restoration, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.077.049

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Measurement and prediction of success of restoration projects

The degree of success of a habitat replacement scheme can be measured in a number of different ways, and is plainly far from guaranteed. Reasons for failure to meet expectations include:

-Inadequate baseline knowledge, planning, monitoring and long-term commitment to after-care;
-Incomplete understanding of all issues involved.
-Deviation from initial goals.
-Heavy dependence on the selected target species, its biology, and the solubility of the factors causing the problem in the first place;

Furthermore, success cannot be gauged by a short-term increase in species numbers or diversity, but must be measured over periods as long as decades. What is more, it seems plain that habitat replacement is still a relatively young and experimental science, with many details yet to be firmly settled.

“Practicioners (sic) need to build on the existing foundation for restoring physical structure in estuaries, like water flow patterns and vegetation, to learn how to restore function. They must identify ways to transfer knowledge from smaller intensively managed restoration sites to much larger restoration efforts, moving from demonstration projects to larger geographic areas. They need to learn more about the effects of sea level rise, sedimentation and a host of other variables to help set appropriate goals and success indicators for restoration projects in their dynamic natural environments. They need improved models at the habitat level to help with site selection, understanding tidal flows and selection of reference sites for individual projects. Better models at the ecosystem level will help in understanding things such as life cycles of particular species and links between habitats”. - (RAE-ERF, 1999).

“But restoration and mitigation are not cure-alls. There has been great debate within the HWG [Habitat Workgroup] as to whether the current wetland regulatory guidelines requiring one-to-one or three-to-one mitigation replacement acreage in public works projects and damages claims are too conservative. It is uncertain whether wetland mitigation, as it is practiced, maintains the goal of no loss or no net loss. While state-of-the-art restorations and creations can "build" wetlands that look natural, there is considerable controversy as to how long it will take, if ever, for these created or restored systems to function as high-quality natural wetlands. Successful replacement of wetlands is usually measured only at the grossest structural level -- replacement of dominant vegetation cover type -- and does not account for the full complement of the wetland ecosystem functions, including development of the peat substrate, abundance of invertebrate populations, storage of essential nutrients, and development of nutrient cycles. Forest restorations take decades longer to recover full structural and functional values”. - (EPA, 2001a)

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

EPA believes restoration measures will be well suited for some sites, and not well suited for others. Evaluation and monitoring difficulties are two reasons why restoration measures may not be suitable for a particular site.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.077.050

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Conclusion: the utility of habitat replacement.

a. No-loss solutions vs. no net loss

Fundamentally, it is arguable whether designing and building a habitat to promote the few key species identified as being under threat is a suitable replacement for an entire mature ecosystem. It is also questionable whether replacement wetland and estuarine habitats can effectively mitigate for the extremely high numbers of fish and larvae impinged and entrained by CWIS. PSEG's initial estimate that over 5000 hectares would be required to offset I&E losses at the Salem plant gives a reasonable indication of the scale of mitigation required. The assumption that the productivity of a relatively small area of habitat can truly replace potential losses of several billion eggs, larvae and adult fish every year must be questioned. And if losses cannot thus be replaced, then we must ask whether the cost of such a scheme might not be better employed in effective anti-entrainment / impingement measures.

In addition, estuarine improvement may provide extra habitat for estuarine and brackish water spawning species, but it cannot mitigate for losses of deepwater spawners whose juveniles subsequently move into estuaries and are entrained (e.g. atlantic croaker, spot and menhaden), or those species which spawn upstream in freshwater (for instance salmonids and shad) and are entrained or impinged on their journey downstream. Further, it provides no recompense for losses of threatened and endangered species such as (at Delaware) the shortnose sturgeon and various turtles.

b. Broader considerations.

Balanced against the points above is the developers' desire for a higher environmental profile, and, as PSEG put it, to provide "long-term, broad-based benefits for the natural resources and people of the region". Existing and planned environmental protection regulations may well also discriminate in favour of a broad-based benefit, and provide the opportunity for enhancements to the wider community.

These are valid and valuable ideals, but it is far from certain that they are a true replacement for losses, and so it can be argued that they should not be used as a bargaining chip to enable utilities to reduce their commitment to solving the primary environmental problems, impingement and entrainment. Furthermore, we must question whether habitat restoration should be offered as a viable alternative to effective measures against I&E, on the grounds of the apparent success of one project, on a scale greatly exceeding other projects likely to be put forward.

EPA Response

For a discussion of the role of restoration in the final rule, and EPA's authority to include restoration measures, see EPA's response to comment 316bEFR.056.003 as well as the preamble to the final rule.

For a discussion of the requirement to consider design and construction technologies and operational measures before choosing restoration measures, see EPA’s response to comment 316bEFR.033.005.

For a discussion of ancillary benefits from restoration measures, see EPA’s response to comment 316bEFR.032.011.

Spatial scale

The EPA would prefer that trades be conducted between water bodies that share similar ecological characteristics regardless of geographic proximity of the facilities to each other.

There are two problems with this preferred option. First, it is unclear what is meant by share similar ecological characteristics. All estuaries share the characteristic that they are nursery areas for marine fish, however the species occupying estuaries differ with geographical locality. This phrase would need to be carefully defined. In particular, the use of ecological characteristics is too vague to be useful.

The second problem relates to the sharing of populations within the region where trading would be allowed. The one key ecological characteristic that must be shared for trading to be ecologically protective would be the populations of the impinged or entrained species. Two rivers or lakes may have many species in common and a generally similar ecology, but their populations may be completely isolated. Therefore improvements in one system would be of no benefit to the populations in an unconnected system. Also, the characteristics and genetics of species change with geographical locality. Therefore geographic proximity and in particular some degree of connectivity are important so that waters can share populations or occasionally swap migrants. This is essential if they are to have ecological characteristics that can be considered shared.

If the primary aim is to protect the populations of fish and crustaceans, then the geographical scale and the nature of the ecological characteristics for consideration must be determined by the extent and isolation of the populations of target species. A necessary, but not sufficient, criterion must be that all waters over which trading is conducted must be connected so that they interchange their most abundant fish species. In situations, such as estuaries, where they are connected by the ocean it must also be proven that trading is occurring between localities between which the main species do actually move. While for some species, such as striped bass, the ocean may be no obstacle, for others it may be effectively insurmountable. A similar situation can occur in large rivers where different tributary catchments can be isolated islands for species unwilling to enter the main stem of the river. This brings into sharp focus the fact that the appropriate geographical scale changes with the species.

The above considerations suggest that trading should only be allowed over limited geographical zones and normally confined within a single estuary, river or lake. Further, in large water bodies, where clear environmental gradients are present, it would be inappropriate to allow trading between sites with very different lists of commonly entrained and impinged species. For example, in the River Hudson Estuary there are great differences in the larval fish entrained between low salinity waters towards the head of the estuary and higher salinity waters towards the mouth. In the case of ocean sites they would need to be within a zoogeographic zone that shared fish populations. For large rivers there would also need to be habitat subdivisions reflecting habitat features. This leads to the conclusion that the appropriate spatial scale is trading within specific water bodies with further subdivisions for large and very large water bodies.

The above arguments lead to the view that trading should only be permitted between sites situated on the same water body and ecological community and that impact the same populations of common species at similar life stages.

EPA Response

Trading in the context of section 316(b) raises many complex issues. One fundamental complex issue is the scale within which trades can be made. Identifying the proper scale for trading entails a balance between allowing enough flexibility so that there is a potential for trades to occur and ensuring the protection of the ecosystem structure and function in the vicinities of the facilities involved in the trade. The decision made regarding the scale will determine whether the program is implementable. Due to the complex issues relating to trading, including those raised by the author of this comment, EPA has elected not to specify how a trading program in the context of section 316(b) should be implemented but rather has left it to the discretion of a permit director to decide whether a trading program is a beneficial use of State resources.

A determination on the appropriate spatial scale within which to allow trades will ultimately determine the possible number of trades. Larger geographic units will allow for more possible trades between more facilities; however, it may compromise the ecosystem structure and function in the vicinities of the facilities if too large due to site-specific differences in species diversity and abundance. Too large of a scale could cause greater impacts in one waterbody than in another and will do little to improve stocks in either waterbody. Trading programs that allow trades to occur at too large of a scale run the risk of disrupting ecosystem function, community structure, biodiversity and genetic diversity if trades are made that involve different species or even different populations of a single species. Smaller geographic units may make trading less likely because fewer partners will be available to trade. However, trades in the same waterbody will ensure that a net positive effect on the local stocks will occur due to implementation of the requirements of this rule. A smaller trading scale would also ensure that the same ecological community is affected. EPA believes that the geographic scale would need to ultimately be set at a size that is protective of fishery resources and does not cause localized impacts. Should a State choose to propose a trading program under § 125.90(c), EPA will evaluate the State's proposal on a case-by-case basis to ensure the program complies with the regulatory requirement – that it will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at § 125.94. To this end, EPA foresees potentially approving only those trading programs which allow trades within individual watersheds.

Comment ID 316bEFR.077.052

Author Name Reed W. Super
Organization Pisces Conservation, Ltd.

Subject Matter Code 20.04
RFC: Potential trading units/ credits

The unit for trading

The EPA propose three possible units of exchange, species density, species counts and biomass. As will be discussed below there are considerable problems with all 3 possible units for trading and further clarification and definition is required.

Using species density; numbers of eggs, larvae, juvenile fish and shellfish species entrained per unit volume would be used. This could only be an appropriate measure for trading if trading were strictly limited between sites in the manner proposed above under spatial scale. The distribution of all species is far from uniform and is variable through time. Therefore this proposal will not offer equal protection to all species. In particular, the density of shellfish species needs to be considered in more detail as it may seriously distort the outcome. Crustaceans are normally much more abundant than fish in both entrainment and impingement samples. For example, in estuarine and marine sites very large numbers of shrimp (Crangon spp.), mysids and young crab are entrained. Is it proposed to give these organisms equal weighting to that of larval fish? The situation is even more difficult if molluscs are to be considered. In some estuarine and marine localities large numbers of small molluscs such as just ready to settle mussels (Mytilus spp.) may be entrained. Such ‘fouling’ organisms are frequently viewed as a pest and sometimes are actively killed using biocides or heat treatment. The implication would seem to be that these would be given equal weight to larval fish for trading purposes. The example of trading under the EPA’s preferred alternative (p17172) is based on only a few abundant fish species and gives no mention to shellfish. A final area that needs to be clarified is the base data that will give a measure of the entrainment at each plant between which trading is proposed. The recruitment of fish and the abundance of other entrainable organisms can vary dramatically from year to year and change greatly through time. A clear example of long-term change is the 15-fold increase of abundance in striped bass in the River Hudson estuary since the 1970s. If trading is to be fair and appropriate it is essential that each of the sites within the trading group must have contemporaneously collected entrainment data and that the time period for comparison between the sites must be of equal length.

Species counts would use data on the numbers of each species. Further, these numbers would be subdivided into age classes. A value would need to be given to each species at each life stage. It is far from clear how each species and stage will be given a monetary value, and the amount of work required to collect and organise the data would be considerable. In reality this method could only be used for selected species. How would these species be selected? There would be a great temptation to focus on important commercial species, as they would be easier to value in monetary terms. As for species density, if trading is to be fair and appropriate it is essential that each of the sites within the trading group must have contemporaneously collected entrainment data and that the time period for comparison between the sites must be of equal length.

Biomass; trading would be based simply on the weight of entrained organisms per unit volume. This would give equal weight to all living (or possibly recently killed) life. The effect would be to effectively have a trading system based on phytoplankton. For marine and estuarine systems these would be mostly diatoms, Phyocystis and other colonial forms and dinoflagellates. In some freshwaters diatoms and even blue-green algae could dominate. The most abundant animal groups are frequently ciliates and other protozoans and microcrustaceans such as copepods and cladocerans. At ocean sites it is often observed that the biomass of ctenophores entrained is considerable. The biomass of eggs and larvae of fish and macrocrustaceans such as crab and lobster would be negligible. A biomass trading system would be completely inappropriate, as it would focus protection towards the rapidly reproducing, short-lived lower-life forms that are best able to cope with the losses caused by entrainment.

EPA Response

Trading in the context of section 316(b) raises many complex issues. One fundamental complex issue is the appropriate unit of trade. Identifying a unit for trading entails a balance between allowing enough flexibility so that there is a potential for trades to occur and ensuring the protection of the ecosystem structure and function in the vicinities of the facilities involved in the trade. The decision made regarding the unit of trading will determine whether the program is implementable. Due to the complex issues relating to trading, EPA has elected not to specify how a trading program in the context of section 316(b) should be implemented but rather has left it to the discretion of a permit director to decide whether a trading program is a beneficial use of State resources.

A determination of the appropriate units to trade would introduce so many issues that EPA believes it should be left to the discretion of the permit director whether they want to take on the burden of a trading program. EPA does not support trading biomass because it may not be protective of populations of fish and shellfish, since phytoplankton and zooplankton would be included in the weight and since one large individual of an abundant species could potentially be traded for many eggs or larvae of a rare species. In addition, EPA does not advocate trading similar species because it introduces a host of problems in assessing similarity given that each species occupies a separate niche within an ecosystem. EPA does not believe that it is possible at this time to quantify with adequate certainty the potential effects on ecosystem function, community structure, biodiversity, and genetic diversity of such trades, especially when threatened and/or endangered species are present. Trading the same species would eliminate many issues regarding measuring equality of species; however, it would still be burdensome to implement. EPA would like to caution permit directors that measuring any units of trade effectively would be extremely difficult given the inherent variability and dynamic nature of the populations of aquatic organisms subject to impingement mortality and entrainment. Should a State choose to propose a trading program under § 125.90(c), EPA will evaluate the State's proposal on a case-by-case basis to ensure the program complies with the regulatory requirement – that it will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at § 125.94. To this end, EPA foresees potentially approving only those trading programs which allow trades within individual watersheds and trade for numbers of the same species. In addition, EPA would like to explicitly state at this time that a trading program that would allow trading between aquatic organisms and pollutant discharges, as has been suggested by some stakeholders, would introduce comparability and implementation challenges that would be difficult to overcome; therefore, EPA does not expect that such a program would meet the requirements for approval. EPA also questions whether such a program would be consistent with the recent Water Quality Trading Policy.

Comment ID 316bEFR.077.053

Author Name Reed W. Super

Organization Pisces Conservation, Ltd.

Subject Matter Code 6.05

Impacts to T&E species

The extent of threatened and endangered species problems

Cooling water systems impact threatened and engendered species directly by entrainment and impingement and indirectly by habitat degradation. Fish, crustaceans and molluscs are often directly impacted because they have swimming stages that can enter the intakes. However, other animal groups such as turtles and even seals have been entrained and caught on screens or in screen wells. Aquatic birds and mammals tend to be indirectly affected via lost food supplies and habitat degradation.

It should be assumed that all power plants situated on estuarine and coastal sites will impact to some degree threatened or endangered (T & E) species. Major American river estuaries are all heavily utilised by man and because of overfishing and habitat damage they all hold fish populations that are considered endangered or threatened. In many cases these species are fish that were once quite abundant but have been much reduced by man, such as sturgeon and migratory salmonids. Where entrainment or impingement data for a power plant have been thoroughly collected for a number of years it is usually the case that T & E species have been recorded. Where insufficient data are available to make it likely that a rare fish would have been detected there is often information to suggest that T & E species occur in the area and would be vulnerable to harm by the cooling water system. For example, the San Francisco Bay / Delta estuary study includes the following in the list of species vulnerable to I&E:

1. Central Valley ESU steelhead - Oncorhynchus mykiss

2. Central Valley fall/late fall-run ESU Chinook salmon – Oncorhynchus tshwytscha

3. Central Valley spring-run ESU Chinook salmon – Oncorhynchus tshwytscha

4. Delta smelt – Hypomesus transpacificus

5. Green sturgeon – Acipenser medirostris

6. Longfin smelt – Spirinchus thaleichthys

7. Sacramento River winter-run ESU Chinook salmon – Oncorhynchus tshwytscha

8. Sacramento splittail – Pogonichthys macrolepidotus

Along the same coast at Morro Bay, the April 2002 staff report for the California Energy Commission notes that the estuary used for cooling water by Morro Bay GS is inhabited or potentially inhabited by the federally endangered tidewater goby (Eucycloglobius newberryi) and the steelhead trout (Oncorhyrnchus mykiss). Note that the tidewater goby is not listed as present in the San Francisco Bay area.

Similarly sized lists of T & E species could be complied for almost all ocean and estuarine sites. For example, in the Hudson Estuary both shortnosed (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus) have been impinged on cooling water intakes.

At many ocean and lower estuarine sites young turtles are potentially vulnerable to entrainment. For example, in the recent assessment of the impact of the Sunset Energy proposal for a power plant in New York harbour the following turtle species were listed as potentially present:

1. Green sea turtle – Chelonia mydas

2. Loggerhead sea turtle – Caretta caretta

3. Leatherback - Dermochelys coriacea

4. Kemp’s ridley turtle – Lepidochelys kempii

5. Hawksbill – Eretmochelys imbricata

With the exception of a few leatherbacks, most of the turtles in nearshore waters in the New York coastal region are small juveniles. The loggerhead is the most abundant, followed by the Kemp's Ridley. These two species, along with a few green turtles, move into harbours and estuarine waters, while the leatherback turtles remain along the coast and are rarely seen in embayments. Kemp's Ridley inhabits the shallower areas of Chesapeake Bay in search of blue crab, their preferred prey. Their preference for shallow waters and blue crabs makes the Kemp's Ridley the most likely sea turtle species to venture into the New York & New Jersey Harbor area. Similar lists would be produced for many east coast marine or lower estuarine power plants situated to the south of New York.

A point to note is that if conservation measures for species such as sturgeons and turtles were successful then populations could greatly increase, resulting in extended ranges and the risk of higher impingement in future years.

It is not so easy to make generalisation about freshwater habitats. Plant situated on rivers, particularly smaller rivers, are almost certain to impact T & E species, as are those situated on the great lakes. Kelso and Kilburn (1979), in an examination of impingement and entrainment at Great Lakes power stations, report:

“There were seven species found among impinged fish that were rare or never before detected (Scott and Crossman 1973) in the Great Lakes including pirate perch (Aphredoderus sayanus), redfin pickerel (Esox americanus americanus), golden redhorse (Moxostoma erythrurum), orange spotted sunfish (Lepomis humilis), brindled madtom (Noturus miurus), warmouth bass (Chaenobryttus gulosus) and chestnut lamprey (Ichthyomyzon castaneus)”.

Plant using water from reservoirs or smaller lakes may not directly impact T & E fish, birds or reptiles. This is because these may be in areas of low aquatic biodiversity or even utilise water from man-made water bodies. However, the isolation inherent in freshwater water lakes and some river catchments results in the formation of distinctive biological races of many species of fish. The maintenance of this genetic biodiversity is recognised as important and loss of genetic diversity may be a more important impact on freshwater fish than is generally appreciated.

In addition to direct impacts indirect effects in terms of habitat degradation are likely to be affecting other T & E species. This is particularly the case when power plants are situated on smaller estuaries, inlets or close to less common types of habitat. For example, Morro Bay Power Plant is situated on a small estuary on the Californian coast and the region holds threatened sea otter (Enhydra lutris) and federally endangered California brown pelican (Pelicanus occidentalis). These species rely on the Bay for food that can be reduced by impingement and entrainment. In many localities the abundance of fish feeding birds is probably directly proportional to the level of food resources available for the birds. Thus any damage to the populations of often rather small, non-commercial fish species can have a direct impact on aquatic birds.

EPA Response

In order to help the permit writer to take into account possible impacts of cooling water intake structures on threatened and endangered species when determining the best technology available for minimizing adverse environmental impact, the Impingement Mortality and/or Entrainment Characterization Study described in § 125.95(b)(3) in this rule must include taxonomic identifications of all life stages of fish, shellfish and any species protected under Federal, State, or Tribal Law (including threatened and endangered species) that are in the vicinity of the cooling water intake structure and are susceptible to impingement and entrainment.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Brad Shanks

On Behalf Of:

American Chemistry Council

Author ID Number:

316bEFR.078

Notes

CWISC (316bEFR.035)

Comment ID 316bEFR.078.001

Author Name Brad Shanks

Organization American Chemistry Council

Subject Matter Code 3.01

Definition: Existing Facility

EPA should specify directly in the Phase II regulations, not the preamble alone, that they do not apply to facilities whose primary business activity is not power generation.

The proposed Phase II regulation includes criteria for applicability if the facility "both generates and transmits electric power, or generates electric power but sells it to another entity for transmission." Section IV of the preamble further clarifies the above applicability by stating: "Today's rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by co-generation." The Council supports this statement and recommends that EPA include this directly in the regulations to provide more clarity on the applicability of the Phase II Rule.

EPA Response

See response to 316bEFR050.002.

Comment ID 316bEFR.078.002

Author Name Brad Shanks

Organization American Chemistry Council

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Permittees should have the option of meeting an actual flow threshold in lieu of the 50 MGD design flow threshold.

The proposed rule lists a design intake flow of 50 MGD as one of the criteria for applicability of the proposed Phase II regulations. In many cases, however, actual intake flow is below the design capacity. This is typically due in part to water conservation initiatives, process improvements, and more efficient use of water resources since the original design and construction of the intake structure and/or the facility. If a permittee is willing to accept permit limitations that restrict actual water usage below 50 MGD, EPA should encourage such actions as a means of reducing the potential for entrainment and impingement, which is the goal of Sec. 316(b) of the Clean Water Act.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.078.003

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Brad Shanks

Organization American Chemistry Council

Once “Best Technology Available (BTA)” has been determined and no significant cooling water increases occur afterwards, there should be no further need for a Sec. 316(b) analysis.

The Council believes that a Sec. 316(b) analysis should be a one-time only requirement. That is, once “best technology available” has been determined for a facility, installing and operating that technology should relieve the facility of further Sec. 316(b) reviews. The “location, design, construction, and capacity” of the cooling water intake structures are matters of design and construction, not operation. Congress could not have intended that facilities be in the business of redesigning, demolishing, and reconstructing their intake structures every five or ten years.

For each NPDES permit renewal cycle, a permittee could certify that there have been no changes in the plant operations or the design of the intake structure. From this, the Director should then accept the original Sec. 316(b) analysis and BTA determination. However, the Council does support the need for a new Sec. 316(b) analysis if there have been significant changes in plant operations or the design of the intake structure that may lead to adverse changes to the aquatic populations.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.078.004

Author Name Brad Shanks

Organization American Chemistry Council

Subject Matter Code 17.08

Option: UWAG's recommended approach

THE COUNCIL SUPPORTS UWAG'S SITE-SPECIFIC APPROACH AND DEFINITION OF ADVERSE ENVIRONMENTAL IMPACT

The Council believes that the regulations governing cooling water intake structures should maintain the greatest possible flexibility for meeting best technology available performance standards, which are meant to minimize adverse environmental impact. Including a flexible site-specific option as well as voluntary restoration will allow permittees' to cost effectively protect the environment.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.078.005

Author Name Brad Shanks

Organization American Chemistry Council

Subject Matter Code 17.08

Option: UWAG's recommended approach

The UWAG site-specific approach when applied in the Phase II rule will providE greater flexibility for permittees and provide protection for the environment.

The Council recommends that EPA adopt the UWAG site-specific approach as presented in Section VI.C. of the preamble since it provides the most flexibility of the proposed site-specific options and provides protection for the environment.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.078.006

Author Name Brad Shanks

Organization American Chemistry Council

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

The Council supports UWAG's definition of Adverse Environmental Impact.

The Council supports UWAG's definition of Adverse Environmental Impact as presented in Section VI.C. of the preamble. This option provides the greatest flexibility for the permittee. If no adverse environmental impact is determined through the site-specific approach, no application of BTA is required by the permittee.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.078.007

Subject Matter Code 21.08

Burden on permitting agencies (general)

Author Name Brad Shanks

Organization American Chemistry Council

The additional burden imposed on regulatory agencies under the site-specific approach is outweighed by the enormous value to the permittee and its customers.

EPA expresses a concern related to the "Implementation Burden under Any Site-specific Approach." Specifically, EPA is concerned about the resources needed by the State permitting agencies to implement a site-specific option. The Council urges EPA to consider any burden that may be imposed by this rule on the States and other governmental agencies against the huge burden that would be otherwise imposed on the regulated community. EPA should not oversimplify regulations and eliminate regulatory flexibility such that substantial additional costs are imposed on the regulated community for environmental controls that provide minimal benefit to the environment. The Council supports appropriate regulation of cooling water intake structures, if an adverse environmental impact exists, but urges that they be flexible and cost effective in protecting the environment.

EPA Response

See response to comment 316bEFR.034.005 for a discussion of the efficiencies added to today's final rule to speed permitting and reduce potential burden on the regulated community.

Comment ID 316bEFR.078.008

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Brad Shanks

Organization American Chemistry Council

The Council supports restoration and recommends that it be voluntary as part of the permittee's overall assessment.

EPA maintains in the preamble that the role of restoration measures in addition to or in lieu of technology measures for mitigating impingement and entrainment impacts or in establishing best technology should be available on a site-specific basis.

The Council strongly urges EPA to include restoration as a voluntary tool that the permittee may use to minimize adverse environmental impact.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

For a discussion of the role of restoration in the final rule, see the preamble to the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jim Stevens

On Behalf Of:

Vero Beach Power Plant

Author ID Number:

316bEFR.079

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.079.001

Subject Matter Code 22.06

UMRA/Impacts on local governments

Author Name Jim Stevens

Organization Vero Beach Power Plant

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that my utility finds particularly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities that are owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.079.002

Subject Matter Code 17.08

Option: UWAG's recommended approach

Author Name Jim Stevens

Organization Vero Beach Power Plant

The City of Vero Beach Power Plant endorses the technical and legal comments submitted to the EPA from Utility Water Act Group (UWAG), Large Public Power Council/American Public Power Association (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the commenter's support for these comments.

Comment ID 316bEFR.079.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Jim Stevens

Organization Vero Beach Power Plant

EPA should be complimented for considering a variety of alternative approaches to the regulation. The City of Vero Beach Power Plant is encouraged that the EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those instances the proposal provides the facility with the opportunity to justify an alternative technology selection.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.079.004

Author Name Jim Stevens

Organization Vero Beach Power Plant

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the water bodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.079.005

Author Name Jim Stevens

Organization Vero Beach Power Plant

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. The City of Vero Beach Power Plant has a good working relationship with the state and believes in deferring, where possible, to the state regulators.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule. This rule preserves an important role for states.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.079.006

Author Name Jim Stevens
Organization Vero Beach Power Plant

Subject Matter Code 22.06
UMRA/Impacts on local governments

Criticism:

The EPA has underestimated the impact on public power systems. The City of Vero Beach Power Plant believes that the EPA should consider these impacts on local government.(See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

The City of Vero Beach Power Plant agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements coordinating with states to ensure reliable grid operations.

The City of Vero Beach Power Plant is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time.

The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would have scheduled outage, maintenance or have lower demand. The EPA's proposed rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases-particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

For a response to comments on implementation of new 316(b) requirements, please refer to comment 316bEFR.028.007 in subject matter code 21.09.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jay Hudson

On Behalf Of:

South Carolina Public Service Authority (Santee Cooper)

Author ID Number:

316bEFR.080

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.080.001

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Santee Cooper appreciates the flexible approach of the proposed rule and commends the EPA for giving permittees three options. The third option, which allows for site-specific determinations of BTA based on a comparison of the costs for compliance vs. the benefits of meeting the presumptive performance requirements, appears to be a particularly reasonable approach.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule. Also see 316bEFR.338.002 for a discussion of the site-specific option.

Comment ID 316bEFR.080.002

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

As defined beginning on page 17163 of the Preamble, Santee Cooper supports the UWAG alternative definition and approach for determining "Adverse Environmental Impacts" over the EPA approach. The EPA's approach referring to "significant numbers or percentages" lacks specificity while UWAG's approach provides protective physical and biological decision criteria that are attributable to the operation of the cooling water intake structure.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.080.003

Subject Matter Code 18.02.02

UWAG recomm. for using previous studies

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

Also, we believe the EPA should adopt the UWAG approach and allow use of previous Section 316(b) Demonstration Studies unless there has been a change in the species of concern (Representative Indicator Species) at the intake location. UWAG's approach, as noted on page 17165, is the most practical in that it allows for all "relevant costs" to be considered as true costs of the impact that the particular technology proposed would cause to the permittee.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Additionally, in today's final rule, EPA offers a site-specific compliance alternative (see 125.94(a)(5)) in which an applicant may receive a determination of BTA from the Director for its facility provided it meets one of two cost tests. EPA believes that this alternative will provide additional flexibility for facilities who may find that the other compliance alternatives are not suitable for their site.

Comment ID 316bEFR.080.004

Subject Matter Code 21.03
Monitoring requirements

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

At pages 17179 and 17180 of the Preamble, the EPA notes that permittees would have to perform verification monitoring to demonstrate compliance with the requirements of minimizing adverse environmental impact. Santee Cooper recommends that the EPA consider that compliance be "demonstrated" upon initial operation of those technologies that will be approved by the Director during the permit renewal process and satisfactorily constructed by the permittee. Once the permittee has installed the technology, in lieu of monitoring, he should only be required to operate and maintain that technology for the life of the intake.

EPA Response

Please see EPA's response to comment 316bEFR.074.023. EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. Please see EPA's response to comment 316bEFR.017.003 for an explanation of what constitutes compliance with today's performance requirements. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.080.005

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

Subject Matter Code 7.02

Performance standards

Santee Cooper understands the "calculation baseline" is an estimate which the EPA intends to use as the basis to "verify" the level of protection that should be provided by the permittee's proposed technology(ies). The EPA's proposed "benchmark" ranges for nationwide compliance are reductions of 80 to 95 percent and 60 to 90 percent from the calculation baseline for impingement and entrainment, respectively. While Santee Cooper advocates the EPA's approach, we are not sure the range is optimum or correct for all sites. In Chapter 5 of the EPA's own Technical Development Document(as referenced in the New Facilities Phase I Rule), the EPA notes the performance of the various technologies was found to vary based on site-specific conditions and recognizes the practicality or effectiveness of alternative technologies are not uniform under all conditions. We therefore ask if it is reasonably possible to predict with certainty whether other ranges only 10 percent lower than the stated benchmark ranges would not also be equally protective of a species of concern at a particular site.

Santee Cooper believes the state Directors would be more informed whether a national standard should be applied for compliance, or whether a lower range, which would provide adequate protection for a particular waterbody, should be applied. Santee Cooper has a good working relationship with the state and believes in deferring, where possible, to the state regulators. Santee Cooper recommends leaving significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the years.

Consequently, we believe EPA's stated benchmark ranges should not constitute "absolute compliance" ranges; instead, they should be benchmark goals. If the ranges were considered goals, the state Directors would be given the latitude and discretion to determine whether a permittee that has installed the technologies they approved to reduce impingement actually met the compliance criteria. Consider the hypothetical case where a permittee installed the approved technology for reductions in impingement, but were to find through monitoring he actually achieved a reduction of 78 percent - only 2 percent shy of the "low benchmark." In this case, if the ranges were goals, Directors would have the flexibility to determine whether the actual percentage for that facility was close enough to the goal to be in compliance.

Similarly, consider the case for a facility which installed the technologies that were designed to meet both the impingement and entrainment ranges and subsequently finds through monitoring that one range is met while the other range falls short by only a few percent. It would seem unreasonable and impractical to require that permittee to install additional technologies to improve just a couple of percent. Simply put, should the EPA not adopt the approach we are proposing in comment no. 4 above, we believe the EPA should provide the Directors more flexibility in the determination for BTA compliance based on the reasonableness of the proposed technologies to meet "goals," not absolute compliance ranges.

EPA Response

EPA disagrees. The national performance standards adopted in today's rule are both appropriate and supported by the record. EPA believes that today's rule maintains a desired flexibility for both the permittee and the Director in determining the most appropriate and cost-effective means to meet the requirements. EPA adopted performance ranges rather than single value limits in recognition of the inherent variability that may exist between waterbodies and facility configurations.

For a discussion on the Technology Installation and Operation Plan and how it relates to compliance with today's rule, please see the preamble to today's final rule.

EPA has decided to give the Director the authority to determine methods of evaluating compliance. Thus, the Director will specify species and life stages of concern. The Director may choose to require evaluation of all species or of certain indicator species; or the Director may elect to verify compliance using biomass as a metric. EPA believes that as each situation will be somewhat unique, it should be left to the Director to determine whether biomass or actual numbers are a more appropriate unit.

Comment ID 316bEFR.080.006

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Santee Cooper recommends the proposed rule should allow permittees restoration credits for cooling ponds that were constructed to operate the facilities, particularly if the cooling ponds did not exist before the facility was constructed.

EPA Response

For an activity to be considered a restoration measure, it must meet all of the requirements described in the final rule.

Comment ID 316bEFR.080.007

Author Name Jay Hudson

Organization South Carolina Public Service Authority (Santee Cooper)

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

At §125.95 on page 17222, as well as at §125.98 on page 17224, it is evident the EPA intends that permittees be required to submit a Comprehensive Demonstration Study upon each renewal application. Santee Cooper believes that BTA demonstrations should be a one-time demonstration unless there are significant changes within the waterbody where the intake structure is located.

Santee Cooper recommends the EPA clarify that Comprehensive Demonstration Studies are not required at each renewal.

Additionally, in §125.95 there is a requirement the Comprehensive Demonstration Study must be submitted with the renewal application at least 180 days before the permittee's permit expires. This is an unreasonable requirement as proposed. The EPA must factor in additional time for permittees whose permits are set to expire approximately coincident with the date the rule becomes final. The EPA simply must allow permittees sufficient time to perform the field studies which are necessary prerequisites to compiling the Comprehensive Demonstration Study.

EPA Response

EPA disagrees that the Comprehensive Demonstration Study should, in its entirety, be a one-time submittal. For an explanation of EPA's position, please refer to the final rule preamble section VIII.E.4., Comprehensive Demonstration Study (CDS). EPA recognizes that in many cases, this information cannot be developed, analyzed and submitted prior to the time a facility's current permit expires. EPA has attempted to accommodate this situation in § 125.95(b). Please refer to the preamble to today's rule and EPA's response to comment 316bEFR.034.066 for a clarification of timing requirements for the submittal of studies and permit compliance issues in today's final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jon W. Allan

On Behalf Of:

Consumers Energy

Author ID Number:

316bEFR.081

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), UWAG (316bEFR.041)

Comment ID 316bEFR.081.001

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 7.03.01

Sample facilities/technologies

Consumers Energy has been a leader in developing innovative technologies to minimize fish impingement and entrainment in a variety of Great Lakes situations. CE was the first in the Great Lakes to design and install an off-shore wedge-wire screen intake for the JH Campbell Plant on Lake Michigan. This system has no impingement, minimizes entrainment and has been demonstrated in Michigan to be the best technology available for the JH Campbell Unit 3 Plant. CE was one of the first companies in the country to install and operate a fish deterrent net at the JR Whiting Plant on Lake Erie which has reduced fish impingement by 90%. Finally, CE has successfully installed and operated the largest barrier net in the county at the Ludington Pumped Storage Project on Lake Michigan, which also annually reduces fish loss by about 90%. Our experience with the installation, operation, evaluation and maintenance of such a variety of intake systems has shown that site-specific consideration of technologies and impact is the most effective way to attain agency and facility agreement on the best technology to minimize adverse environmental impact.

EPA Response

Today's rule maintains the flexibility for a facility to determine the most appropriate design and construction technologies, operational measures, and/or restoration measures suitable to its location that can best achieve requirements of today's rule.

EPA acknowledges the success achieved at both the JR Whiting facility and JH Campbell with their respective technologies and notes their inclusion in Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.081.002

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Accordingly, we appreciate the limited flexibility provided in EPA's proposed rules that recognizes a variety of BTA alternatives, includes an option for developing site-specific standards and allows for use of restoration in lieu of, or in conjunction with technologies for compliance. We also appreciate the significant effort that has put into this rule development and believe that with modification, it can provide a workable permitting framework for both facility owners and permitting agencies.

EPA Response

Please refer to the response to comment 316bEFR.080.001.

Comment ID 316bEFR.081.003

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 8.03

Proposed standards for Great Lakes

THE GREAT LAKES STANDARDS

The proposed Great Lakes requirement of a technology to reduce fish entrainment by 60 - 90% in the Great Lakes is not justified and limits the number of technologies available for consideration. Years of past intake study demonstrations and lake assessments have clearly shown that entrainment is a relatively small factor of potential cooling water impact and that impingement reductions yield the most cost-effective environmental benefit. While the Great lakes are a unique resource, they do not require more protection than other lakes and reservoirs. Elimination of the entrainment standard would allow facility owners and Great Lakes regulators the needed flexibility to select for technologies that are cost-effective and maximize net benefits.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies.

Comment ID 316bEFR.081.004

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

FLEXIBILITY FOR PREVIOUSLY APPROVED INTAKES

Consumers Energy has invested considerable time and resources in evaluating installing and demonstrating cooling water intake technologies that have been approved as BTA. It would be very helpful if the final rule would allow states to re-approve a previously approved intake as best technology available either as they are or with some level of revalidation up to and including a new study under the new 316(b) rule. There are many electric generating facilities in the Great Lakes for which there is already a high degree of confidence that the facility is not creating “adverse environmental impact” and there should be a simpler process for their approval.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today’s final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details. EPA has also added many streamlining efficiencies to reduce burden in today's final rule, please see response to comment 316bEFR.034.005 for a discussion.

Comment ID 316bEFR.081.005

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

ALTERNATIVE SITE-SPECIFIC APPROACHES

As proposed, the EPA only allows site-specific alternatives to be considered if the cost of achieving the standard is significantly greater than the expected benefits of compliance. We believe the best decision criteria allow facilities to select technologies or mitigation measures that maximize net benefits. Therefore, we encourage EPA to adopt either of the two site-specific approaches as proposed by UWAG and PSEG.

EPA Response

See the preamble to the final rule. See also response to comment #316bEFR.075.065. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.081.006

Subject Matter Code 21.04

Determination of compliance

Author Name Jon W. Allan

Organization Consumers Energy

COMPLIANCE ASSESSMENT

Facility owners and agencies will need to expend considerable time and resources to determine if a given technology installed on a cooling water intake achieved the percentage reductions in impingement and entrainment that are specified in the draft rule. In order to reduce implementation costs, speed permitting and prevent unnecessary permit backlog for both States and facilities, the EPA should allow State permitting agencies to waive the requirement for baseline monitoring, study and modeling for facilities that install any of the approved BTA technologies. Compliance monitoring should be focused to that which is necessary to demonstrate proper operation of the technology and not of further biological determinations.

EPA Response

EPA has included in today's final rule five alternatives for achieving compliance, and an option to demonstrate compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.081.007

Author Name Jon W. Allan

Organization Consumers Energy

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

COST-BENEFIT TEST

The cost-benefit test is a critical element of the proposed rule. In its current form, the proposed rule lacks a sound benefit assessment approach, overstating the benefits because of inappropriate inputs in biological assumptions, statistical methods, and resource valuation methodologies. In particular, the EPA use of the habitat replacement cost as a means to value benefits is inappropriate and greatly overstates potential benefits. Consumers Energy urges EPA to broaden their consideration of benefit options to include other mitigative actions such as habitat preservation, fishery recreational items and settlement agreements. Again, this is to build in the flexibility to allow regulators and owners to reach agreements on 316(b) determinations in an efficient and cost-effective manner.

EPA Response

As described in sections 125.94(c) and 125.95(b)(5) of the final rule, facilities may use restoration projects that produce and result in increases of fish and shellfish to meet the rule's performance requirements.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

EPA disagrees with the commenter's assertion that "the proposed rule lacks a sound benefit assessment approach." EPA's approach to benefit cost analysis of the proposed and final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN #6-1931).

For EPA's responses to specific comments on commercial fishing methods please see comment # 316bEFR.323.016.

For EPA's responses to specific comments on recreational fishing methods presented at proposal and the NODA please see comments # 316bEFR075.504 regarding the benefits transfer approach used at proposal, comments # 316bEFR.041.452, #316bEFR.337.010, and #316bEFR.306.320 regarding the RUM analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see comment # 316bEFR.005.035."

As stated in the NODA, the "rule of thumb" is not used for estimating non-use benefits for the final Section 316(b)rule. Due to uncertainty in monetizing non-use values at the national level, EPA has not included quantitative measures of nonuse values The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including peer-reviewed meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, Non-Use Meta-Analysis Methodology, and A15, Habitat Based Methodology for Estimating Non-Use Values, of the final Phase II Regional Studies Document (DCN #6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA also disagrees with the assertion that EPA's I&E analysis is flawed. Please see EPA's responses to Comment 316bEFR.029.105 regarding the age of impingement, Comment 306.092 regarding the detection of ecological impacts, Comment 316bEFR.074.101 regarding EPA's calculation of production foregone, Comment 316bEFR.074.042 regarding multiple conservatisms, Comment 316bEFR.005.009 regarding fish population modeling, and Comment 316bEFR.025.015 regarding compensation.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Russell J. Harding

On Behalf Of:

Michigan Dept of Environmental
Quality

Author ID Number:

316bEFR.082

Comment ID 316bEFR.082.001

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Michigan has implemented a 316(b) program for a number of years. Design, construction, and operation of intake structures have been evaluated on a case-by-case basis to minimize adverse environmental impacts for a majority of the intake structures tar existing regulated facilities in Michigan. We believe it may not be necessary to require new studies or demonstrations for all those facilities with site-specific approvals.

EPA Response

EPA agrees that historical study data may be useful provided that it is reflective of current conditions at the facility. However, EPA also believes that historical BTA determinations must be re-examined against today's rule. See response to 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

Comment ID 316bEFR.082.002

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Subject Matter Code SUP

General statement of support

However, outstanding issues still remain for a number of facilities, and promulgation of the 316(b) regulations will assist us in resolving those issues. Therefore, we support the proposed performance-based standards to help resolve remaining intake issues for existing facilities in the state.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.082.003

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Subject Matter Code 21.08

Burden on permitting agencies (general)

We are concerned, from a regulatory standpoint, about the impact of the proposed regulations on the National Pollutant Discharge Elimination System (NPDES) permitting process. We recommend the regulations provide flexibility for the states to exempt facilities with previously approved 316(b) demonstrations from further study, rather than require every facility to conduct new studies and demonstrations. The states should have the option to require the additional studies or demonstrations if conditions have significantly changed or if special concerns warrant a reevaluation of impacts. We believe this approach will streamline the NPDES permit process and allow us to devote limited resources to facilities that need the attention. This approach will benefit permitting authorities faced with permit backlogs.

EPA Response

Please see response to comment 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

Comment ID 316bEFR.082.004

Subject Matter Code 7.02

Performance standards

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

We support the use of the proposed performance ranges, rather than a single performance benchmark to define performance standards.

EPA Response

EPA notes the comment. No response required.

Comment ID 316bEFR.082.005

Subject Matter Code 8.03

Proposed standards for Great Lakes

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

[W]e agree with the United States Environmental Protection Agency's (EPA's) position that the Great Lakes are a unique system and should be protected to a greater extent than other lakes and reservoirs.

EPA Response

EPA agrees with the commenter.

Comment ID 316bEFR.082.006

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Regarding the restoration (mitigation) provisions of the proposed rules, we recommend that any such provision allow the states to decide what mitigation is appropriate.

EPA Response

The final rule gives permitting authorities the flexibility to determine the feasibility of restoration measures on a site-specific, case-by-case basis. All restoration measures must meet all of the requirements described in the final rule.

Comment ID 316bEFR.082.007

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

We recommend that a hierarchy of mitigation approaches be described to first implement on-site, in-kind mitigation, and that failing that option, mitigation on a broader scale within the watershed or lake basin be considered. For the most part, we would expect that restoration efforts would occur in the watershed or lake basin affected and be specifically designed to address the resource affected. However, there may be unique circumstances that would justify restoration measures outside the waterbody that would benefit the environment.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's responses to comments 316bEFR.212.001 and 316bEFR.059.008.

Comment ID 316bEFR.082.008

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Each state has unique legal provisions that may or may not be compatible with a trading program as discussed in the preamble. Therefore, we support the EPA's proposal to let the states decide if they wish to establish alternate state requirements for a trading program under Title 40 of the Code of Federal Regulations, Part 125.90(d).

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.082.009

Author Name Russell J. Harding

Organization Michigan Dept of Environmental Quality

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

The proposed rules allow for approval of site-specific best technology available for minimizing entrainment/impingement. Approval must be based on a determination that the cost of compliance with the promulgated performance standards would be "significantly greater" than either the costs considered by the EPA in establishing those standards or the benefits of complying with those standards. We recommend that the regulations be revised to add greater clarity in carrying out this cost/benefit comparison. Such improved clarity should be designed to maximize net environmental benefits and to reduce uncertainty for both the regulatory agency and the regulated parties.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

See response to comment 316b.EFR.410.001 for further discussion of clarity and uncertainty in the cost tests.

See response to comment 316bEFR.006.003 for further discussion of significantly greater.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John B. Hart

On Behalf Of:

North Atlantic Services Corporation

Author ID Number:

316bEFR.083

Comment ID 316bEFR.083.001

Author Name John B. Hart

Organization North Atlantic Services Corporation

Subject Matter Code 10.03.06.02

Seabrook

In the Seabrook Station Case Study Chapter G1-1 there are also several errors that are identified and corrected below.

-Seabrook Station is a single-unit generating station. The second unit was cancelled in 1986 and was never completed.

-The circulating water system draws water from the Atlantic Ocean coastal waters off the state of New Hampshire and not Ipswich Bay (Massachusetts).

-The ocean intake consists of three velocity caps (not one).

-The circulating water system discharge is located 5,500 feet offshore in the ocean and not 5,500 feet from Seabrook Station (note: The plant is located two miles inland. An intake tunnel and a discharge tunnel each about three miles long and more than two hundred feet below sea level, deliver cooling water to the inland generating station and return it to the ocean.

EPA Response

EPA regrets these errors. However, EPA wishes to note that this information was never used in EPA's analysis and is no longer included in any documents submitted by EPA in support of the final rule.

Comment ID 316bEFR.083.002

Author Name John B. Hart
Organization North Atlantic Services Corporation

Subject Matter Code 10.01.02.01
EPA methods: age 1 equiv, yield, prod foregone

Review of the EPA's Proposed Rule on Cooling Water Intake Structures for Phase II Existing Facilities Case Study of the Impacts of Impingement and Entrainment at Seabrook Station

Prepared for
North Atlantic Energy Service Corporation
P0 Box 300
Seabrook Station
Seabrook, NH
03874

Prepared by
Normandeau Associates, Inc.
25 Nashua Road
Bedford, NH 03110

and

Langhei Ecology LLC
14820 View Way Court
Glenely, MD 21737

Reviewed by
Seabrook Station Ecological Advisory Committee Members:

Dr. John Tietjen, Chairman (Emeritus, City University of New York)
Dr. W. Huntting Howell (University of New Hampshire)
Dr. Saul Saila (Emeritus, University of Rhode Island)

August 2002

1.0 INTRODUCTION

The EPA's case study for Seabrook Station uses the Production Foregone model to evaluate fish losses at the plant due to impingement and entrainment. The Production Foregone model attempts to estimate the total biomass which could have been produced by the population had the effects of power plant operation not occurred (EPRI 1999). This model requires impingement and entrainment estimates, and life history parameters as input. The following review of the EPA's case study includes a critique of the application of the Production Foregone model, a review of the life history parameters, and a review of the input impingement and entrainment estimates used in the model.

2.0 APPLICATION OF THE PRODUCTION FOREGONE MODEL

As expressed in Chapter A5 of the case study, the approach used by EPA was to first present the raw impingement and entrainment losses at the plant derived from annual Seabrook Station Environmental Monitoring Program reports. Next, these losses were expressed as foregone Age 1 equivalents using Adult Equivalency (AE) methodology. Age 1 equivalents were then converted to foregone fishery yields in terms of biomass using the Thompson and Bell model. Finally, foregone biomass production was converted to a monetary estimate. Specific comments on the application of the Production Foregone model referencing the section numbers of EPA case study, are presented below.

Section A5-2.1 Facility I&E (Impingement and Entrainment) Monitoring

EPA assumed all fish killed by impingement were Age 1 at the time of death. For those species for which impingement occurs at older ages, foregone production and fishery yield will be overstated, because unrealized production of younger fish is greater than that of older fish. A more accurate approach would have been to calculate production foregone for each age class, and then sum the production foregone across age classes.

Section A5-2.2 Species Evaluated

This section begins by stating that “EPA conducted detailed species-specific loss analyses for species that were most predominant in facility collections or had special significance (e.g., threatened or endangered status).” In fact, species were aggregated for analysis. Application of species-specific life history parameters to multiple species amplifies uncertainty in the appropriateness of the parameter values. This problem is exacerbated when selected life history parameters correspond to a species that is a minor component of the aggregate.

Labeling of species aggregates to match available life history information obscures this major source of error. In the case of Seabrook Station, an aggregation of six species was reported by EPA as winter flounder, but winter flounder was only a small portion of the aggregate entrainment for that group of species. In addition, this situation exists with EPA’s lumpfish analysis, which is dominated by Atlantic seasnail. In the EPA’s analysis of impacts to red hake, several species are grouped, including silver hake. Further discussion of inappropriate species groupings appears in Section 4.0.

These inappropriate groupings of species increased both the imprecision and inaccuracy of the impact assessment to an unknown degree through inappropriate application of life history parameters of individual species to aggregated species groups. While this may be justifiable for closely related fishes with similar life histories, it cannot be justified in many cases. This is especially true for winter flounder, where it appears that the overwhelming majority of the eggs assigned to winter flounder were cunner, a completely unrelated fish.

Section AS-3.1 Modeling Age-1 Equivalents

In section A5-3.l of the case study EPA states: “The age of equivalency can be any life stage of interest”. Mathematically, this is true; however, not all ages are equally appropriate for interpreting impacts or as input to other models. For evaluating potential impacts to a fishery, the age of equivalency should be the age of recruitment to the fishery. This age will differ depending on the life history of the species and the fishery. EPA uses the results of the equivalent adults analyses as inputs to the Thompson and Bell model to estimate foregone fishery yield. The Thompson and Bell model assumes that the fish have recruited to the fishery; however, Table G1-35 indicates only 1% of winter flounder are vulnerable to the fishery at Age 1+, 29% at Age 2+, and 80% at Age 3+. This indicates that Age 1+ is not an appropriate age of presumed recruitment to the fishery and therefore not an appropriate age of equivalency for equivalent adult analysis. Appendix G1 indicates that Age 2+ or 3+ would be a more appropriate age of equivalency for many species given the empirical information on age of recruitment to the fishery.

Section A5-3.2 Modeling Foregone Fishery Yield

This section states that the Thompson and Bell model "provides a simple method for evaluating a cohort of fish that enters a fishery ..." . This statement reflects the fact that the Thompson and Bell model is based on recruits. For many species, Age 1+ fish have not recruited to the fishery as seen above for winter flounder. Age 2+ or 3+ is a more appropriate age of equivalency for the harvested species in this case study.

Section A5-3.3 Modeling Foregone Production

Production foregone should not be calculated as if fish were impinged at a younger age than actually occurred. EPA has assumed that all impinged fish were impinged at Age 1+. In doing so, EPA has included production that accrued from Age 1+ to the actual age of impingement as production foregone, thereby overstating production foregone by this amount.

In Table G3-4, EPA adjusted upward the number of impinged fish to account for mortality during the Age 1+ life stage under the assumption that impingement was distributed over the entire interval. This represents an equivalent number of impinged fish, had all of the impingement occurred at the start of the year. EPA's methodology is not entirely clear, however, if EPA used the impingement numbers from Table G3-4 to calculate production foregone, EPA has amplified the error described in the preceding paragraph by applying an inflated number of impingement mortalities in the calculation of production foregone.

Section A5-3.4 Evaluation of Forage Species Losses

The trophic transfer model implicitly assumes that production of harvested species is limited by availability of forage. This assumption is not necessarily true, especially for stocks that are depleted or otherwise below carrying capacity.

Figure A5-2 presents a trophic transfer model for valuation of foregone production of forage species. An explanation for this figure presents an estimate of trophic transfer for high efficiency (prey to predator transfer) and low efficiency (prey through intermediates to recreationally or commercially important species) trophic pathways. The model assumes a coefficient of transfer efficiency (k) of 0.09 for the high efficiency pathway and 0.009 for the low efficiency pathway. Furthermore, the model assumes that 20% of the forgone production will pass through the high efficiency pathway and 80% through the low efficiency pathway. There is no justification given for these assumptions. No literature in either the form of field or laboratory studies is cited. While all models have some assumptions, justification of assumptions is required, usually through reference to the scientific literature

Section A5-4.2 Parameter Uncertainty

The second paragraph asserts parameter uncertainty leads to imprecision rather than inaccuracy, because of offsetting effects of inaccuracies. While errors in individual parameters may offset each other to some degree, the analyses utilize fixed parameter values. The deterministic results exhibit inaccuracy rather than imprecision.

Section A6 – Fish Population Modeling

The citation of Strange et al. (2002) on page A6-7 is not really relevant, because in the examples cited, the entire population is directly exposed to the stressor (i.e., the habitat is altered). The analogous individual-level endpoint for 316(b) would be survival of entrained or impinged individuals. Clearly, however, not all organisms in the habitat are entrained or impinged.

Section G3-4 - Seabrook's Annual Impingement and Entrainment

Table G3-3, which table presents the annual impingement at Seabrook Station expressed as Age 1 equivalents is cited on page G3-14. The estimate of Age 1 equivalents is usually larger than the raw estimate of impingement due to an assumption that is explained in a note at the bottom of the table. This note states: "...ages of impinged fish are assumed to be distributed across the interval between the start of year 1 and the start of age 2.. ."

Calculation of the equivalent number entrained at the start of the year (see Table G3-3 note) is more sensitive, in absolute terms, to error in the mortality rate estimate than is conventional equivalent adults analysis that calculates the equivalency at an older age. Furthermore, the metric is conceptually flawed as a measure of impact, because it has no ecologically meaningful interpretation.

3.0 REVIEW OF LIFE HISTORY PARAMETERS

The output from any model is only as good as the input data. For the Production Forgone model used by EPA, life history data are important input parameters to the model. Appendix G1 presents the life history data used by EPA to estimate the Age 1 equivalents, fishery yields, and production foregone. The models are sensitive to these values, because these parameters are exponents in the models used. Extrapolation across species is a major source of potential error.

A review of all the life history parameters in Appendix G would result in a document almost as long as Appendix G. The following is a discussion of the weaknesses in the estimates of some of the life history parameters presented in Appendix G.

Natural Mortality (per stage)

Eggs

The reference, Stone and Webster (1977), is used as a source for estimates of egg mortality for several different species. This reference apparently contains an estimate of Atlantic silverside egg mortality. Footnotes to tables in Appendix G1 indicate that the Atlantic silverside egg mortality estimate is used to estimate egg mortality of many fishes including American plaice, American sand lance, bluefish, lumpfish, northern pipefish, sculpin spp., scup, striped killifish, and threespine stickleback. The Atlantic silverside is an estuarine spawner with a relatively large egg (1.0-1.5 mm) (Able and Fahay 1998). Eggs are deposited in the intertidal zone and apparently are attached to vegetation by adhesive tendrils (Martin and Drewry 1978). The use of the egg mortality estimate for Atlantic silverside for other species that may have smaller and in many cases pelagic eggs cannot be justified because of the differences in life history among the species.

Larvae

Larval mortality for several species including American plaice, American sand lance, Atlantic cod, bluefish, butterfish, fourbeard rockling, grubby, hogchoker, little skate, lumpfish, northern pipefish, radiated shanny, rock gunnel, sculpin scup, searobin, threespine stickleback, windowpane, were calculated using the expression:

(natural mortality) = -LN (survival) — (fishing mortality)

Fishing mortality on larvae is 0, so we are left with the expression:

(natural mortality) = -LN(survival)

This expression is not informative because no value for survival or citation for the assumed value is provided. Given the values for larval natural mortality in the tables, one can solve for —LN (survival). However, this does not provide any biological justification for the assumed value.

Juveniles

The estimates of natural mortality of Age 0+ fish (larval stage to Age 1+) for several species including American plaice, Atlantic herring, American sand lance, Atlantic menhaden, Atlantic silverside, butterfish, fourbeard rockling, grubby, (longhorn sculpin), little skate, lumpfish, northern pipefish (broad-nosed pipefish), radiated shanny, rainbow smelt, rock gunnel (radiated shanny), sculpin spp. (longhorn sculpin), scup, searobin, threespine stickleback, and windowpane, appear to be derived from either NOAA (2001) or Froese and Pauly 2001.

Natural mortality estimates derived from NOAA (2001) appear to be for older life stages that are commercially exploited and at least partially recruited to the fishery. For most species, natural mortality usually decreases with age. EPA apparently assumed that natural mortality rates were constant from Age 1+ through the remainder of a fish’s life. Therefore, the use of natural mortality estimates of commercially exploited stages for younger life stages is a clear underestimate of natural mortality of the younger life stages. The underestimated natural mortality for these young fish will overstate production foregone and foregone fishery yield. EPA’s assumption that all impinged fish were Age 1+, amplifies the significance of error in mortality rates for Age 1+ and 2+ fish. Other data sources, including Able and Fahay (1998) and other life history papers, present data that could be used to estimate natural mortality for Age 0+ and Age 1+ fish for several of these species.

The source, Froese and Pauly (2001), refers to an internet site (FishBase) where many life history parameters are presented for many fishes. Natural mortality estimates from this site are used for fourbeard rockling, grubby, lumpfish, northern pipefish, radiated shanny, rainbow smelt, rock gunnel, sculpin spp., scup, searobins, threespine stickleback and windowpane. Natural mortality (m) as defined by FishEase "refers to the late juvenile and adult phases of a population" (Froese and Pauly 2001). Therefore, the use of these estimates for the early juvenile stages underestimates the actual natural mortality, especially for longer lived fishes, and overstates the production foregone and foregone fishery yield.

Weight Estimates

Estimates of weight at various lifestages are presented in the tables in Appendix G. These estimates of weight are factors in the estimates of growth rates, which are important in the calculations of foregone production and yield. Weight estimates for each life stage are generally estimated from length-weight relationships. These length-weight relationships should be specific for each lifestage as there are major changes in the body form and the relationship between length and weight among life stages. However, it appears that EPA may have used length-weight relationships for larvae to estimate the weight of eggs based on their diameter. This will tend to underestimate the weight of eggs and thereby overstate production during the transition from egg to larvae. This is potentially significant given the relative portion of individuals entrained as eggs. Furthermore, there can be a reduction in weight between the egg and yolk sac larvae stage, which could be termed negative production. Production cannot begin until the fish commence exogenous feeding.

4.0 REVIEW OF ENTRAINMENT AND IMPINGEMENT REPRESENTATIONS

Table G3-6 of EPA's case study presents estimates of entrainment of eggs and larvae at Seabrook Station derived from the annual monitoring reports. EPA apparently grouped some species based on apparent similarities in life history. North Atlantic takes exception to some of these grouping as explained below.

Entrainment Data

Lumpfish

Data presented in Table G3-6 appear to be a combination of lumpfish and snailfishes. However, these ecologically and taxonomically diverse fishes have different life histories and should not be grouped. Furthermore, snailfish comprise the majority of this group and the application of life history parameters for lumpfish to snailfishes is not appropriate. Egg diameters for lumpfish range from 2.2-2.6 mm while egg diameters for Atlantic seasnail and inquiline seasnail range from 0.8-1.4mm (Collette and Klein-MacPhee 2002). Application of lumpfish egg diameter data to seasnail eggs will result in an overestimate of the biomass of this group.

Red hake

Data presented in Table G3-6 appear to be a combination of hake spp., red hake, white hake and silver hake. The life histories of these fishes are different and they should not be grouped. Estimated natural mortality of silver hake and red hake is 0.4, but 0.2 for white hake (NOAA 2001). Egg diameters for red hake (0.64-0.78 mm) and white hake (0.70-0.79 mm) are similar, but egg diameter for silver hake (1.04-1.24mm) is larger (Collette and Kiein-MacPhee 2002), which affects the estimates of egg biomass.

Sculpin spp.

Data presented in Table G3-6 appear to be a combination of longhorn sculpin, shorthorn sculpin and sea raven. Although sea raven eggs and larvae are rarely entrained, their egg diameters (3.9 mm: Collette and Klein-MacPhee 2002) are much larger than the sculpins and they should not be included in this group.

Winter Flounder

Data presented in Table G3-6 appear to be a combination of Atlantic cod/witch flounder, cunner/yellowtail flounder, Pleuronectidae, winter flounder, witch flounder, and yellowtail flounder. While all of these taxonomic groups appear to be part of the family Pleuronectidae, the inclusion of cunner/yellowtail flounder and Atlantic cod/witch flounder with winter flounder is not justified. Corrected estimates of winter flounder entrainment are presented in Table 1. EPA's overestimate of winter flounder entrainment ranged from 500,000 in 1994 to 790,000,000 in 1991.

Table 1. ERRORS IN EPA's PRESENTATION OF WINTER FLOUINDER ENTRAINMENT ESTIMATES.

Year	Data from Table G3-6 (EPA)	Data from Seabrook Station Annual Reports	EPA Overestimate
1990	520,479,242	3,200,000	510.000,000
1991	800,030,734	9,000,000	790,00,00
1992	242,018,538	6,200,000	232,000,000
1993	62,666,462	2,900,000	59,800,000
1994	500,000	0	500,000
1995	60,200,044	8,000,000	52,000,000
1996	172,100,000	10,300,000	162,000,000
1997	199,800,000	2,200,000	198,000,000
1998	138,521,000	4,700,000	134,000,000

Cunner/yellowtail flounder eggs are among the most numerous groups entrained each year, and the largest single component of EPA's winter flounder group (Figure 1). However, none of the cunner/yellowtail flounder eggs are likely to be winter flounder eggs. Winter flounder eggs are distinguished from cunner/yellowtail flounder eggs by theft irregular shape and thicker and grainy membrane (Collette and Klein-MacPhee 2002). Furthermore, winter flounder eggs are demersal and adhesive and therefore, are rarely entrained at the mid-water intakes of Seabrook Station.

The cunner/yellowtail flounder group is not likely to contain many yellowtail flounder eggs. It is explicitly stated in the annual monitoring reports that "A comparison of cunner and yellowtail flounder larval abundance indicated that most of the eggs in the cunner/yellowtail flounder group were likely cunner, assuming a relatively similar hatching rate between the two species (NAT 1999: p 4-45). The ratio of cunner to yellowtail flounder larvae is variable but can be as large as 408:1 (1997: NAT 1998a), indicating that in some years the percentage of yellowtail flounder eggs in the cunner/yellowtail flounder group may be less than 1%.

Given the dominance of cunner in this species grouping, the cunner/yellowtail flounder group should be split out and addressed separately as cunner, rather than grouped with winter flounder. The inclusion of cunner/yellowtail flounder eggs with winter flounder eggs greatly increases the estimate of winter flounder entrainment, and the potential monetary value of losses due to impingement and entrainment at Seabrook Station.

Atlantic cod/witch flounder eggs were also included with winter flounder. However, this group does not contain any winter flounder eggs. Atlantic cod/witch flounder eggs are distinguished from winter flounder eggs by their spherical shape and larger size (Atlantic cod: 1.20-1.69 mm; witch flounder 1.07-1.45 mm; Collette and Klein-MacPhee 2002).

Impingement Data

North Atlantic has stated in recent annual Environmental Monitoring Reports that not all impingement estimates prior to the last quarter of 1994 are reliable because plant personnel were not adequately sorting fish from impingement debris. Impingement monitoring was improved in late 1994. Since 1998, an outside contractor has been conducting impingement counts and estimates are considered to be reliable. Therefore, any projections of impingement impacts using data prior to 1995 are inaccurate and probably are underestimates.

Table G3-2 in EPA's case study presents estimates of impingement at Seabrook Station, apparently derived from the annual monitoring reports. However, several of the impingement estimates are in error or represent inappropriate groupings of species. Most of these errors are numerically small, and probably do not affect the assessment of the impacts of entrainment and impingement. Errors observed, and corrections are presented in Appendix A.

5.0 CONCLUSIONS

The EPA's case study on the impacts of entrainment and impingement at Seabrook Station is flawed due to improper application of the Production Foregone model and inappropriate input data. EPA's method of scaling the number of entrained and impinged fish to Age 1 rather than the age of recruitment to the fishery is conceptually flawed and, combined with understated rates of natural mortality, results in a systematic overestimate of production foregone. Furthermore, misapplication of the Thompson-Bell model assigns an inflated portion of the estimated foregone production to lost fishery yield.

Input parameters for the model are not always well supported by the scientific literature, or there are no good data available. The estimates of trophic transfer (k) used in the model are not supported by literature citations. Many of the life history parameters, including mortality and weight estimates, are inappropriate. Specifically, the use of natural mortality estimates of adult fish for juvenile fish is inaccurate, as well as the apparent use of length-weight regressions of larval fish for estimating weight of fish eggs.

The apparent grouping of species resulted in inaccurate estimates of the number of organisms entrained. The EPA's winter flounder aggregation included two taxonomic groups that contained few if any winter flounder eggs or larvae. This inappropriate grouping inflated the estimates of winter flounder entrainment by orders of magnitude.

It is EPA’s responsibility to either use the data that is accurate, or to acknowledge that the life history data are lacking and it is not possible to accurately estimate monetary losses due to impingement and entrainment. The use of dubious estimates of life history parameters simply because they are the best data available, results in inaccurate and imprecise estimates of monetary losses. A complete discussion of the weaknesses of the life history parameter estimates and the implications of the weaknesses of these estimates is lacking in the case studies. Species for which accurate life history data are lacking should be clearly identified so that the accuracy of the monetary losses can be evaluated.

Despite years of study, many life history parameters for some fishes are not well known. However, these uncertain estimates of life history parameters are used to calculate a monetary loss due to impingement and entrainment. When monetary losses are presented, there is an implied accuracy to the estimate. There is the real risk that monetary losses will be taken out of the context of the discussion of parameter uncertainty, and presented as absolute numbers with little error associated with the estimates.

EPA Response

The commenter proposes an alternative procedure for tabulating production foregone among impinged fish. EPA believes that the proposal may have merit but maintains that the practical effect of using the alternative procedure would be negligible, for reasons described in response to Comment 316bEFR.305.003 on EPA's production foregone analysis. The commenter's suggestion is based in part on the fact that EPA’s analysis for proposal used an assumption that all impinged fish were age 1. EPA notes that this assumption has been changed, as described in response to Comment 316bEFR.029.105.

The commenter discusses the possible effects of the species aggregation methods employed by EPA. EPA used species aggregation to reduce the total number of distinct species requiring individual parameter sets because of the lack of life history data for many species, particularly survival rates of early life stages. EPA believes that the aggregations are reasonable and do not introduce significant biases. In the Regional Analysis Document (DCN# 6-0003), EPA noted which species were included in the aggregations.

The commenter asserts that EPA has improperly used age 1 equivalents in the context of estimating foregone harvest. EPA maintains that the estimates of foregone harvest do not suffer from the kinds of flaws suggested by the commenter. The commenter seems to improperly equate the technical term "age of equivalency" with "age 1 equivalent." EPA did not estimate, nor did it report, "age of equivalency" which, as the commenter correctly notes, refers to the age at which fish enter a fishery. EPA did not use its estimates of age 1 equivalents as if they were the same as "age of equivalency" equivalents. EPA's estimates of foregone harvest were based on the best available information about the age at which fish become vulnerable to the fishery which, as the commenter notes, is frequently greater than age 1.

The commenter raises concerns about survival rates and fish weights, including certain values employed and EPA's reporting methods used to document them. The Regional Analysis Document (DCN# 6-0003) includes revisions that were motivated by earlier public review and references to additional source material (see EPA’s response to Comment 316bEFR.305.003 on production foregone for additional information. EPA maintains that some degree of uncertainty is unavoidable and that the parameter sets used by EPA reflect a good faith effort to obtain the best available data.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Charles K. Wakild

On Behalf Of:

Progress Energy

Author ID Number:

316bEFR.084

Comment ID 316bEFR.084.001

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 17.08

Option: UWAG's recommended approach

CP&L & FPC preferred site-specific approaches.

CP&L and FPC believe that the environmental impacts associated with CWIS are highly site-specific and that the determination of best technology available (BTA) for minimizing adverse environmental impacts (AEI) at existing facilities should be made on a site-specific basis. Accordingly, we have concluded that any of the site-specific alternatives described in 67 Fed. Reg. 17159-166 is more appropriate and scientifically defensible than the proposed option. More specifically, we support "The Utility Water Act Group (UWAG) Approach" described starting on 67 Fed. Reg. 17162. We believe that this site-specific approach optimizes all resources and considerations for determining BTA.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.084.002

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

It should be noted that the reason the EPA is undergoing this rulemaking is because of the absence of a rule to implement § 316(b) of the Clean Water Act. EPA issued final § 316(b) regulations in 1976, which referred the permit writer to a "Development Document" that described various intake technologies, and factors to be considered in choosing the BTA for a site-specific CWIS. The 1976 site-specific rule was remanded [Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977)] on procedural grounds and not technical grounds. Therefore the site-specific technical concept was left intact and has been continued via a draft guidance document for 25 years. Examples of successful site-specific 316(b) determinations include CP&L's Brunswick Nuclear Plant, which has successfully implemented BTA technologies, and FPC's Crystal River Plant, which has successfully employed mitigation measures.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.084.003

Subject Matter Code 21.08

Burden on permitting agencies (general)

Author Name Charles K. Wakild

Organization Progress Energy

CP&L and FPC recognize that EPA has rejected site-specific approaches, in part, due to the implementation burden that is presumed to be greater on State and Federal permitting agencies than the burden imposed by EPA's proposed option. CP&L and FPC believe that this concern is unfounded and that when all requirements are considered, site-specific approaches are not more burdensome than EPA's proposed option. The current site-specific decision-making process generally requires each regulated facility to develop and conduct studies that characterize or estimate potential AEI. If AEI is determined to be occurring, the guidance presents a basis for determining the BTA for minimizing the AEI. The state regulatory and resource agencies are partners in approving the studies and conclusions. EPA's proposed rules require similar efforts. EPA's proposed option requires a characterization of the subject waterbody (including impingement and entrainment information) and a design and construction technology plan. Again state regulatory and resource agencies are partners in approving the studies and conclusions. In both scenarios, studies are conducted on the specific waterbody and compliance plans are developed. There is a possibility that the site-specific approach could even be less burdensome. Most of the site-specific options described in 67 Fed. Reg. FR 17159-1766 would target certain species ("representative indicator species" or "critical aquatic organisms") and consequently would focus state resources rather than causing the state resources to diverge in an attempt to address all species in the waterbody. Additionally with the site-specific approach, it will be determined in some cases that certain facilities are not causing AEI and no further efforts will be needed.

Lastly, CP&L and FPC do not believe that all State and Federal permitting agencies view site-specific approaches as overly burdensome. As support for our opinion, we have attached letters froth the Honorable Michael F. Easley, Governor, North Carolina (February 22,2002) and the Honorable David B. Struhs, Secretary, Florida Department of Environmental Protection (February 27, 2002) wherein both states have indicated their preference for site-specific regulatory approaches for CWIS that emphasize flexibility for state decision-making.

EPA Response

EPA has included the site-specific determination of BTA in today's final rule in addition to four other compliance alternatives. Please see response to comment 316bEFR.019.014 for a discussion of site-specific considerations.

Comment ID 316bEFR.084.004

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

CP&L and FPC support the use of previous §316(b) demonstrations.

CP&L and FPC encourage EPA to adopt a process that would allow for the use of previous §316(b) demonstrations that have determined whether or not AEI is occurring and the BTA for minimizing AEI, if needed. We believe that states should be given the flexibility to reaffirm the findings of previously conducted demonstrations if specified conditions are met. The specified conditions could include acceptable data collection and analytical methods and documentation that there have been no significant changes to either the aquatic populations affected by the CWIS or to the design, construction or operation of the permitted facility. CP&L and FPC have successfully performed several site-specific 316(b) demonstrations wherein impacts were accurately assessed and mitigative measures were appropriately deployed. Studies for the Brunswick Plant and Crystal River Plant are excellent examples.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.084.005

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 7.02

Performance standards

The proposed performance standards (80-95% reduction of impingement mortality and/or 60-90% reduction in entrainment) should not be included as numerical limits in permits. Instead CP&L and FPC believe it would be more appropriate to use the performance standards as guidelines for selecting technologies, operational measures, and restoration measures to address impingement and entrainment issues. Once the facility submits, and the agency approves, the Design and Construction Technology Plan (technologies and/or operational measures) and any proposed restoration measures, the approving agency could include a condition in the permit requiring the proper design, installation, operation and maintenance of approved technologies, operation measures, and restoration measures, rather than compliance with a numeric performance standard.

EPA's proposed option for implementing §316(b) consists of establishing performance requirements expressed as percentage reductions in impingement and entrainment compared to a baseline value. A performance requirement expressed as a percentage reduction is not realistic for either a baseline calculation or a compliance determination. A percentage by function is a ratio of one value to another. Due to the variability of the biological dynamics for fish and shellfish populations, each value in this ratio is a variable subject to diel, seasonal, and yearly fluctuations. The number of species that are to be considered further complicates this process. EPA did endeavor to address this issue of variability by assigning a range of performance percentages (e.g. reduction in impingement mortality by 80—95%). However, even a range of performance that is relative to a ratio of two variables, each of which has a large degree of variability, is impractical. To impose such requirements will lead to the need for determinations of confidence intervals around the values (be they a value of central tendency or a percentile). This can only lead to statistical complexity when determining baseline calculations and compliance with the performance standards. It is envisioned that much energy and resources will be expended arguing statistics of a somewhat arbitrary performance standard rather than determining true impacts to the environment.

EPA Response

Please see responses to comments 316bEFR.307.064, 316bEFR.311.002, 316bEFR.009.040 and 316bEFR.063.005. EPA agrees with the statistical observations in this comment. For this and other reasons, EPA has authorized, with the approval of the Director, compliance to be demonstrated pursuant to the implementation of Technology Implementation and Operation Plan rather than in relation to the performance standards.

Comment ID 316bEFR.084.006

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

The proposed performance standard for entrainment should be modified such that the standard is applicable to entrainment mortality and not all entrainment. Based on studies CP&L and FPC have conducted, we are convinced that entrained organisms can and do survive. Consistent with our reasons for preferring site-specific regulatory approaches, CP&L and FPC have observed that survival rates are species- and site-specific.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.084.007

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 7.02

Performance standards

The proposed performance standard for impingement mortality should be modified such that the standard is applicable to representative indicator species (RIS), as discussed at 67 Fed. Reg. 17,162-64, and is not applicable to all species. We believe it is not practical or desirable to design and operate an intake technology that attempts to ensure protection of all impingeable species. The identification of RIS should be done in consultation with natural resource management agency personnel who understand how the potentially impacted ecosystem functions.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.084.008

Subject Matter Code 7.02
Performance standards

Author Name Charles K. Wakild
Organization Progress Energy

The 60-90% reduction standard for entrainment should be measured either in terms of total biomass or in total numbers of organisms entrained. Most significant, CP&L and FPC do not believe it is feasible to require a facility to prove that it has reduced entrainment of every entrained species by at least 60% from a calculated baseline.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.084.009

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 7.02

Performance standards

The use of operational measures to mitigate impingement or entrainment impacts should be voluntary.

EPA Response

Today's rule does not prescribe, nor does it prohibit, any method from use by the facility in meeting the performance standards. EPA recognizes that the facility is best suited to determine for itself the most cost-effective means of achieving the required reductions in impingement mortality or entrainment.

Comment ID 316bEFR.084.010

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

CP&L and FPC support the use of restoration measures.

We are convinced that effective restoration projects have greater potential to achieve net environmental benefits for certain waterbodies than intake technologies or operational measures. Notwithstanding their potential effectiveness, we fully support EPA's belief that restoration measures should be voluntary.

EPA Response

EPA does not believe the net environmental benefits of restoration measures are necessarily higher than those of design and construction technologies and operational measures. For a discussion of ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.084.011

Author Name Charles K. Wakild
Organization Progress Energy

Subject Matter Code 21.09
Permit applications/implementation schedule

CP&L and FPC encourage EPA to allow sufficient time for permitted facilities to achieve compliance.

To accommodate existing facilities whose NPDES permit renewal application is due soon after the final rules are adopted, CP&L and FPC recommend that the effective date of the final rule be structured to allow sufficient time for permitted facilities to conduct adequate studies, develop compliance plans and construct any technology measures that may be needed. The proposed rule states that permitted facilities must comply with the rule "when an NPDES permit containing requirements. . .is issued..." The proposed rule further states that certain study information must be submitted with the NPDES permit application. EPA also presumes at 67 Fed. Reg. 17208 that the information collection activities may take as long as three years. Also, in the Economic and Benefits Analysis document on page B1-13 it is stated that facilities have to come into compliance with the proposed Phase II rule during the year their first post-promulgation NPDES permit is issued. Obviously there is a need for EPA to recognize the time (in some cases possibly years) needed by a permitted facility to complete their NPDES permit application and to come into compliance with the proposed rule. The activities involved in compiling an application include developing a study plan, obtaining approval of the plan, conducting the planned monitoring, evaluating the monitoring data, determining appropriate measures to comply with the applicable requirements, and obtaining approval of proposed compliance measures from State and Federal permitting agencies. This process could easily take three or more years. Next, the permitted facility will need time for construction of any technologies. CP&L and FPC encourage EPA to factor into the final rule, sufficient time for permitted facilities to achieve compliance.

EPA Response

See response to comment 316bEFR.045.007.

Comment ID 316bEFR.084.012

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Charles K. Wakild

Organization Progress Energy

CP&L and FPC do not support the reevaluation of previous §316(b) demonstrations at each permit renewal.

CP&L and FPC are opposed to the-proposed rule where it suggests a “comprehensive reevaluation” of the §316(b) demonstration every time a permit is renewed. We recommend that after a successful demonstration has been completed, the permit writer should accept the initial demonstration at each subsequent permit renewal, unless there have been significant changes in plant operations or adverse changes to the aquatic populations.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.084.013

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

CP&L and FPC believe that the design flow of emergency service water intakes should not be included in determining the applicability of the rule.

CP&L and FPC suggest that EPA distinguish between primary cooling water intakes and emergency service water intakes. For example, at one of CP&L's facilities, a closed cycle recirculating cooling water system (natural draft wet cooling tower) is employed as the primary means of cooling. The facility also uses an emergency, once-through service water system, which normally operates a nominal amount of time to ensure that the system is in working order. However, this emergency intake has a design capacity greater than 50 MGD. CP&L and FPC believe that the design flow of an intake that is used nominally for reliability testing should not be included when determining whether a facility is subject to the § 316 rule.

EPA Response

Please see response to comment 316bEFR.041.202.

Comment ID 316bEFR.084.014

Author Name Charles K. Wakild

Organization Progress Energy

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

CP&L is concerned that certain statements found in the preamble of the proposed rule misrepresent current impacts at its Brunswick Nuclear Plant

CP&L believes that EPA's discussion of impingement and entrainment impacts found at 67 Fed. Reg. 17137-38 contains misleading statements regarding its Brunswick Nuclear Plant. EPA asserts that "impacts attributable to impingement and entrainment at individual facilities may result in appreciable losses of early life stages of fish and shellfish (e.g., three to four billion individuals annually)." EPA also states that "a modeling effort evaluating the impact of entrainment mortality on a representative fish species in the Cape Fear estuarine system predicted a 15 to 35 percent reduction in the species population." In support of both statements, EPA cites Brunswick Station's "Historical Summary and Review of Section 316(b) Issues" prepared by EPA Region IV (1979). This information, which dates from the early stages of Brunswick operation, is out of date. CP&L took several steps many years ago to address the alleged impacts. Although it is doubtful that an adverse environmental impact would have occurred at the Brunswick facility even without mitigation, CP&L installed mitigation measures in the l980s. These include a diversion fence at the mouth of the intake canal (installed in 1982), fine mesh screens with a fish return system (1983 and 1987), and a seasonal flow-reduction schedule. Studies conducted since the installation of these mitigation measures indicate that they have significantly reduced impingement mortality and entrainment. Reductions in impingement mortality have ranged up to 97%, based on organism density, for all species. Reductions in entrainment of total organisms as a result of the combination of voluntary flow minimization and fine-mesh screens have ranged up to approximately 90 percent, depending on species and life stage. Additionally, it should be noted that recent studies show that there have been no significant changes over the past 25 years in the population densities in the Cape Fear estuary for several species allegedly impacted by the Brunswick Plant's cooling water system.

EPA Response

EPA used the data available to the agency when compiling examples of environmental impact associated with cooling water intakes for the preamble to the proposed rule. EPA thanks the commenter for the submission of this update on environmental impacts related to the Brunswick facility.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Pamela F. Faggert

On Behalf Of:

Dominion Generation

Author ID Number:

316bEFR.085

Notes

EEI (316bEFR.072), NEI (316bEFR.020), UWAG (316bEFR.041)

Comment ID 316bEFR.085.001

Subject Matter Code	21.05
	Role of States and Tribes (alt./equiv. programs)

Author Name Pamela F. Faggert

Organization Dominion Generation

Dominion strongly supports the concept that 316(b) approval authority should remain with the state permitting agencies. State agencies are best equipped from prior 316(b) activity to effectively implement the program. In addition, Dominion urges EPA to expand the rule to allow continued reliance on technically sound § 316(b) decisions (and § 316(b) State programs) that were made in the past.

EPA Response

See response to 316bEFR.025.017 for details on State program approval. Please also see response to 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

Comment ID 316bEFR.085.002

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Dominion strongly supports EPA's rejection of alternatives that would have required some or all existing facilities to install closed-cycle cooling systems (that is, cooling towers or ponds).

EPA Response

No response necessary.

Comment ID 316bEFR.085.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Pamela F. Faggert

Organization Dominion Generation

Dominion strongly supports EPA's recognition that a site-specific alternative approach is needed to establish intake requirements at sites where the costs of intake technologies are excessive, or where meeting the performance standards with the technologies is not practicable.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.085.004

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Encourage the use of existing data to minimize rule's cost impact.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

1. Sample Site-Specific Rule (p. 17159-17160)

EPA also invites comment on site-specific approaches for determining the best technology available for minimizing adverse environmental impact at existing facilities.

125.94 (a) (2) A previously conducted section 316(b) demonstration may be used to determine whether the location, design, construction and capacity of the facility's cooling water intake structure reflect best technology available for minimizing adverse environmental impact if it reflects current biological conditions in the water body and the current location and design of the cooling water intake structure. A previously conducted section 316(b) demonstration generally would reflect current conditions or circumstances if:

(i) The previous section 316(b) demonstration used data collection and analytical methods consistent with guidance or requirements of the permitting agency and/or the Administrator;

(ii) The available evidence shows that there have been no significant changes in the populations of critical aquatic species; and

(iii) The owner or operator can show there have been no significant changes in the location, design, construction, and capacity of the facility's cooling water intake structure that would lead to a greater adverse environmental impact.

DOMINION COMMENTS: If a facility has data showing that there is: (1) minimal entrainment and impingement and no discernable harm to the aquatic community, or (2) the environmental impact of entrainment and impingement is of so little economic and environmental significance that the costs of a comprehensive § 316(b) study would be significantly greater than its likely benefits, then there should be no need for either further intake evaluation or installation of additional intake technology. A provision should be added to the rule to allow a facility to make a justification that one of the conditions has been met and thus a 316(b) study is not required.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

The rule does not require a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.085.005

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.05
Role of States and Tribes (alt./equiv. programs)

Successful state § 316(b) programs should be continued.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse

Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

Section 125.96 Will Alternative State Requirements and Methodologies for Determining the Best Technology Available for Minimizing Adverse Environmental Impact Be Recognized? (p.17160)

Notwithstanding any other provisions of this subpart, if a State demonstrates to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under this subpart, the Administrator shall approve such alternative regulatory requirements.

DOMINION COMMENTS: In the proposed rule, EPA proposes to allow States to continue to use “alternative regulatory requirements” they have adopted, if they can show these requirements are “functionally equivalent” to the new federal rule - that is, if within each relevant watershed they would result in environmental performance that is comparable to the reductions in impingement mortality and entrainment that would be achieved under EPA’s proposed § 125.94(67 Fed. Reg. 17,180 col. 1-2).

EPA’s proposal appears to require that a State show that its program achieves the same percentage reductions in entrainment and impingement mortality as EPA’s performance standards (60-90% and 80-95% respectively). But a successful State program may have focused on larger-scale effects, such as impacts on fish populations or the aquatic community, and the State may know that its program has successfully protected local aquatic communities but not necessarily be able to demonstrate that, for example, entrainment has been reduced by 60-90 percent. EPA should allow States to retain proven successful programs without having to force-fit them into EPA’s new performance standards.

Many States have incorporated § 316(b) into their water permit programs by adopting the federal §316(b) language and then writing regulations or guidance that references EPA’s 1977 draft § 316(b) guidance. If a State has complied with its administrative laws and procedure in developing and implementing its § 316(b) program, the program should be eligible for consideration as “functionally equivalent” to proposed §125.94.

EPA Response

See response to comment 316bEFR.025.017.

Comment ID 316bEFR.085.006

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Pamela F. Faggert

Organization Dominion Generation

Site specific determination of Best Technology Available is preferred.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

4. Site-Specific Determination of Best Technology Available (p. 17145)

Under today's proposed rule, the owner or operator of an Phase II existing facility may demonstrate to the Director that a site-specific determination of best technology available is appropriate for the cooling water intake structures at that facility if the owner or operator can meet one of the two cost tests specified under § 125.94(c)(1).

DOMINION COMMENTS: Dominion strongly supports EPA's recognition that a site-specific alternative approach is needed to establish intake requirements at sites where the costs of intake technologies are excessive, or where meeting the performance standards with the technologies is not practicable.

The process of designing impingement and entrainment monitoring programs and selecting impact assessment methodologies is inherently site-specific. Site-specific factors are very important in determining the best approach to minimize adverse CWIS effects. Technologies that work at one location are frequently found not to work at another. The only way to accurately and appropriately select best technology available is on a site-specific basis. Site-specificity maximizes the ability to achieve the most environmentally effective and cost-effective reductions in adverse environmental impact.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.085.007

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 10.06.01
RFC: Incorp. costs/benefits without burden on Dir.

Streamline the workload for evaluating site-specific applications.

Regulatory Reference: Preamble VI Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

13. Cost Benefit Test (p. 17153)

EPA is also concerned about the potential for members of the public who object to the authority's site-specific determinations to raise challenges that must be resolved in administrative appeals that can be very lengthy and burdensome, followed in some cases by judicial challenges. An ongoing State study of permitting workloads estimates that appeals of NPDES permits issued to major facilities require 40 hours to resolve in a simple case and up to 240 hours for a very complex permit. EPA Region 1 estimates that one year is required to resolve a complex administrative appeal, involving significant amounts of technical and legal resources. Should the permit appeal be followed by a judicial challenge, EPA Region 1 estimates an additional two years or more of significant investment of technical and legal resources in one decision, with additional time and resources needed if the initial judicial decision is appealed. Again, however, EPA notes that these burdens may be small compared to the potential costs of complying with presumptive performance standards. EPA invites comments on ways to incorporate site-specific consideration of costs and benefits without undue burden on the Director. In particular, EPA invites comment on decision factors and criteria for weighing and balancing these factors that could be included in regulation or guidance that would streamline the workload for evaluating site-specific applications and minimize the potential for legal challenges.

B. Other Technology-Based Options Under Consideration

3. The Utility Water Act Group (UWAG) Approach (p. 17162)

The Utility Water Act Group (UWAG), an association of more than 100 individual electric utility companies and three national trade associations of electric utilities, provided EPA with a recommended site-specific regulatory framework, entitled "316(b) Decision Principles for Existing Facilities." UWAG's recommended approach for decision-making under section 316(b) includes the following components:

A definition of "Adverse Environmental Impact";

-Use of Representative Indicator Species (RIS) for the assessment of adverse environmental impact;

-Making decisions under section 316(b) that complement, but do not duplicate, other Federal, state, and local regulatory programs;

-Use of de minimis criteria to exempt small cooling water users that pose no appreciable risk of causing adverse environmental impact because only a small amount of cooling water is withdrawn from a water body at a location that does not require special protection;

-Determination of adverse environmental impact or its absence using the facility's choice of three methods, either alone or in combination: (1) Use of previously conducted section 316(b) demonstrations that are still valid in light of current circumstances; (2) use of ecological risk assessment by means of demonstration of no appreciable risk of adverse environmental impact using conservative decision criteria; or (3) assessment of risk using a structured decision making process consistent with EPA's Ecological Risk Assessment Guidelines;

-A "maximize net benefits" approach for selecting the best technology available for minimizing adverse environmental impact;

-At the option of the permittee, recognition of voluntary enhancements such as fish stocking or habitat improvements; and

-Providing data or information with NPDES permit renewal applications if new information shows that previously conducted section 316(b) demonstrations are no longer scientifically valid.

DOMINION COMMENTS: Dominion supports UWAG's 316(b) Decision Principles, because it will provide technical, legal and policy tools that will ultimately streamline the workload for evaluating site-specific applications.

EPA is concerned that site-specific decisions on environmental impact will require burdensome, time and effort by permitting agencies and therefore proposes to simplify the § 316(b) decision process by setting a numerical criterion. However EPA's criterion merely prescribes a reduction in the number of individual animals lost and thus fails to address the complexities of aquatic communities.

Without question, State and federal regulators face resource constraints. EPA's proposal makes the goal (60-90% reduction, for example) more numerically precise, to be sure. But proving that the goal is met will require permit writers to consider the effects of the same site-specific factors that have always been considered. Most of the burden of implementing a site-specific approach, conducted in accordance with a clear and consistent decision-making process like that described in UWAG's 316(b) Decision Principles, would fall on regulated facilities, not regulators. Dominion is prepared to perform studies reasonably necessary to allow scientifically and environmentally sound § 316(b) decisions. A streamlined process will provide the technical, legal, and policy tools for decision-making that were lacking in the past and as a result minimize the burden on EPA and states.

EPA Response

See Comment ID 316EFR.040.007

Comment ID 316bEFR.085.008

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 18.01.01
UWAG definition of "adverse environmental impact"

EPA should adequately define adverse environmental impact.

Regulatory Reference: Preamble VI Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

5. Discussion of Site-Specific Approach Issues and Associated Questions for Comment a. Determination of Adverse Environmental Impact

(3) Discussion of UWAG Recommendation for Determining Adverse Environmental Impact (p. 17163)

UWAG offers the following definition: Adverse environmental impact is a reduction in one or more representative indicator species (RIS) 61 that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure.

DOMINION COMMENTS: Section 316(b) cannot be implemented effectively unless there is a definition of "adverse environmental impact." "Adverse environmental impact" cannot mean harm to a single fish or a single egg; it must mean harm at the population or community level. Dominion supports UWAGts recommended definition of "adverse environmental impact": Adverse environmental impact is a reduction in one or more representative indicator species that (1) creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) this negative impact is attributable to the operation of the cooling water intake structure.

At many electric generating facilities, there is already a high degree of confidence that the facility is not creating "adverse environmental impact" or has already installed BTA. Examples would include (1) where a facility already has performed a § 316(b) demonstration before the new § 316(b) rule I promulgated and has shown to the satisfaction of its regulatory agency that the facility complies with § 316(b), or (2) where operating experience and knowledge of the local fishery provide regulatory authorities with confidence that fish populations are not being harmed by impingement and/or entrainment.

The statute calls for minimizing "environmental impact," not eliminating entrainment and impingement mortality, so technologies should be evaluated accordingly. Fisheries should be viewed as a resource that can be managed and sustained. EPA should recognize that some losses of individual fish are not harmful to the fishery resource as a whole and that there is no reason to view losses caused by cooling water intake structures as fundamentally different from losses caused by any other human activity or natural occurrence. Great losses occur as a result of commercial fishing industry, and a rebound of striped bass populations has been witnessed upon initiation of a fishing moratorium.

EPA's § 316(b) rule should use the lessons of fisheries management science. If the impact of a facility's CWIS is in the range of impacts known by fisheries managers to be within normal variation or not of concern to the viability of the fishery, the facility is not creating "adverse environmental impact."

EPA Response

This comment is identical in nature to 316bEFR.040.008. Please see the response to that comment.

Comment ID 316bEFR.085.009

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 18.01
RFC: Definition of "adverse environmental impact"

EPA should define the term "minimal" as it pertains to entrainment and impingement losses and adverse environmental impact.

Regulatory Reference: Preamble V. Environmental Impacts Associated With Cooling Water Intake Structures

A. Facility Examples (p. 17137)

In some cases, the number of organisms impinged and entrained by a facility can be substantial and in other examples impingement and entrainment may be minimal due to historical impacts from anthropogenic activities such as stream or river channelization.

A. Facility Examples (p. 17138)

At this facility, fish impingement and entrainment by cooling water intakes were found to be minimal.

VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

C. Site-Specific Based Options Under Consideration

13. Cost Benefit Test (p. 17153)

EPA notes that at some sites, impingement and entrainment losses are minimal.

DOMINION COMMENTS: Dominion proposes that the rule include a definition for the term "minimal" since the term is often used in discussions of environmental impacts, entrainment and impingement losses (mortality) and adverse environmental impact (this is consistent with the previous comment - EPA should adequately define adverse environmental impact).

-Minimal = SMALL = Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource, i.e. population structure.

EPA Response

This comment is identical in nature to comment 316bEFR.040.009. Please see the response to that comment.

Comment ID 316bEFR.085.010

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 21.09

Permit applications/implementation schedule

The rule should be implemented through permit requirements.

Regulatory Reference: Preamble VII. Implementation

B. What Information Must I Submit to the Director When I Apply for My Reissued NPDES Permit?

4. Comprehensive Demonstration Study

a. Proposal for Information Collection (p. 17175)

The proposed rule does not specify particular timing requirements for your information collection proposal, but does require review and approval of the proposal by the Director. In general, EPA expects that it would be submitted well in advance of the other permit application materials, so that if the Director determined that additional information was needed to support the application, the facility would have time to collect this information, including additional monitoring as appropriate.

DOMINION COMMENTS: The permittee, as part of its permit application package, should be allowed to propose a schedule for developing the data collection plan, to get the plan approved by the state's permitting authority, to collect and analyze the data, to use the data to assess technologies, and to prepare the BTA recommendation. After being reviewed and approved by the state's permitting agency, this process would be written as a permit condition.

Once the data are collected and the BTA selection has been made, the permit would be modified. The §316(b) rule should make it clear that reasonable time for state agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. In the case of a permit that is reissued prior to the submission of the required studies, the rule leaves to the Director's discretion whether to modify the permit to include section 316(b) requirements based on those studies or to wait for permit reissuance. EPA notes, however, that the initial permit must include section 316(b) requirements determined on a BPJ basis.

Comment ID 316bEFR.085.011

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.09
Permit applications/implementation schedule

Reasonable compliance schedules are necessary.

Regulatory Reference: Preamble VII. Implementation

C. How Would the Director Determine the Appropriate Cooling Water Intake Structure Requirements? (p. 17178)

If the Director determines that the Comprehensive Demonstration Study submitted does not demonstrate that the technologies, operational measures, and supplemental restoration measures employed would achieve compliance with the applicable performance standards, the Director may issue a permit requiring such compliance. If such studies are approved and a permit is issued but the Director later determines, based on the results of subsequent monitoring, that the technologies, operational measures, and supplemental restoration measures did not meet the rule standards, the Director could require the existing facility to implement additional technologies and operational measures as necessary to meet the rule requirements. In general, this would occur at the next renewal of the permit. The Director would also review the facility's Technology Verification Plan for post-operational monitoring to demonstrate that the technologies are performing as predicted.

DOMINION COMMENTS: If EPA were to make the new § 316(b) rule immediately applicable, it would lead to even more delay in the NPDES permitting process than currently exists. The available consultants skilled in biological monitoring and intake technology design undoubtedly would be overwhelmed with work and would have to put many licensees on waiting lists. Negotiations over consent orders might bog down the permit process in some States, and the backlog of unprocessed NPDES permit applications would grow worse. Reasonable compliance schedules are a matter of administrative necessity as well as of fairness to state regulators and permittees.

The permittee, as part of its permit application package, should be allowed to propose a schedule for developing the data collection plan, to get the plan approved by the state's permitting authority, to collect and analyze the data, to use the data to assess technologies, and to prepare the BTA recommendation. After being reviewed and approved by the state's permitting agency, this process would be written as a permit condition.

EPA Response

See response to comment 316bEFR.085.010.

Comment ID 316bEFR.085.012

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.09
Permit applications/implementation schedule

Permits should have technology “upset” and “bypass” provisions.

Regulatory Reference: Preamble VII. Implementation

E. How Would Compliance Be Determined? (p. 17180)

This proposed rule would be implemented by the Director placing conditions consistent with this proposed rule in NPDES permits. To demonstrate compliance, the proposed rule would require that the following information be submitted to the Director:

Data submitted with the NPDES permit application to show that the facility is in compliance with location, design, construction, and capacity requirements;

Compliance monitoring data and records as prescribed by the Director. Proposed § 125.97 would require existing facilities to keep records and report compliance monitoring data in a yearly status report. In addition, Directors may perform their own compliance inspections as deemed appropriate (see CFR 122.41).

DOMINION COMMENTS: The permit should have a provision analogous to EPA’s “upset” and “bypass” provisions in the NPDES permit regulations to allow an intake technology to be temporarily bypassed if necessary for plant operation. For example, if the screens are fouled so as to jeopardize plant operation, the permittee should be allowed to bypass them until they can be cleared. Similarly, if because of emergency conditions water levels in a reservoir are reduced to the point where technologies are inoperative, bypassing to allow continued operation should be allowed. Such exceptional bypasses should be allowed only for short periods of time, until the emergency has passed and the permittee has had time to restore the intake technology to proper operation. As for any exceptional event, the permittee would be required to report the circumstances of the upset or bypass to the state permitting authority in a timely manner.

EPA Response

See response to comment 316bEFR.034.017.

Comment ID 316bEFR.085.013

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 21.09

Permit applications/implementation schedule

Permits should be “grandfathered” if they are due to expire very near the application deadline.

Regulatory Reference: Preamble VII. Implementation

A. When Does the Proposed Rule Become Effective? (p. 17173)

Phase II existing facilities subject to today’s proposed rule would need to comply with the Subpart I requirements when an NPDES permit containing requirements consistent with Subpart J is issued to the facility. See proposed § 125.92. Under existing NPDES program regulations, this would occur when an existing NPDES permit is reissued or, when an existing permit is modified or revoked and reissued.

DOMINION COMMENTS: For a facility whose permit renewal application is undergoing agency review when the § 316(b) rule becomes effective, the permittee should not have to resubmit its application. In such a case, the subsequent permit renewal process should trigger the permittee’s compliance with the new rule requirements.

Similarly, if the new rule becomes effective when a permittee is very near the time when its renewal application is due (for example, between 365 and 180 days before the permit expires), it would be almost as unreasonable to require the permittee to adjust its application process in midstream. The practical difficulties in preparing a permit application, especially if biological monitoring is needed, suggest that the new rule should not apply until the succeeding permit term, to any permittee that has one year or less until its permit expires when the rule takes effect

EPA Response

EPA has clarified timing requirements for the submittal of the required studies and permit compliance issues in today's final rule. See response to comment 316bEFR.034.066 for a discussion. See also response to comments 316bEFR.021.006 and 316bEFR.035.019.

Comment ID 316bEFR.085.014

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration measures could be employed in lieu of, or in combination with other measures.

Regulatory Reference: Subpart J—Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

§ 125.94 How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?

(d) Restoration Measures. (p. 17221-17222) In lieu of, or in combination with, reducing impingement mortality and entrainment by implementing design and construction technologies or operational measures to comply with the performance standards specified in paragraph (b) of this section or the Director's determination pursuant to paragraph (c) of this section, you may, with the Director's approval, employ restoration measures that will result in increases in fish and shellfish in the watershed. You must demonstrate to the Director that you are maintaining the fish and shellfish within the waterbody, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures to meet that portion of the requirements of paragraphs (b) or (c) of this section that you are meeting through restoration. Your demonstration must address species that the Director, in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by your cooling water intake structure, identifies as species of concern.

DOMINION COMMENTS: Dominion supports allowing permittees, on a voluntary basis, to employ restoration measures in lieu of, or in combination with other technologies or operational measures that will result in increases in fish and shellfish species of concern in the watershed. We support the idea of providing improvements to populations using proven technologies and/or strategies, if they are warranted.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR060.022.

Under the final rule, restoration measures may be used in lieu of or as a supplement to design and construction technologies and/or operational measures.

Comment ID 316bEFR.085.015

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

5. What Is the Role of Restoration Under Today's Preferred Option? (p. 17146) EPA also seeks comment on the most appropriate spatial scale under which restoration efforts should be allowed "should restoration measures be limited to the waterbody at which a facility's intakes are sited, or should they be implemented on a broader scale, such as at the watershed or State boundary level.

DOMINION COMMENTS: Dominion supports expanded state-wide and even interstate watershed spatial boundaries for restoration projects. This approach appropriately provides the flexibility to locate a restoration project in an area that may provide greater overall environmental benefit and/or enhance an ecosystem that may benefit more than the area in the near proximity of a facility's intakes.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.085.016

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 11.07
RFC: Restoration above BTA level

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

5. What Is the Role of Restoration Under Today's Preferred Option? (p. 17147)

EPA recognizes that substantial information exists regarding wetlands mitigation and restoration. For example, tools and procedures exist to assess wetlands in the context of section 404 of the Clean Water Act. However, restoration of other aquatic systems such as estuaries is complex and continues to evolve. EPA seeks comment on how it may measure the success or failure of restoration activities given the high degree of uncertainty associated with many areas of this developing science and that many of these activities do not produce measurable results for many months or years after they are implemented. For these reasons, EPA requests comment on whether to require that a facility using restoration measures restore more fish and shellfish than the number subjected to impingement mortality or entrainment. EPA believes that restoring or mitigating above the level that reflects best technology available for minimizing adverse environmental impact (e.g., restocking higher numbers of fish than those impinged or entrained by facility intakes or restoring aquatic system acreages at ratios greater than one-to-one) would help build a margin of safety, particularly when the uncertainties associated with a particular restoration activity are known to be high.

The concept of compensatory mitigation ratios being greater than one-to-one is found in other programs. For example, under the CWA section 404 program no set mitigation ratio exists, however, current policies require no net loss of aquatic resources on a programmatic basis. The permitting authority often requires permit applicants to provide more than one-to-one mitigation on an acreage basis to address the time lapse between when the permitted destruction of wetlands takes place and when the newly restored or created wetlands are in place and ecologically functioning. The permit may also require more than one-to-one replacement to reflect the fact that mitigation is often only partially successful. Alternatively, in circumstances where there is a high confidence that the mitigation will be ecologically successful, the restoration/ creation has already been completed prior to permitted impacts, or when the replacement wetlands will be of greater ecological value than those they are replacing, the permitting authority may require less than one-to-one replacement

DOMINION COMMENTS: Dominion does not support a requirement to restore populations above the level of BTA. However, a facility should receive credit if the restoration effort achieves this status during the verification monitoring period and should become eligible to negotiate for reduced monitoring.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to satisfy the requirements of the final rule, see EPA's responses to comments 316bEFR.060.026 and 316bEFR.212.001.

Any restoration measure must meet all the requirements described in the final rule.

Comment ID 316bEFR.085.017

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.05
Role of States and Tribes (alt./equiv. programs)

Approval authority should remain with the state permitting agencies.

Regulatory Reference: Preamble VI. Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities

A. What Is the Best Technology Available for Minimizing Adverse Environmental Impact at Phase II Existing Facilities?

11. State or Tribal Alternative Requirements That Achieve Comparable Environmental Performance to the Regulatory Standards Within a Watershed (p.17151-17152)

In § 125.90, today's proposal includes an alternative where an authorized State or Tribe may choose to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions in impingement mortality and entrainment that would otherwise be achieved under § 125.94. If a State or Tribe can successfully make this demonstration, the Administrator is to approve the State or Tribe's alternative regulatory requirements. EPA is proposing that such alternative requirements achieve comparable performance at the watershed level, rather than at larger geographic scales or at the individual facility-level, to allow States and Tribes greater flexibility and, potentially, greater efficiency in efforts to prevent or compensate for impingement mortality and entrainment losses, while still coordinating those efforts within defined ecological boundaries where the increased impacts are directly offset by controls or restoration efforts. Requiring performance level assessment to take place at the watershed level ensures that facility mitigation efforts take the overall health of the waterbody in the target watershed into account. The Agency requests comment on all aspects of this approach, including the appropriate definition of watershed.

EPA also recognizes that States sometimes assign higher priority to protecting some waters over others. This may be due to the exceptional environmental, historic, or cultural value of some waters, or conversely to a concern with multiple stresses already occurring in a watershed. It could also be based on the presence of individual species of particular commercial, recreational, or ecological importance. For these reasons, States with alternative requirements might choose to provide more protection that would be achieved under § 125.94 in some watersheds and less protection in others. Under current language in proposed § 125.90, States could not use such an approach because they would not be able to demonstrate comparable environmental performance within each watershed. EPA requests comment on whether it should instead allow States to demonstrate comparable environmental performance at the State level, thus allowing States the flexibility to focus protection on priority watersheds. The standard provided in proposed §125.90 for evaluating alternate State requirements is "environmental performance that is comparable to the reductions that would otherwise be achieved under § 125.94." EPA recognizes that it may not always be possible to determine precisely the reductions in impingement and entrainment associated with either § 125.94 or the alternate State requirements, particularly at the watershed level or State-wide. Furthermore, alternate State requirements may provide additional environmental benefits, beyond impingement and entrainment reductions that the State may wish to factor into its comparability demonstration. However, in making this demonstration, the State should make a reasonable effort to estimate impingement and entrainment reductions that would occur under § 125.94 and under its alternate requirements, and should clearly identify any other environmental benefits it is taking into account and explain how their comparability to impingement and entrainment reduction under §125.94 is being evaluated. EPA invites comment on the most appropriate scale at which to define a watershed to reflect the variability of the nature of the ecosystems impacted by cooling water intake structures within a State or Tribal area and on methods for ensuring ecological comparability within watershed-level assessments. EPA also invites comment on whether defined watershed boundaries for the purpose of section 316(b) programs should lie entirely within the political boundaries of a Tribe or State unless adjoining States and/or Tribes jointly propose to establish alternative regulatory requirements for shared watersheds.

DOMINION COMMENTS: Dominion supports giving state agencies the flexibility to focus their protection effort on priority watersheds. States also should be allowed to demonstrate overall comparable environmental performance at the State level instead of at the watershed level. Streamlined decision-making is inextricably linked with preserving state authority. Where a state has already made a careful determination of the best technology available for a particular intake, a change in the state's decision is warranted only if there has been a significant change in circumstance since the determination was made.

EPA Response

See response to 316bEFR.023.001 for a discussion on State program approval and response to 316bEFR.040.001 for details on the use of historical BTA determinations.

Comment ID 316bEFR.085.018

Author Name Pamela F. Faggert

Organization Dominion Generation

Subject Matter Code 7.02

Performance standards

EPA should clarify the definition of calculation baseline.

Regulatory Reference: Subpart J—Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

§ 125.93 What special definitions apply to this subpart? (p. 17220)

Calculation baseline means an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls.

DOMINION COMMENTS: EPA should clarify the definition of "calculation baseline" by assuming that the baseline plant is equipped with standard 3/8-inch mesh screens and the hypothetical baseline intake has the similar cooling water requirements as the actual facility.

EPA Response

In response to comments that the proposed definition for the calculation baseline was overly vague, EPA published in the NODA a series of additional specifications aimed at clarifying the definition of the calculation baseline. These specifications are as follows and are included in today's final rule at § 125.93.

1. Baseline cooling water intake structure is located at, and the screen face is parallel to, the shoreline. EPA believes it is appropriate to allow credit in reducing impingement mortality from screen configurations that employ angling of the screen face and currents to guide organisms away from the structure before they are impinged.

2. Baseline cooling water intake structure opening is located near the surface of the source waterbody. EPA believes it is appropriate to allow credit in reducing impingement mortality or entrainment due to placement of the opening in the water column.

3. Baseline cooling water intake structure has a traveling screen with the standard 3/8 inch mesh size commonly used to keep condensers free from debris. This allows a more consistent estimation of the organisms that are considered "entrainable" vs. "impingeable" by specifying a standard mesh size that can be related to the size of the organism that may potentially come in contact with the cooling water intake structure.

4. Baseline practices and procedures are those that the facility would maintain in the absence of any operational controls implemented in whole or in part for the purpose of reducing impingement mortality and entrainment. This recognizes and provides credit for any operational measures,

including flow or velocity reductions, a facility had adopted that reduce impingement mortality or entrainment.

Comment ID 316bEFR.085.019

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 7.02
Performance standards

The methods of measuring the calculation baseline should be redefined.

Regulatory Reference: Preamble VII. Implementation

B. What Information Must I Submit to the Director When I Apply for My Reissued NPDES Permit?

4. Comprehensive Demonstration Study

(d) Design and Construction Technology Plan (p. 17176)

Reductions in impingement mortality and entrainment from this calculation baseline as a result of any design and construction technologies already implemented at your facility would be added to the reductions expected to be achieved by any additional design and construction technologies that would be implemented in order to determine compliance with the performance standards. Facilities that recirculate a portion of their flow may take into account the reduction in impingement mortality and entrainment associated with the reduction in flow when determining the net reduction associated with existing technology and operational measures. This estimate must include a site-specific evaluation of the suitability of the technology(ies) based on the species that are found at the site, and/or operational measures and may be determined based on representative studies (i.e., studies that have been conducted at cooling water intake structures located in the same waterbody type with similar biological characteristics) and/or site-specific technology prototype studies. If your facility already has some existing impingement mortality and entrainment controls, you would need to estimate the calculation baseline. This calculation baseline could be estimated by evaluating existing data from a facility nearby without impingement and/or entrainment control technology (if relevant) or by evaluating the abundance of organisms in the source waterbody in the vicinity of the intake structure that may be susceptible to impingement and/or entrainment.

DOMINION COMMENTS: The preamble to the proposed rule says that the calculation baseline could be estimated by evaluating existing data from a nearby facility. This method should be written into the rule itself with some clarification. The representative facility need not necessarily be “nearby” or even on the same waterbody. A permittee should be able to use fish or larval abundance data from power plant locations similar to its own to estimate how much impingement mortality and entrainment would occur with no reduction controls. Also, a permittee should be allowed to do upstream studies in an area near the intake to predict baseline impingement mortality and entrainment.

EPA Response

Please see response to comments 316bEFR.018 and 316bEFR.063.022.

In addition, the final rule authorizes use of data from your facility or another facility with comparable design, operational, and environmental conditions. This should address the commenter's concerns.

Comment ID 316bEFR.085.020

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Pamela F. Faggert
Organization Dominion Generation

§ 316(b) should be a one-time only requirement.

Regulatory Reference: Subpart J—Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

§ 125.98 As the Director, what must I do to 'comply with the requirements of this subpart?

(a) Permit Application. (p. 17224)

As the Director, you must review materials submitted by the applicant under 40 CFR 122.21(R) and § 125.95 before each permit renewal or reissuance.

(1) After receiving the permit application from the owner or operator of a Phase II existing facility, the Director must determine which of the standards specified in § 125.94 to apply to the facility. In addition, the Director must review materials to determine compliance with the applicable standards.

(2) At each permit renewal, the Director must review the application materials and monitoring data to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit.

DOMINION COMMENTS: Once "best technology available" is determined for a plant, installing and operating that technology ought to relieve the plant of further §316(b) obligations unless or until the plant is significantly modified. The "location, design, construction, and capacity" of the cooling water intake structures are matters of design and construction, not operation. Congress could not have intended that power plants be in the business of redesigning, demolishing, and reconstructing their physical plant every five or ten years. The most- appropriate way to apply §316(b) would a one-time review designed to achieve minimal "adverse environmental impact" at a reasonable cost.

EPA's proposed rule suggests a "comprehensive reevaluation" of the § 316(b) demonstration every time a permit is renewed. Once a successful § 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be sufficient. Dominion suggests that § 125.98(a)(2) be changed as follows: "Unless there have been significant changes in plant operations or adverse changes to the aquatic population, after a successful demonstration of compliance with EPA's performance standards, at each subsequent permit renewal the permit writer should accept the initial demonstration."

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.085.021

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.03
Monitoring requirements

Compliance monitoring should verify BTA efficiency.

Regulatory Reference: Preamble VII. Implementation

D. What Would I Be Required To Monitor? (p. 17179)

Proposed § 125.96 provides that Phase II existing facilities would have to perform monitoring to demonstrate compliance with the requirements of § 125.94 as prescribed by the Director. In establishing such monitoring requirements, the Director should consider the need for biological monitoring data, including impingement and entrainment sampling data sufficient to assess the presence, abundance, life stages, and mortality (including eggs, larvae, juveniles, and adults) of aquatic organisms (fish and shellfish) impinged or entrained during operation of the cooling water intake structure. These data could be used by the Director in developing permit conditions to determine whether requirements, or additional requirements, for design and construction technologies or operational measures should be included in the permit. The Director should ensure, where appropriate, that any required sampling would allow for the detection of any annual, seasonal, and diel variations in the species and numbers of individuals that are impinged or entrained. The Director should also consider if a reduced frequency in biological monitoring may be justified over time if the supporting data show that the technologies are consistently performing as projected under all operating and environmental conditions and less frequent monitoring would still allow for the detection of any future performance fluctuations. The Director should further consider whether weekly visual or remote or similar inspections should be required to ensure that any technologies that have been implemented to reduce impingement mortality or entrainment are being maintained and operated in a manner that ensures that they function as designed. Monitoring requirements could be imposed on Phase II existing facilities that have been deemed to meet the performance standard in § 125.94(b)(l) to the extent consistent with the provisions of the NPDES program.

DOMINION COMMENTS: Dominion recommends that after a verification monitoring period, the data should be analyzed to determine whether the newly installed technology is indeed achieving the projected 80-95% reduction in impingement mortality and 60-90% reduction in entrainment As long as the data shows performance within these ranges, the technology should be deemed to comply with the rule. Assuming the data showed performance within the ranges given, then biological monitoring requirements should be significantly reduced. Thereafter, the permittee should be required only to monitor and document that it continues to operate and maintain the technology.

On the other hand, if the initial monitoring showed that the technology was not meeting the performance standards, then a period of additional study should be provided to determine why projected reduction targets are not being met and what should be done to fix it. Once the permittee had demonstrated that the technology performed within the performance standard ranges, it would have only to maintain and operate the same technology for the life of the plant and would not have to make repeated demonstrations. This is a reasonable proposal, given that § 316(b) is a construction-oriented requirement and that fish populations are highly variable and subject to many stresses other than cooling water intakes.

EPA Response

Please see EPA's response to comment 316bEFR.041.119.

Comment ID 316bEFR.085.022

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 21.03
Monitoring requirements

Two years of verification monitoring could be shortened.

Regulatory Reference: Subpart J—Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act

§ 125.95 As an owner or operator of a Phase II existing facility, what must I collect and submit when I apply for my reissued NPDES permit?

(b) Comprehensive Demonstration Study

(7) Verification Monitoring Plan. (p. 17178)

You must include in the Study a plan to conduct, at a minimum, two years of monitoring to verify the full-scale performance of the proposed or implemented technologies, operational measures, or restoration measures. The verification study must begin once the technologies, operational measures, and restoration measures are implemented and continue for a period of time that is sufficient to demonstrate that the facility is reducing the level of impingement and entrainment to the levels documented pursuant to paragraphs (b)(4)(iii), (b)(5)(ii), and/or (b)(6)(iii)(B) of this section. The plan must describe the frequency of monitoring and the parameters to be monitored and the basis for determining the parameters and the frequency and duration for monitoring. The plan must also describe the information to be included in a yearly status report to the Director. The Director will use the verification monitoring to confirm that you are meeting the applicable requirements of § 125.94.

DOMINION COMMENTS: A two-year period of verification monitoring is excessive and unnecessary. If a plant had already collected abundant data and no change to the plant was required by the new rule, then this period should be shortened to a maximum of one year or waived.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.085.023

Author Name Pamela F. Faggert
Organization Dominion Generation

Subject Matter Code 18.01
RFC: Definition of "adverse environmental impact"

Dominion suggests assigning a three-level standard of significance to the definition of adverse environmental impact - SMALL, MODERATE or LARGE - used by the Nuclear Regulatory Commission to evaluate environmental issues and developed using the Council on Environmental Quality guidelines.

-SMALL - Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource, i.e. population structure.

-MODERATE - Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

-LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

If a facility had determined that impingement or entrainment losses are SMALL or MODERATE, the facility should be eligible for a site-specific determination of best available technology independent of whether either of the cost tests for site-specific determination have been met.

EPA Response

This comment is identical in nature to comment 316bEFR.040.023. Please see the response to that comment.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Keith M. Stephens

On Behalf Of:

Alabama Electric Cooperative, Inc.

Author ID Number:

316bEFR.086

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.086.001

Subject Matter Code 3.03

Definition: Waters of the U.S.

Author Name Keith M. Stephens

Organization Alabama Electric Cooperative, Inc.

Cooling Lakes and Ponds

Although AEC does not have a surface impoundment that serves as a cooling lake or pond, EPA should consider any such impoundment as a treatment system and not “Waters of the United States”, thereby exempting a facility with this type impoundment from the 316(b) regulations. Even if EPA decides not to designate such type surface impoundment as a treatment system, EPA should determine that a cooling system using any such surface impoundment constitutes a “closed-cycle recirculating system” and is, therefore, in compliance with the 316(b) rules.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.086.002

Author Name Keith M. Stephens

Organization Alabama Electric Cooperative, Inc.

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Cost - Benefit Test

The cost-benefit test is the key to the successful implementation or failure of this rule. If EPA adopts their framework as proposed, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.086.003

Author Name Keith M. Stephens
Organization Alabama Electric Cooperative, Inc.

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

"Significantly Greater"

The proposal provides for a site-specific determination of the "best technology available" if the costs of compliance at a site would be "significantly greater" than either the benefits of meeting the performance standards or the cost of what the agency considered. EPA must provide a clear definition of what is meant by "significantly greater." To maximize net benefits to society, economic theory would dictate that this should be interpreted to mean any cost benefit ratio greater than 1:1. This reflects the most cost-effective, performance-based outcome.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.086.004

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Keith M. Stephens

Organization Alabama Electric Cooperative, Inc.

Application to Existing Facilities

The proposal should include a process for approving existing intake technologies as “best available” if it can be shown that the facility is not causing adverse environmental impact or the technologies have been deemed “best available” by the state. Such a process is reasonable since Section 316(b) has been in effect since 1972 and has been implemented case-by-case at many sites. There are many electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impacts or that it has already installed the best technology available. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for either further studies or for additional intake technology.

EPA Response

See response to 316bEFR.006.004.

Comment ID 316bEFR.086.005

Author Name Keith M. Stephens

Organization Alabama Electric Cooperative, Inc.

Subject Matter Code 21.04

Determination of compliance

Compliance Assessment

Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the "best available", the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see EPA's response to comment 316bEFR.081.006.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

David Schlissel, et al

On Behalf Of:

Synapse obo Riverkeeper, Inc.

Author ID Number:

316bEFR.087

Comment ID 316bEFR.087.001

Subject Matter Code 1.01

Comment period

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

We were not able to gain access to critical analyses and data needed to evaluate the proposed Phase II Existing Facilities Rule (“Phase II Rule) and the alternative regulatory options because this information has been designated as Confidential Business Information.

EPA Response

EPA is obligated to comply with the confidential business information requirements specified in 40 CFR Part 2, subpart B. EPA believes, however, that there was considerable data and information in the public record, including discussion of the rationale, methodologies and assumptions underlying this rule, that provided a meaningful opportunity for public participation.

Comment ID 316bEFR.087.002

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

There would be no adverse impact on electric system reliability from the implementation of the proposed Phase II Rule, the All Cooling Tower Option (Federal Register Option 1) or the Waterbody/Capacity-Based Option (Federal Register Option 3).

EPA Response

Please refer to the response to comment 316bEFR.087.010 in subject matter code 9.03.

Comment ID 316bEFR.087.003

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

The EPA analyses over-estimate the amount of capacity that would be retired under the All Cooling Towers and Waterbody/Capacity-Based Options.

EPA Response

Please refer to the response to comment 316bEFR.087.011 in subject matter code 9.03.

Comment ID 316bEFR.087.004

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.02

Economic impacts on consumers/households

The costs of complying with the alternative regulatory options that would require cooling towers would be minor in the context of overall electricity costs to consumers.

EPA Response

EPA's decision to reject cooling towers was based on a number of factors, the most important of which was the total costs involved for facilities to make these retrofits. Even if its true that secondary effects (i.e., those experienced by the consumer) would be "minor" the very high capital costs, coupled with the energy penalty and other considerations, persuaded EPA that cooling towers were not the BTA for minimizing adverse environmental impact for the category of existing facilities as a whole. See also the preamble to the final rule.

Comment ID 316bEFR.087.005

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.0

Costs

The EPA's predicted costs of complying with the alternative regulatory options are significantly overstated.

EPA Response

See response to comment 316b.efr.087.013.

Comment ID 316bEFR.087.006

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

There appears to be a contradiction between the definitions of "repowering" in EPA's Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule ("EBA") and the Technical Development Document and the Federal Register Notice.

EPA Response

See Comment ID 316EFR.087.014.

Comment ID 316bEFR.087.007

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

The EPA appears to have failed to consider the potential for the repowering of older, coal-fired facilities to use combined cycle technology.

EPA Response

See Comment ID 316EFR.087.014.

Comment ID 316bEFR.087.008

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

The cost-to-revenue analyses presented in the EBA appear to overstate the magnitude of compliance costs relative to facility-level and firm-level revenues.

EPA Response

Please refer to the response to comment 316bEFR.087.016 in subject matter code 9.01.

Comment ID 316bEFR.087.009

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 1.01

Comment period

Data Availability

We were not able to gain access to critical analyses and data needed to evaluate the proposed Phase II Rule and the alternative regulatory options because this information has been designated as "Confidential Business Information" ("CBI"). In particular, it is impossible to identify, let alone assess the reasonableness of, the individual facility and firm level costs and reliability impacts of the proposed rule and the alternative options because (1) we cannot determine which individual facilities and firms would be affected by the alternative regulatory options and (2) there is insufficient non-CBI information to allow any detailed plant or firm-specific assessment of the analyses provided by the EPA. It also is impossible to assess how realistically the IPM models the effect of the various regulatory options because so much of the underlying information has been designated CBI.

EPA Response

Please see EPA's response to comment 316bEFR.087.001.

Comment ID 316bEFR.087.010

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Reliability Impacts

Finding: There would be no adverse impact on electric system reliability from the implementation of the proposed Phase II Rule, the All Cooling Tower Option (Federal Register Option 1) or the Waterbody/Capacity-Based Option (Federal Register Option 3).

The installation of the Impingement and/or Entrainment ("I&E") controls that would be required under the proposed Phase II Rule would have no energy penalty or any effect on facility reliability and availability. Affected facilities would not have any incremental outage time to install these measures because they can be installed while the plant is in operation or during normally scheduled maintenance downtime. Thus, electric system reliability would not be affected by the installation of I&E controls at affected facilities.

Consequently, only the regulatory options requiring the installation of Flow Reduction Technologies could potentially have any impacts on electric system reliability. However, as explained below, even these more aggressive options would only have negligible impacts on system reliability.

As shown in Table B8-1 in the EBA, under the Waterbody/Capacity-Based Option a total of 52 facilities, representing 5.9 percent of National Pre-Run Capacity, would have to add cooling towers. However, EPA has assumed that the new cooling towers could be built while an affected facility is operating and that the attachment of the new tower to the existing cooling system would have only a one-time effect, extending a planned maintenance outage by one month. Therefore, if the transition took place over five years and the extra month of downtime occurred randomly throughout the year, the total 5.9 percent affected capacity actually would become an average reduction in national generating capacity at any one time of only 0.1 percent. <FN 1> Such a minor reduction in available capacity would have no effect on the reliability of the national electric system during the five-year transition period, especially considering the 26-percent summer 2005 and the 53-percent winter 2005/2006 reserve margins projected by NERC. <FN 2>

Moreover, the cooling system conversions would undoubtedly be scheduled to occur preferentially during the off-peak seasons when system loads are lower and capacity reserves and reserve margins are much higher. Therefore, the implementation of this option would have even less of an effect on electric system reliability than even these minor impacts would suggest.

The same would be true for the individual regional NERC electric systems. For example, Table B8-1 reveals that, when considered on a regional basis, the maximum fraction of generating capacity that would be affected by the Waterbody/Capacity-Based Option would be 16.7 percent in both the FRCC and the NPCC NERC regions. However, if the transition were planned to take place over five years with the extra month of downtime spread throughout the year, this 16.7 percent of affected capacity would become an average reduction of only 0.3 percent in the amount of capacity available in each of these regions. <FN 3> Again, this extremely minor decrease in the amount of generating capacity that would be available during the five-year transition period would not have any adverse effect on electric system reliability in the FRCC and NPCC NERC regions given the 23.1 percent (FRCC) and 28.2 percent (NPCC) reserve margins forecast for these regions for the summer of 2005. <FN 4> The proposed Waterbody/Capacity Based Option would have even less of an effect on electric system reliability in the other NERC Regions where EPA estimates that significantly less generating capacity would be affected. <FN 5>

The implementation of the Dry Cooling Option (EBA Option 5) would have similarly minor impacts on the amounts of electric generating capacity that would be available at any one time during the five year transition period and, therefore, also would not have an adverse effect on electric system reliability.

Under the All Cooling Towers Option, 416 facilities representing 33.1 percent of National generating capacity would have to add cooling towers. But the facility outages required to connect these new cooling towers also could be scheduled to occur throughout the five-year transition period. As a result, on average, only 0.5 percent of the nation's electric generating capacity would be out of service at any one time as a result of the implementation of this regulatory alternative. <FN 6> As noted above, such a minor reduction in available capacity would have no effect on the reliability of the national electric system during the five-year transition period considering the 26-percent summer 2005 and the 53-percent winter 2005/2006 reserve margins projected by NERC. <FN 7>

At the same time, only 0.75 percent of the generating capacity in the ECAR and NPCC regions, on average, would be out of service at any one time. <FN 8> An even smaller percentage of the generating capacity would be out of service at any one time, on average, in the other NERC regions as a result of the implementation of the All Cooling Towers Option.

As noted above, this assumes that the extra downtime needed to connect the new cooling towers would be spread evenly throughout the year. It is far more likely that the extra downtime would be preferentially scheduled to occur during the off-peak seasons when system loads are lower and capacity reserves and reserve margins are significantly higher. As a result, the implementation of the All Cooling Towers Option would have even less of an effect on national and regional electric system reliability than these figures would suggest.

The EPA also assumes that there would be continuing energy penalties from the conversion to recirculating systems with wet or dry cooling towers. <FN 9> However, the reductions in net plant capacity from such conversions would have a negligible effect on electric system reliability, as shown by the EPA itself. For example, Table B8-3 in the EBA reveals that implementation of the Waterbody/Capacity-Based Option would reduce the total national domestic generating capacity in 2013 by about 800 MW which would be only a 0.1 percent reduction from EPA's estimated 922,740 MW. The same Table reveals that implementation of the All Cooling Towers Option would reduce the total national domestic generating capacity in 2013 by only 3,380 MW, or only 0.4 percent. Clearly, such minor reductions would not have a significant impact on electric system reliability.

However, there are a number of reasons why even these extremely minor reductions in available capacity overstate the effect that the implementation of either the All Cooling Towers or the Waterbody/Capacity-Based Options would have on electric system reliability.

First, the EPA analyses significantly understate the amount of generating capacity that should be available during and after the five-year transition period. For example, EPA assumes that there would be 941,990 MW of national generating capacity in 2008. <FN 10> This is more than 200,000 MW less than the 1,045,335 MW of generating capacity forecast by the individual NERC regions and approximately 178,000 MW less than NERC's Reliability Assessment Subcommittee believes to be the "most likely scenario going forward." <FN 11>

The EPA then appears to make the extremely unrealistic and unreasonable assumption that the amount of national generating capacity actually will decrease from 941,990 MW in 2008 to 922,740 MW in 2013. <FN 12> Such an assumption is entirely unwarranted and unrealistic in light of the tremendous growth in electric generating capacity projected for the period 2001 through 2010. For example, the NERC assumes that approximately 134,000 MW of new capacity will be added nationally by 2010. <FN 13> There is no basis to expect that this growth will end and that the amount of generating capacity actually will decrease after 2010.

Second, the EPA analyses ignore the additional capacity that would be available from the repowering of coal-fired facilities. Instead, the EPA defines repowering a facility as the change from oil/gas capacity to combined-cycle capacity. By doing so, it excludes any consideration that an affected coal-fired facility could be repowered to combined-cycle capacity. As discussed in more detail later in these comments, a literature review reveals that at least 15 coal-fired facilities have been or are planning to be repowered to use combined-cycle technology. The repowering of these coal-fired plants could add thousands of additional megawatts of generating capacity to the national electric system and, thereby, improve system reliability while reducing water usage.

Third, the EPA analyses ignore the additional capacity that will be available from the implementation of power uprates at nuclear power plants. A power uprate means increasing the thermal power produced by the plant. A power uprate increases the output of the plant at a relatively low cost. The U.S. Nuclear Regulatory Commission has approved more than 60 such power uprates of between 5 and 20 percent. Requests for additional uprates are currently under review by the NRC or are planned for submission in the near future. An average increase of 10 percent in the power levels of the nation's nuclear plants would add approximately 9,000 megawatts of additional capacity to the electric system.

Fourth, it appears that EPA has assumed that the service lives of some, but not all, nuclear power plants, will be extended beyond the current 40 year terms of their Nuclear Regulatory Commission-issued operating licenses. <FN 14> However, it is impossible to tell how many nuclear units, and which individual facilities, are assumed to have their operating lives extended Given the NRC's recent actions and stated intentions, it is reasonable to expect that the NRC will allow any owner that wants to extend the operating life of its nuclear plant to do so. Therefore, there may be more generating capacity available over the next 30 to 50 years than has been assumed in the EPA analyses.

Fifth, the EPA analyses reflect the costs of condenser upgrades <FN 15> but not the improved performance (in terms of fewer tube failures and lower forced outage rates) that can be expected from such upgrades. In other words, the facilities which have implemented condenser upgrades should be available for service for more of the year than they previously had been. This additional capacity can be expected to further enhance electric system reliability.

Finally, the EPA analyses assume that some generating capacity will be retired as a result of the implementation of the All Cooling Towers and Waterbody/Capacity-Based Options. <FN 16> As explained below, we believe that the assumption that significant nuclear capacity would be retired as a result of the proposed All Cooling Towers or Waterbody/Capacity-Based Options is unreasonable and unrealistic. The availability of this nuclear capacity that EPA assumes would be retired would further reduce system reliability impacts.

In any event, the retirement of some of the facilities that would have to add cooling towers might spur the construction of additional new combined-cycle plants that would use less water.

Footnotes

1 This 0.1 percent figure represents the total 5.9 percent of national capacity that EPA estimates would be affected by the option divided by the 60 months in the five-year transition period.

2 Reliability Assessment, 2001-2010, The Reliability of Bulk Electric Systems in North America, North American Electric Reliability Council, October 16, 2001, Table 1, at pages 14 and 15.

3 This 0.3 percent figure represents the total 16.7 percent of the FRCC and NPCC regional generating capacity that EPA estimates would be affected by the option divided by the 60 months in the five-year transition period.

4 Reliability Assessment, 2001-2010, The Reliability of Bulk Electric Systems in North America, North American Electric Reliability Council, October 16, 2001, Table 1, at pages 14 and 15.

5 See Table B8-1 on page B8-2 of the EBA.

6 This 0.5 percent figure represents the total 33.1 percent of national capacity that EPA estimates would be affected by the option divided by the 60 months in the five-year transition period.

7 Reliability Assessment, 2001-2010, The Reliability of Bulk Electric Systems in North America, North American Electric Reliability Council, October 16, 2001, Table 1, at pages 14 and 15.

8 This 0.75 percent figure represents the approximately 44 percent of regional ECAR and NPCC generating capacity that EPA estimates would be affected by the option divided by the 60 months in the five-year transition period.

9 EBA, at Table B1-1.

10 EBA, at Table B8-1.

11 Reliability Assessment, 2001-2010, The Reliability of Bulk Electric Systems in North America, North American Electric Reliability Council, October 16, 2001, at pages 11 and 17.

12 See Tables B8-1 and B8-2 in the EBA.

13 Reliability Assessment, 2001-2010, The Reliability of Bulk Electric Systems in North America, North American Electric Reliability Council, October 16, 2001, at page 17.

14 EBA, at page B3-9.

15 See the Phase II Technical Development Document at pages 2.18 and 2.26.

16 EBA, at page B8-3.

EPA Response

EPA notes that it revised its assumption regarding installation outages required for technologies other than cooling towers. At proposal, EPA assumed that I&E controls other than cooling towers would not require installation outages. However, for the NODA and final rule analyses, this assumption was revised. Some of the I&E technologies are now estimated to require between 2 and 11 weeks of installation outage.

Please refer to section VII of the preamble for information about EPA's decision to reject cooling towers.

Comment ID 316bEFR.087.011

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Capacity Retirements

Finding : The EPA Analyses over-estimate the amount of capacity that would be retired under the All Cooling Towers and Waterbody/Capacity-Based Options.

The EPA notes that 2,550 MW of nuclear capacity in the NPCC and WSCC would be retired as a result of the adoption of the Waterbody/Capacity-Based Option. <FN 17> The EPA does not identify the number of MW of nuclear capacity that would be retired as a result of the adoption of the All Cooling Towers Option. However, it is reasonable to expect that the same nuclear facilities that EPA predicts would close in its analysis of the Waterbody/Capacity-Based Option also would be predicted to close in EPA's analysis of the All Cooling Towers Option.

Unfortunately, the analyses and underlying data which form the basis for the EPA conclusion that this nuclear capacity would be retired as a result of these options has been designated CBI. Therefore, we have been unable to evaluate, let alone validate, these results. <FN 18> Moreover, based on previous Synapse work, we believe that it is extremely unrealistic to expect that currently operating nuclear power plants will be retired as a result of the adoption of any of the flow reduction technology based regulatory options. This conclusion is based on (a) the improved performance and reduced O&M costs achieved at nuclear plants since the mid-1990s, (b) the fact that nuclear plants' low operating and fuel costs allow them to compete successfully in bid-based wholesale markets, and (c) the significant economic benefits that are available from relatively low cost investments in plant power uprates and operating life extensions.

For example, a recent Synapse analysis concluded that a $36 million investment in increasing the power level of the Vermont Yankee Nuclear Plant by 13 percent would result in a net present value benefit of $56 million (in 2001 dollars). <FN 19> A similar investment in extending the unit's operating life by twenty years would produce a net present value benefit of $253 million. <FN 20> With the opportunity for potential economic benefits of this magnitude, it is unlikely that any nuclear plant would be retired as result of the adoption of the cooling tower options considered by the EPA.

In addition, the EPA analyses ignore the possibility that fossil-fired facilities will be repowered instead of retired as a result of the adoption of any of the flow reduction technologies. The examples of the Reliant Astoria Repowering Project and the Bethlehem Energy Center in New York State are evidence that firms will seek to repower older, less efficient generating facilities and that such repowerings can include cooling towers as part of the repowered facility in place of once-through cooling. Such projects will provide significant environmental benefits in terms of reduced water usage and lowered air emissions and will offer substantial economic benefits for their owners.

Footnotes

17 EBA, at page B8-3.

18 We have similarly been unable to evaluate the analyses underlying the EPA claim that some fossil-fired units also would be retired as a result of these options.

19 Redacted Prefiled Testimony of Bruce E. Biewald in Vermont Public Service Board Docket No. 6545, dated January 7, 2002, at page 31, lines 16-18.

20 Ibid., at page 32, lines 1-5.

EPA Response

EPA disagrees with this comment. EPA's results with respect to early retirements of power plants, including nuclear plants, is based on the energy market modeling analysis conducted with the IPM. The IPM considers the net present value of future operations, both in the baseline and under section 316(b) policy options. If, as a result of compliance with a section 316(b) policy option, operation of the facility is no longer economical, the facility is predicted to shut down. The factors mentioned by the commenter (reduced O&M costs, low operating and fuel costs, and power updates and life extensions) are all taken into account by the IPM. However, a facility would still be predicted to retire in cases were compliance costs as a result of a policy option are high enough to offset these advantages.

EPA further notes that EPA's analyses did not ignore the possibility that fossil-fuel facilities will be repowered. The IPM includes a repowering option for both coal facilities and oil/gas facilities. In addition to compliance with the rule and retirement, repowering is one option that the IPM evaluates. It should be noted that Chapter B3 in support of the proposed rule (DCN 4-0002) erroneously stated that repowering in the IPM only consists of converting oil/gas capacity to combined-cycle capacity. This statement was corrected to also include coal facilities.

Comment ID 316bEFR.087.012

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.02

Economic impacts on consumers/households

Cost Estimates

Finding: The Costs of Complying with the alternative regulatory options that require cooling towers would be minor in the context of overall electricity costs to consumers.

As shown in Table 1 below, the compliance costs projected in the EBA would lead to very minor increases in the average cost of generating electricity at the affected facilities. In fact, these cost increases would average only 0.1 cents per kilowatt hour ("kwh") even under the All Cooling Towers Option (EBA Option 4), which would add cooling towers at 416 facilities. The average price of generating electricity at the affected facilities would increase by only 0.026 cents per kwh under the Waterbody/Capacity-Based Option (EBA Option 1).

[see hard copy for table]
Table 1 – Average Annual Costs per kwh of Alternative Regulatory Options Analyzed by EPA <FN 21>

It is not certain that in deregulated markets the owners of affected facilities could pass these cost increases along to their customers. But even if they could, the overall price paid by consumers for the electricity they use would reflect a blend of both the price of generating electricity at affected facilities and the price of generating electricity at non-affected facilities. Consequently, as shown in the last column of Table 1, the average price of electricity paid by consumers would increase by only 0.056 cents per kwh under the All Cooling Towers Option or by 0.015 cents per kwh under the Waterbody/Capacity-Based Option.

These average cost increases are extremely minor when compared to the average 8.47 cents per kilowatt hour paid by residential electricity consumers in 2000. <FN 22> For example, the 0.056 cents per kilowatt hour increase projected for the All Cooling Towers Option would represent only a 0.66 percent increase in an average residential customer bill. <FN 23> The 0.015 cents increase projected for the Waterbody/Capacity-Based Option would represent only a 0.18 percent increase in an average residential bill. <FN 24>

In other words, an average consumer who uses 500 kilowatt hours per month might see his/her bill increase by only 7.5 cents per month if the Waterbody/Capacity-Based Option were adopted. <FN 25> The average consumers' bill could increase by only 28 cents per month if the All Cooling Towers Option were adopted. <FN 26>

Footnotes

21 The annualized costs for each of the options shown in the middle column of Table 1 were taken from Tables B7-2, B7-7, B7-12 and B7-17 of the EBA. The individual cents per KWH costs shown in the right hand column were calculated by dividing each of these annual costs by the 2,300,000,000 of net generation forecast for affected facilities in Table A2-2 of the EBA.

22 Typical Electric Bills and Average Rates Report, Winter 2001, Edison Electric Institute, at page 188.

23 0.056 cents per kilowatt hour divided by 8.47 cents per kilowatt hour equals 0.66 percent.

24 0.015 cents per kilowatt hour divided by 8.47 cents per kilowatt hour equals 0.18 percent.

25 This 7.5 cents per month increase represents the 0.015 cents per KWH increase shown for this option in Table 2 multiplied by an average 500 KWH per month usage.

26 This 28 cents per month increase represents the 0.056 cents per KWH increase shown for this option in Table 2 multiplied by an average 500 KWH per month usage.

EPA Response

EPA agrees with the commenter's assessment of the uncertainties about the ability of affected facilities to pass on costs to their customers. See response to 087.004 and the preamble to the final rule for a discussion of EPA's decision not to promulgate a rule based on cooling water technologies.

Comment ID 316bEFR.087.013

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.0

Costs

Finding: The Costs of Complying with the alternative regulatory options are significantly overstated.

Although the costs of complying with the alternative regulatory options that require the implementation of flow reduction technologies are extremely low, they are nevertheless overstated for the following reasons:

First, the capital costs of adding a cooling tower are annualized over a 30-year period even though the EPA has acknowledged that there is substantial evidence that cooling towers have service lives longer than 30 years. The EPA should annualize the capital costs of adding cooling towers over a period that is more likely to reflect the expected operating lives of those towers. Such an annualization over a period longer than 30 years would lower the annual compliance costs presented in the EBA for the All Cooling Towers, the Waterbody/Capacity-Based and Dry Cooling Options.

Second, the EPA notes that data from the Nuclear Regulatory Commission indicate that "recirculating cooling systems have lower condenser flow to MW ratios than once-through systems, regardless of age or other characteristics." <FN 27> However, the EPA nevertheless uses the baseline (i.e., once-through) system intake flow of affected plants to size the needed recirculating cooling towers and associated conduit systems. <FN 28> This assumption renders the affected facility recirculating systems modeled by EPA oversized and unnecessarily expensive. EPA instead should have used the Nuclear Regulatory Commission data to properly size the cooling system conversions.

Third, to calculate the capital costs of wet cooling towers, the EPA starts with the cost of a redwood tower with splash fill for all fossil-fuel plants. Such a cooling tower is slightly more expensive than a tower fabricated from fiberglass reinforced plastic. <FN 29> Further, EPA has acknowledged that it has learned from cooling tower vendors that fiberglass has become "relatively standard" for new facility installations. <FN 30> EPA should have used the cost of the more standard fiberglass material for new cooling towers at existing fossil-fired facilities.

Fourth, the equations used by EPA to quantify the capital cost of a new cooling tower produce cost estimates that "in almost all cases" exceeded the actual project costs, sometimes by as much as 25 percent of the actual costs. <FN 31> For this reason, EPA should revise its equations to more accurately reflect the actual costs of building a cooling tower. In the alternative, if the EPA decides to continue to use these equations without revision, it should not apply a 20 percent "retrofit factor" when quantifying the cost of adding a cooling tower at an existing facility. The combined use of both the existing equations and the 20 percent retrofit factor leads to unreasonably high estimates for the capital costs of adding a new cooling tower at an existing facility.

Fifth, the EPA assumed that in order to increase the efficiency of the recirculating cooling system affected facilities would elect to upgrade their condensers as part of cooling system conversions from once-through to recirculating systems. <FN 32> Although the costs of these condenser upgrades were included in the EPA's quantification of compliance costs, these costs do not reflect any reductions in condenser-related O&M costs that can be expected from upgrading to the new materials which are less susceptible to failure. Such material upgrades should lead to fewer tube leaks and, consequently, lower repair and repair outage-related costs.

Sixth, the EPA assumed that a range of 2,000 feet to 4,000 feet (depending on intake flow) of concrete-lined steel piping would be used for cooling water make-up water and blowdown. <FN 33> The EPA included these costs to account for conversion cases in which significant distances may exist between intake locations and cooling tower sites even though this was not necessarily true for the example cases reviewed by EPA. EPA should have used a range of piping length that is more typical of existing facilities instead of using a range that might only apply to a limited number of plants.

Seventh, the only intake structure technologies for which EPA develops costs are fine mesh traveling screens and fish handling equipment. The EPA notes that "fine mesh traveling screens tend to have higher costs, in the Agency's estimation than other similar technologies." <FN 34>   The EPA should identify these other viable intake structure compliance strategies, and compliance cost estimates should reflect the use of these strategies at facilities can be expected to use them.

Eighth, the EPA notes that it does not develop costs for certain compliance strategies that companies may employ in response to the new rule. <FN 35> Several of these compliance strategies are likely to be less costly than the strategies for which the EPA has developed costs. The EPA should cost out all applicable compliance strategies in order to develop an accurate assessment of each option's costs.

Ninth, as noted earlier, the EPA analyses do not reflect the repowering of coal-fired facilities to use combined-cycle technology. However, as we will discuss below, at least 15 coal-fired facilities have been repowered to combined-cycle technology or are planning to so repower in the near future. The costs of compliance under the All Cooling Towers, the Waterbody/Capacity-Based and Dry Cooling Options are overstated to the extent that they fail to reflect these repowerings because the costs of complying with any of these options would be lower for a repowered facility than for the original coal-fired plant.

Tenth, the energy penalties used by the EPA to develop the compliance costs are too high, as follows:

1. To calculate the cost of foregone electricity sales during the extended outage to connect a wet tower to an existing plant, EPA uses annual average electricity sales figures for the company and annual average wholesale prices. As the Agency notes, these outages are likely to occur during the off-peak seasons (spring and fall), when both electricity sales and wholesale prices are below annual average levels. <FN 36>   Thus, the use of annual average data will tend to overstate the cost of the extended outage. We believe that EPA should use electricity sales and wholesale price data from off-peak seasons to calculate this cost.

The EPA only quantified the avoided fuel costs from this one-month downtime. However, EPA also has noted that variable production costs other than fuel costs may be avoided during downtime. By only including fuel costs and ignoring the avoided variable production costs, EPA may have overstated the cost of the connection outage. <FN 37>

2. In calculating the energy penalty associated with reduced steam turbine efficiency, EPA calculates energy losses at 67-percent load operation for all in-scope facilities. <FN 38>   However, the EPA

notes that many power plants operate at very high load levels during most of their operating hours. <FN 39> In fact, a substantial number of the plants affected by this rule – especially large nuclear and coal-fired facilities – are used as baseload plants and operate at or near their maximum power levels during a very large percentage of their operating hours. Therefore, EPA should use a higher load level to calculate turbine efficiency losses due to cooling system conversions. As discussed at length in the EBA and the Technical Development Document, the use of such higher load levels would reduce the turbine losses that could be expected from the conversion to a recirculating cooling system.

On page 5-9 of the Technical Development Document, the Agency appears to confuse the concepts of a power plant's operating load level and its annual capacity factor. The Agency writes:

The average capacity factor for nuclear power plants in the U.S. has been improving steadily and recently has been reported to be approximately 89 percent. This suggests that for nuclear power plants, the majority appear to be operating near capacity most of the time. Therefore, the use of the energy penalty factors derived from the maximum load curves for nuclear power plants is reasonably valid. In 1998, utility coal plants operated at and average capacity of 69 percent (DOE 2000). Therefore the use of energy penalty values derived from the 67 percent load curves would appear to be more appropriate for fossil-fuel plants. <FN 40>

Operating loading is a description of how close to full load a plant is operating at a given moment. In contrast, a plant's capacity factor is a function of both the plant's load level during each hour and the number of hours operated. Thus, the 69 percent average capacity factor for fossil-fueled units does not indicate that these units tend to operate near 69 percent of full load. Most large fossil-fired steam plants operate at loadings above 69 percent during most of their hours of operation. The annual average capacity factor is brought down to 69 percent by forced and unforced outages – periods during which the plants are generating no electricity. <FN 41> (In fact, if one assumes a month per year of downtime on average for fossil units, then they must be operating at loadings well above 69 percent in order to achieve an average capacity factor of 69 percent.) Correcting this conceptual error illustrates why energy penalties for the in-scope units should be calculated at a loading well above 67 percent.

3. The EPA has acknowledged that energy penalties for the West were not available at the time that its analyses were finalized. The IPM analysis for plants located in California therefore used the U.S. average. This overstated the energy penalty for these facilities. <FN 42>

Footnotes

27 Technical Development Document, at page 2.18.

28 In fact, EPA notes that in some cases, the design flows it used are significantly higher than actual operating flows. Technical Development Document, at page 2.18.

29 Technical Development Document, at page 2.22.

30 Ibid.

31 Technical Development Document, at page 2.23.

32 Technical Development Document, at pages 2.18 and 2.26.

33 EBA, at page B1-4.

34 Technical Development Document, at page 2.16.

35 EBA, at page B1-17.

36 EBA, at page B1-9.

37 Ibid.

38 EBA, Table B1-1

39 EPA writes: “The Agency understands, based on discussions with the Department of Energy, that a significant portion of existing power plants, when dispatched, would operate at near maximum loads.” Technical Development Document, at page 5.2.

40 Technical Development Document, at page 5-9.

41 Similarly, while the average annual capacity factor of the nation’s nuclear units has been increasing in recent years, this reflects mainly reduced down time at nuclear units, not operation of the units at higher loadings when they operate.

42 EPA response to Kristy Bulleit Question No. 2.

EPA Response

Regarding point 1. of comment ten made by the commenter (regarding the cost of foregone electricity), the Agency disagrees with the assertion that annual average data will overstate the cost of an extended outage. See response to comment 316b.EFR.306.423.

See comment 316b.EFR.306.418 for another commenter's rebuttal of the points made regarding amortization periods.

See response to comment 316b.EFR.404.058 for discussion of the issues cited in this comment, save point 1 of comment ten, which is addressed above.

Comment ID 316bEFR.087.014

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

Repowering

Finding: There appears to be a contradiction between the definitions of "repowering" in the EBA and the Technical Development Document and the Federal Register Notice.

The EBA notes that "Repowering in the IPM consists of converting of oil/gas capacity to combined-cycle capacity." <FN 43> However, the Technical Development Document and the Federal Register Notice have a much broader definition of repowering. <FN 44> The EPA should clarify which definition is being used and should be consistent in the application of that definition. In addition, as noted earlier, the EPA also should consider facilities that are converting from coal to combined-cycle capacity within its definition of repowering.

EPA makes the following observations at page 2.38 of the Technical Development Document:

Because the Agency developed a cost estimating methodology that primarily utilizes design intake flow as the independent variable, the Agency examined the extent to which compliance costs would change if the repowering data summarized above were incorporated into the cost analysis of this rule. The Agency determined that projected compliance costs for facilities withdrawing from estuaries could be lower after incorporating the repowering changes. The primary reason for this is the fact that the majority of estuary repowering facilities would change from a steam cycle to a combined-cycle, thereby maintaining or decreasing their cooling water withdrawals (note that a combined-cycle facility will withdraw one-third of the cooling water of a comparably sized full steam facility). Therefore, the portion of compliance costs for regulatory options that included flow reduction requirements or technologies could significantly decrease if the Agency incorporated repowering changes into the analysis. As shown in Table 2-22 the majority of facilities projected to increase cooling water withdrawals due to the repowering changes use freshwater sources. In turn, the compliance costs for these facilities would increase if the Agency incorporated repowering for this proposal. <FN 45>

The EPA should explain in detail precisely how it evaluated and quantified the potential impact of repowering for potentially affected facilities and provide the underlying analyses and data. The EPA also needs to consider the potential impact of the repowering of oil, gas, and coal-fired facilities to combined-cycle technology on the costs of complying with the alternative regulatory options. This is especially important because the EPA acknowledges that the "the portion of compliance costs for regulatory options that included flow reduction requirements or technologies could significantly decrease if the Agency incorporated repowering changes into the analysis."

Footnotes

43 EBA at page B3-8, footnote no. 11.

44 Technical Development Document, at pages 2.36 and 2.37.

45 Technical Development Document, at page 2.38.

EPA Response

For a general discussion of repowering, see section II of the preamble to the final rule.

The Agency defines repowering as existing facilities either undertaking replacement of existing generating capacity or making additions to existing capacity. Under this final rule certain forms of repowering could be undertaken by an existing power generating facility that uses a cooling water intake structure and it would remain subject to regulation as a Phase II existing facility. For example, the following scenarios would be existing facilities under the rule:

- An existing power generating facility undergoes a modification of its process short of total replacement of the process and concurrently increases the design capacity of its existing cooling water intake structures;
- An existing power generating facility builds a new process for purposes of the same industrial operation and concurrently increases the design capacity of its existing cooling water intake structures;
- An existing power generating facility completely rebuilds its process but uses the existing cooling water intake structure with no increase in design capacity.

Thus, in most situations, repowering an existing power generating facility would be addressed under this rule. Ultimately, however, whether a facility is subject to Phase I or Phase 2 will be determined according to whether it meets the definition of "new facility" in §125.83.

EPA did consider conversion of existing coal capacity to new combined-cycle capacity as repowering. Comments regarding EPA's failure to consider the potential for the repowering of older, coal-fired facilities were due to a statement in the Economic and Analysis (EBA) in support of the proposed rule. At the time of the NODA and for the final rule, EPA has corrected the statement in the EBA to read, “Repowering in the IPM typically consists of the conversion of existing oil/gas or coal capacity to new combined-cycle capacity.” (See DCN 5-3002 and Chapter B3, DCN 6-0002)

EPA provided its repowering analysis at 66 FR 17134. There the Agency explained that it analyzed a proprietary database (NewGEN) for information on plants that planned to undertake repowering activities. (See also Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule).

For the section 316(b) analysis, EPA did not use the IPM function that allows the model to pick among a set of compliance responses. As a result, there is no iterative process that would adjust the compliance response (and as a result the cost of compliance) if a facility chooses to repower. Repowering in the IPM typically consists of the conversion of existing oil/gas or coal capacity to new combined-cycle capacity. The modeling assumption is that each one MW of existing capacity is replaced by two MW of repowered capacity. This change in plant type and size might lead to a change in intake flow and potentially to different compliance requirements and costs. Since combined-cycle facilities require substantially less cooling water than other oil/gas or coal facilities, the effect of repowering is likely to be a reduction in cooling water requirements (even considering the doubling of the plant’s capacity). As a result, not allowing the model to adjust the compliance response or cost is likely to lead to a conservative estimate of compliance costs and potential economic impacts from the final rule. (See Chapter B3, Economic and Benefits Analysis for the Final Section316(b) Phase II Existing Facilities Rule; DCN 6-0002).

Comment ID 316bEFR.087.015

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

Finding: The EPA appears to have failed to consider the repowering of coal-fired facilities to use combined cycle technology.

Synapse has conducted a literature search to identify electric generating facilities that have been repowered or that are currently planned to be repowered in the near future. This literature search consisted of reviews of such public sources as state public utility commission websites, utility and non-utility generator websites, the EIA Form 767 database, and the UDI database.

We found that at least 16 coal-fired facilities have repowered or are currently proposing to repower. <FN 46> However, the EPA analyses appear to ignore such potential repowerings of coal-fired facilities. <FN 47> In fact, many of these repowerings involve conversion to combined-cycle technology.

Footnotes

46 Eleven of these repowerings were identified using publicly available information. The remaining four were identified from a confidential database.

47 "Repowering in the IPM consists of converting of oil/gas capacity to combined-cycle capacity." See the EBA at page B3-8, footnote no. 11.

EPA Response

See Comment ID 316EFR.087.014.

Comment ID 316bEFR.087.016

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

The Cost-to-Revenue Measure

Finding: The cost-to-revenue analyses presented in the EBA appear to overstate the magnitude of compliance costs relative to facility-level and firm-level revenues.

Because many of the underlying calculations and data have been designated CBI it is impossible to evaluate the cost-to-revenues measures presented in the EBA. Nevertheless, there are several reasons why the cost-to-revenue discussions in Chapters B7 of the EBA (and the results presented in Tables B7-4, B7-5, B7-9, B7-10, B7-14, B7-15, B7-19, and B7-20 of the EBA) overstate the magnitude of compliance costs relative to revenues.

First, as discussed in detail above, the costs of complying with the alternative scenarios have been overstated. This overstatement directly distorts the cost-to-revenue measures presented in the EBA and inflates the magnitude of the compliance costs relative to revenues.

Second, it is unclear from the EBA and the materials provided by the EPA whether the analyses reflect any increases in facility-level and firm-level revenues as a result of the passing through to consumers of cost increases resulting from the implementation of the proposed Phase II rule or any of the alternative regulatory options. This omission would be critical because it is reasonable to expect that firms, rather than being forced to bear all of these costs themselves, could pass along to their customers a significant portion, if not all, of the costs they incur in meeting any new Phase II EPA requirements and, thereby, recover these costs through increased revenues.

Those firms located in states in which electricity generation has not yet been deregulated would have an opportunity to file a rate case to recover any increased costs resulted from cooling system modifications or conversions. Those firms located in states in which deregulated electricity markets exist may be able to recover any Phase II-related costs through increases in market prices.

For this reason, the EPA should model scenarios where some or all of the costs of implementing the proposed Phase II rule or the alternative regulatory options are recovered through increased revenues.

EPA Response

For a response to the comment on EPA's cost estimate for alternative scenarios, please refer to comment 316bEFR.087.005 in comment category 9.0.

EPA notes that the cost-to-revenue ratio was only one of several economic measures used in support of the proposed and final rules. The main measure of economic impact was the market model analysis using the IPM. This analysis explicitly considers the potential for increases in electricity prices and associated change in revenue for regulated entities as a result of the 316(b) regulation. Thus, this analysis incorporates the commenter's point that EPA should consider the possibility that some part of the cost of regulatory compliance will be passed onto consumers in the form of electricity price increases. Indeed, in its analysis of one of the NODA options, the waterbody/capacity-based option, EPA found that most facilities estimated to incur compliance costs would experience revenue increases as a result of the overall market effects of the regulatory option.

Comment ID 316bEFR.087.017

Author Name David Schlissel, et al

Organization Synapse obo Riverkeeper, Inc.

Subject Matter Code 4.01.01

RFC: Effects of re-powering on intake flow

Appendix A - Coal Plant Repowerings

Synapse has identified the following completed, underway and proposed coal plant repowings:

[see hard copy for table]

EPA Response

See Comment ID 316EFR.087.014.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Sonia S. Kim

On Behalf Of:

Omaha Public Power District

Author ID Number:

316bEFR.088

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.088.001

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

OPPD strongly believes that the EPA and States with program authority should build on the solid foundation of state experience with site-specific decision-making regarding section 316(b) of the Clean Water Act. While more rigor and consistency can be brought to the framework presently used by the states, the current approach contains a number of features that make it especially useful for making sound, scientifically credible decisions and which reflect progressive thought regarding how to approach environmental protection in the future.

EPA Response

EPA recognizes the effort on the part of some States to develop comprehensive 316(b) programs. As such, today's rule allows for the approval of State 316(b) programs that meet the requirements in 125.90(d).

Comment ID 316bEFR.088.002

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 7.01.03

Option 3--Site-specific determination

OPPD is encouraged that the proposed rule provides a solid initial foundation by recognizing the site-specific nature of the issue, providing several compliance options based on cost-benefit analyses, and, most important, rejects any mandate for the use of one specific technology (such as cooling towers) in a one-size-fits-all approach.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.088.003

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Sonia S. Kim

Organization Omaha Public Power District

Several aspects of the proposal must be improved in order to assure optimal, cost-effective, and administratively simple protection of the environment. To assure that environmental protections are effectively achieved, EPA should embrace a regulatory framework that allows states to equally and fairly consider all site-specific costs and benefits.

Specifically, EPA should endorse a rule that provides a framework for site-specific decision making, allowing a state to make the critical decisions about the kinds of controls to be established at a plant and does not arbitrarily reopen past decisions when a state finds them to be effective in minimizing adverse environmental impact. Both the cost-cost and cost-benefit test should be retained. While EPA suggests using the vague term “significantly greater than” as the decision criteria for deciding the acceptability of cost benefit tests, we suggest that when comparing differing policy options, the alternative having the greatest positive difference between benefits and costs is the best option and the basis on which such decisions should be made. A clear understanding of this important concept will ease the time associated with permit issuance, lessening the overall burden to permitting authorities in administering the final rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

A goal of today’s rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.088.004

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 10.1

General: cost tests

Since many varied and efficient tools are available and are always being improved for implementing cost - benefit decisions, we encourage the Agency to explicitly state that alternative methods and approaches other than those expressly noted in the proposal are acceptable and encouraged. This will promote streamlined and innovative approaches that will lead to more efficient decision making.

EPA Response

This comment is not entirely clear. If the commenter is suggesting that EPA should provide flexibility within the site-specific compliance alternative, EPA believes that it has done so. Please see EPA's response to comment 316bEFR.004.004. Overall, EPA has provided a tremendous amount of flexibility in the rule, including five compliance alternatives, one of which enables any interested person to propose a technology for approval by the Director (see § 125.99(b)).

Comment ID 316bEFR.088.005

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Sonia S. Kim

Organization Omaha Public Power District

Moreover, the Agency should consider fortifying the proposal to encourage States to maintain, promote and refine existing programs that implement section 316(b) to include an alternative that accommodates facilities that have already demonstrated no adverse environmental impact. This would streamline the numerous NPDES permits each state must administer, reduce permit backlog and would maintain the integrity of state programs in this area. In many cases, environmentally protective and responsible decisions have already rendered in accordance with appropriate stakeholder input. To require these decisions to be re-evaluated and permits reissued is bureaucratic, unnecessary, costly and counterproductive since there, are additional water quality concerns that should be immediately addressed. Public Power facilities are particularly concerned about ways to minimize unnecessary and counter productive expenses since public power utilities are entities of local government.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

See also response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.088.006

Subject Matter Code 7.02

Performance standards

Author Name Sonia S. Kim

Organization Omaha Public Power District

The Agency should allow deployment of the technologies mentioned in the proposal as de facto compliance as long as they are properly operated and maintained. The administrative burden associated with demonstrating the effectiveness of already proven technologies is significant. Reducing the administrative burden associated with demonstrations associated with each permit is desirable. Since the technologies noted in the proposal are proven effective, then the administrative requirements associated with demonstrating performance should be waived. Where states and facilities determine that a site specific approach is warranted, these demonstration studies would still be required. This change, in particular, benefits both the state and the regulated industry and does not jeopardize environmental protection.

EPA Response

Under compliance alternatives 1(i), 1(ii), and 4, a facility, using any one of those alternatives, would be subject to fewer components of the Comprehensive Demonstration Requirements (see 125.95(b)).

Comment ID 316bEFR.088.007

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 7.02

Performance standards

OPPD agrees with the threshold range that constitutes reductions in entrainment and not impingement, OPPD would like to bring to your attention, however, that the impingement performance standard of 80 to 95% reduction, although possibly achievable in most larger, clean freshwater stream segments or rivers, cannot be achieved with existing proven control technologies due to the amount of debris and situation that we experience on Missouri River.

EPA Response

EPA notes the commenter's support for the entrainment performance standard. In addition, EPA agrees that high debris loads in certain waterbodies (the Missouri River among them) present different challenges regarding the selection and deployment of design and construction technologies. EPA disagrees, however, with the commenter's assertion that existing technologies are incapable of meeting the impingement mortality performance standard in such waterbodies.

Compliance alternative 4 allows a facility to install and properly operate and maintain an approved technology, thus subjecting itself to a more streamlined compliance regimen. Today's rule approves cylindrical wedgewire screens for use by facilities sited on freshwater streams and rivers, among other criteria (see § 125.99(a) for more details on the specific criteria). EPA believes, based upon extensive research, that the majority of facilities with the appropriate site conditions, and that have installed and properly operate and maintain submerged cylindrical wedgewire screen technology, should be capable of meeting the performance standards set forth in § 125.94. For facilities that fail to meet performance standards through the approved design and technology alternative, the Director may amend the facility's permit to require the use of design and construction technologies, operational measures, and/or restoration measures, in order to meet the performance standards. For a discussion on the applicability of cylindrical wedgewire screens and their deployment in high-debris waterbodies, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.088.008

Subject Matter Code 7.03

Available I&E technologies

Author Name Sonia S. Kim

Organization Omaha Public Power District

EPA based the presumptive performance standards on three technologies outlined in the proposed rule. Design and construction technologies such as fine and wide-mesh wedgewire screens, aquatic filter barrier systems, barrier nets, modified screens and fish return systems, fish diversion systems, fine mesh traveling screens, and fish return systems were outlined in the proposal. There are many technological strategies for the reduction in impingement and entrainment that were not included. It should be noted that state of the art technologies which may include other methods than those specifically listed may be used to achieve the applicable reduction rates associated with fish protection. It is recommended that research regarding existing or emerging technologies be further established, or that technologies be opened for further discussion. At this point, many reduction technologies are available, however the determination of the best or most economical, efficient, and cost effective methodologies is yet to be determined.

EPA Response

EPA agrees that there are many technological strategies, as well as operational and restoration measures, available to facilities to meet the requirements in today's rule. The discussion of certain technologies in the preamble to today's rule and supporting documentation does not preclude a facility from demonstrating that other, more innovative technologies would accomplish the desired results. EPA encourages the investigation of newer technologies and welcomes the distribution of any documentation that demonstrates its technologies.

EPA believes that the determination of which technologies are the most cost-effective is a process best left to the facility and its respective permitting authority. Today's rule does not make any such pre-determination.

Comment ID 316bEFR.088.009

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

OPPD supports the 5% threshold for freshwater rivers to exclude entrainment. The actual average intake flow should be used to determine whether or not the facility falls under the applicable proposed standard. However, design capacity designates a more conservative estimate and does not reflect the actual flow experienced through the intake structure.

EPA Response

Please see response to comment 316bEFR.077.034.

Comment ID 316bEFR.088.010

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Sonia S. Kim

Organization Omaha Public Power District

Research and analysis should not have to be conducted each time an NPDES permit is reissued. The concern is that the studies would be conducted on an ongoing basis throughout the lifetime of a permit if designated as a permit renewal requirement. It is true that historical records may have already been established and used as a basis for subsequent data or information forwarded to permitting agencies. It is believed that a less frequent monitoring or study period can be established for efficiency and validity of data as it changes over time and subject to the discretion of the State Director.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion. Reduced monitoring requirements are at the discretion of the Director.

Comment ID 316bEFR.088.011

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Best professional judgment (BPJ) should be more adequately defined. For example, the proposed rule states that while BPJ should be utilized to minimize adverse environmental impact, more stringent laws falling under Federal, State, or Tribal law should be followed when certain conditions apply. This language is confusing and should be clarified.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.088.012

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Sonia S. Kim

Organization Omaha Public Power District

Past research and studies should be allowed in order to establish a framework for determining if a utility has previously proved, with concurrence from regulatory agencies that current technologies at a site exhibit minimal or low impingement and entrainment occurrences as associated with levels in the proposed rule. For instance, OPPD has conducted previous studies which satisfied our State Administrator that mortality rates were already sufficiently low. Monitoring requirements, once mandated, have been deleted as unnecessary. Such prior reports with updated information subject to the discretion of the State Administrator should be allowed.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.088.013

Subject Matter Code 10.1

General: cost tests

Author Name Sonia S. Kim

Organization Omaha Public Power District

Previous cost estimates into modification technologies should be allowed to demonstrate that due to cost, it would not be feasible to construct, alter, or modify existing systems. Previous reports should be used to assist in the determination that once-through cooling systems are adequate for minimal adverse environmental impact and that the cost of retrofitting and installation of cooling towers may not be feasible at a site. Also, environmental disadvantages of cooling tower installations should be addressed for an objective assessment of alternatives.

EPA Response

Previous cost estimates may be used in estimating the compliance costs at a facility or for use in the cost-cost tests. The final rule requires the cost estimates to meet a particular standard for engineering cost estimates, but the age of the estimates is not defined as one of those criteria. The Agency notes that past cost analysis may not in all cases (as the commenter asserts) prove that modifications are infeasible.

Comment ID 316bEFR.088.014

Author Name Sonia S. Kim

Organization Omaha Public Power District

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Voluntary restoration measures were not readily defined in the proposed rule and perhaps that is appropriate. Such measures are likely numerous, and should be up to the discretion of the State regulatory agency and affected facility based on their unique knowledge of local environmental conditions and needs.

EPA Response

EPA agrees with the commenter that there are many types of restoration measures.

For a discussion of the roles and responsibilities of the permitting authority and the permit applicant, see EPA's response to comment 316bEFR.060.026.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Tim Reeves

On Behalf Of:

Southern Illinois Power Coop

Author ID Number:

316bEFR.089

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.089.001

Author Name Tim Reeves

Organization Southern Illinois Power Coop

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling Lakes and Ponds: SIPC built a cooling lake (Lake of Egypt) expressly for the purpose of complying with restrictions on heat rejection rates. EPA should consider this lake a treatment system and not "Waters of the United States" thereby exempting this facility from the 316(b) regulations. Even if EPA decides not to designate this lake a treatment system, EPA should determine that this cooling system constitutes a "closed-cycle recirculating system" and is, therefore, in compliance with the 316(b) rules.

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.089.002

Author Name Tim Reeves

Organization Southern Illinois Power Coop

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

Cost - Benefit Test: The cost-benefit test is the key to the successful implementation or failure of this rule. If EPA adopts their framework as proposed, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

EPA has included a site-specific compliance option based on cost-benefit considerations. For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.089.003

Author Name Tim Reeves

Organization Southern Illinois Power Coop

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

"Significantly Greater": The proposal provides for a site-specific determination of the "best technology available" if the costs of compliance at a site would be "significantly greater" than either the benefits of meeting the performance standards or the cost of what the agency considered. EPA must provide a clear definition of what is meant by "significantly greater." To maximize net benefits to society, economic theory would dictate that this should be interpreted to mean any cost benefit ratio greater that 1:1. This reflects the most cost-effective, performance-based outcome.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.089.004

Subject Matter Code	18.02

RFC: Use of previous demonstration studies

Author Name Tim Reeves

Organization Southern Illinois Power Coop

Application to Existing Facilities: The proposal should include a process for approving existing intake technologies as “best available” if it can be shown that the facility is not causing adverse environmental impact or the technologies have been deemed “best available” by the state. Such a process is reasonable since Section 316(b) has been in effect since 1972 and has been implemented case-by-case at many sites. There are many electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impact or that it has already installed the best technology available. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for either further studies or for additional intake technology.

EPA Response

See response to 316bEFR.006.004.

Comment ID 316bEFR.089.005

Author Name Tim Reeves

Organization Southern Illinois Power Coop

Subject Matter Code 21.04

Determination of compliance

Compliance Assessment: Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the “best available”, the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see EPA's response to comment 316bEFR.081.006.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

David W. Kay

On Behalf Of:

Southern California Edison CO

Author ID Number:

316bEFR.090

Notes

CWISC (316bEFR.035), EEI (316bEFR.072), UWAG (316bEFR.041)

Comment ID 316bEFR.090.001

Author Name David W. Kay

Organization Southern California Edison CO

Subject Matter Code 17.08

Option: UWAG's recommended approach

The Environmental Protection Agency (EPA) should adopt the UWAG site-specific approach and definition of adverse environmental impact. EPA should maintain in the regulations the highest flexibility in allowing for site-specific determinations of adverse environmental impact, and for voluntary restoration to meet best technology available (BTA) performance standards. The inclusion of a more flexible site-specific option and voluntary restoration will allow the permittee to cost-effectively protect the environment, which benefits all consumers of electricity.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.090.002

Author Name David W. Kay

Organization Southern California Edison CO

Subject Matter Code 7.02

Performance standards

The proposed rule must be revised so the "calculation baseline" is not the only surrogate measure for the threshold of adverse environmental impact; the rule must provide for use of alternative performance standards that allow demonstrating that the existing intake structure is not significantly adversely impacting populations of aquatic life in the area.

For example, SCE's Clean Water Act Section 316(b) demonstration study for SONGS showed that with the present CWIS configuration, any individual of any age class among the target species examined would incur at most a 3% chance of being entrained (and presumably killed) in the CWIS. In other words, the adverse impact to marine life with the existing CWIS configuration is insignificant. Nevertheless, examination of seven additional CWIS technology retrofits showed that the incremental improvements in survival for all but one target species were less than 0.2%. Therefore, any technology retrofit would not result in any significant reduction in entrainment or impingement losses.

However, EPA's proposed numerical performance standards could require SCE to either install additional technology, implement restoration, or perform a cost/benefit analysis. While EPA's proposed performance standards may be achievable, undertaking any of these efforts to achieve those standards would be a waste of public and private resources given the knowledge that the current CWIS configuration causes no significant adverse environmental impact. EPA should therefore allow a permittee who has already made such a demonstration to be deemed in compliance with Section 316(b) if the authorized state permitting agency concurs.

EPA Response

The objective of section 316(b) includes population effects but is not limited to those effects. EPA has considered the consequences associated with the loss of large numbers of aquatic organisms, including impacts on the stocks of various species, loss of compensatory reserve due to the deaths of these organisms and the overall health of ecosystems. Given all of these considerations, EPA determined that there are multiple types of undesirable and unacceptable adverse environmental impacts which result from impingement and entrainment and which must be minimized. Today's rule, however, also authorizes site-specific determinations of Best Technology Available for minimizing adverse environmental impact based on cost-benefit determinations.

Comment ID 316bEFR.090.003

Author Name David W. Kay

Organization Southern California Edison CO

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

SCE supports restoration as a tool by the permittee to minimize adverse environmental impact. SCE believes, however, that restoration should be a voluntary compliance option.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.090.004

Author Name David W. Kay

Organization Southern California Edison CO

Subject Matter Code 21.09

Permit applications/implementation schedule

The proposed rule should make clear that time for agency review must be built into any schedule either prescribed by the rule itself or required by an NPDES permit condition. Permittees and their regulating agencies should be allowed to negotiate reasonable schedules for designing and implementing appropriate demonstration studies, as well as implementing any resulting technology or restoration commitments, without being subject to noncompliance enforcement or citizen lawsuits.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

EPA recognizes that installation of a technology or other means of reducing impingement mortality and/or entrainment at a facility may be a lengthy process. If a facility plans on installing a technology, the facility may demonstrate that it will select design and construction technologies, operational measures, and/or restoration measures that will in combination or alone, meet the performance requirements in 125.94, in its application. The facility could outline a possible installation timeline in its Proposal for Information Collection for review by the Director. The Director may approve an installation timeline for implementation of the design and construction technologies, operational measures, and/or restoration measures. For a discussion of ways of demonstrating compliance with today's rule, see the preamble to the final rule.

Comment ID 316bEFR.090.005

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name David W. Kay

Organization Southern California Edison CO

Once a successful Section 316(b) demonstration is made, maintaining and operating the accepted technology for the life of the plant should be enough. At a minimum, there should be no reconsideration of Section 316(b) compliance for at least ten years, absent new evidence that conditions have so changed that the aquatic community is subject to new adverse impacts from the CWIS.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. However, permit conditions will be reviewed at each permit cycle and adjustments, if any, will be made as appropriate. Please see response to 316bEFR 041.126 for a discussion.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Karen W. Couch

On Behalf Of:

GE Aircraft Engines

Author ID Number:

316bEFR.091

Notes

CWISC (316bEFR.035)

Comment ID 316bEFR.091.001

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 3.01

Definition: Existing Facility

As a business engaged in manufacturing and service operations, GEAE is particularly concerned that the Phase II proposed rule is drafted in such a manner as to potentially regulate facilities whose primary business activity is not related to the generation of electric power, as a result of the presence of cogeneration operations within such a manufacturing facility. GEAE recommends that the Agency clarify the final rule to make clear that facilities whose primary business activity is not power generation are not subject to this phase of the CWIS rule.

EPA Response

See response to 316bEFR050.002.

Comment ID 316bEFR.091.002

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Author Name Karen W. Couch

Organization GE Aircraft Engines

In addition, GEAE is concerned that applicability determinations in the Phase II rule are proposed to be made on the basis of design, rather than actual, flows. GEAE urges the Agency to revise the rule to make clear that these rules do not apply where a permittee is willing to accept permit limitations that restrict its actual cooling water intake to below regulatory levels.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.091.003

Subject Matter Code 3.01

Definition: Existing Facility

Author Name Karen W. Couch
Organization GE Aircraft Engines

Applicability of the Phase II Rule Should be Limited to Facilities Whose Primary Business Activity is Electrical Power Generation

On Page 17135, Section IV of the proposal, EPA states, “Today’s rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by cogeneration.” However this statement appears to be in conflict with provisions in the proposal that indicate the rule could apply to cogeneration facilities (see. e.g., applicability statement regarding cogeneration facilities at Page 17128, Section II, which states that “only that portion of the cooling water flow that is used in cogeneration process shall be considered when determining whether the 50 MGD and 25% criteria are met.”

The confusion resulting from the above statements should be clarified in the final rule by making clear that the Phase II rule applies only to facilities whose primary business activity is electric power generation. In particular, EPA should clarify that, where cogeneration units are located at a facility engaged in manufacturing, but the primary purpose of the power generation facility is to support the manufacturing business, the facility would not fall under Phase II.

This issue could be clearly resolved in the final rule by defining the primary business activity by Standard Industrial Classification (SIC) and/or North American Industry Classification System (NAICS) codes, and then limiting the applicable codes to those whose primary business is electric power generation (e.g. where the facilities primary SIC code does not begin with 49, the facility would not fall under Phase II).

EPA Response

See responses to 316bEFR050.002 and 316bEFR050.001.

Comment ID 316bEFR.091.004

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Applicability Determinations Should be Based Upon Permitted flow Limitations Rather Than Design Intake Capacity

The proposal sets a design intake flow capacity of 50 million gallons per day (MGD) as one of the triggers for applicability of Phase II. In many cases, however, actual intake flows are well below design capacity. This may occur for a variety of reasons, including physical limitations which effectively limit flows to less than design capacity (e.g., in a tidal water body intake structures are located such that they are out of the water during low tide), legal limitations (i.e., the facility may have accepted a permit that limits flow to a fraction of design capacity) or operational reasons (e.g., the intake in question may only be operated intermittently, or may be operated well below design capacity).

We strongly urge EPA to recognize the above limitations in setting applicability criteria. In particular, where the facility has accepted a permit limit that restricts cooling water flows to less than 50 MGD, EPA should use permitted capacity rather than design capacity to determine Phase II applicability. Because it is a legally enforceable limit, permitted capacity provides a more accurate index of the potential impact of the facility. In addition, this would give facilities an incentive to agree to restrictions of theft cooling water intake, thereby reducing the potential for impingement and entrainment.

The applicability criteria should also consider other limitations on flow. For example, under the proposed wording the presence of two pumps, each of 25 MGD capacity for the purposes of redundancy, would trigger rule applicability, when in fact only one pump is operated at a time and the second pump is in place only to back up the first pump should the first pump fail or require maintenance. Applicability is clearly not warranted in a case like this.

Similarly, pumps might have variable speed drives for the purpose of regulating water flow. The fact that the top capacity (highest rpm) might equate to 50 MGD and would result in rule applicability is not appropriate in cases where the pumps do not continuously operate at that top capacity. Another example would be an intake with a capacity of 50 MGD that is run infrequently. On a prorated basis, the daily withdrawal equivalent would be much lower than 50 MGD. The draft rule does address different performance standards for low capacity utilization, but does not consider low utilization in determining applicability.

Finally, the proposed rule also fails to recognize the relevance of intake design as a limiting factor in situations of changing water levels (such as tidal waters). As an example, in a tidal environment in which a CWIS is out of the water during certain lower tides and therefore unable to operate all day, this should be taken into account in determining applicability. A CWIS that has “design capacity” of 50 MGD, but which is out of the water during tides below half tide (equal to half the day), would in reality only be able to deliver 25 MGD. In such a case this facility clearly should not be subject to the rule.

EPA Response

Please see response to comment 316bEFR.019.003.

Comment ID 316bEFR.091.005

Author Name Karen W. Couch
Organization GE Aircraft Engines

Subject Matter Code 3.06
RFC: Cooling water withdrawal thresholds of 25%

Only Cooling Water Used in Electric Power Generation Should be Considered in the Phase II Rule

The rule proposes, as an applicability criterion, that a facility must both generate and transmit electric power. The rule, however, does not clearly state that the cooling water being considered in calculating capacity is limited to cooling water involved in electric power generation. It is recommended that EPA more clearly define “cooling water”, and that this definition be restricted solely to cooling water related to electric power generation. Cooling water used for other cooling purposes should be specifically excluded in the calculation of capacity. This is consistent with the EPA’s stated intention that the rule apply only to facilities whose primary business is electric power generation.

EPA Response

In response to this comment and others like it, today’s rule addresses only those facilities whose primary activity is the generation and transmission of electric power. In Phase III, EPA expects to address existing facilities that use cooling water intake structures for other industrial purposes.

Comment ID 316bEFR.091.006

Author Name Karen W. Couch
Organization GE Aircraft Engines

Subject Matter Code 3.05
Facilities not covered by today's proposal

Facilities Not Otherwise Subject to Phase II Should Not be Regulated Under This Rule on a Best Professional Judgment Basis

Proposed 40 CFR 125.9 (c) states that existing facilities not otherwise subject to this rule may be regulated under Phase II on a case-by-case, Best Professional Judgment (BPJ) basis. GEAE encourages EPA to omit this provision as it threatens to result in arbitrary overlaps between Phase II and Phase III facilities based on the judgment of individual permit writers and result in uncertainty, confusion, controversy and possible litigation. Further, EPA has provided no guidance or details concerning the underlying criteria upon which the BPJ provision would be implemented, preventing more detailed comment on this provision. Because facilities potentially subject to this provision will in all likelihood be subject to the CWIS Phase III rule in any event, there is no justification for incorporating this BPJ provision into this rule.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.091.007

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 17.0

Other technology-based opt. under consideration

Alternative Means for Determination of Whether Performance Standards are Attained Should be Incorporated into the Rule

EPA seeks comments on other technology based options in VI.B, starting on page 17154. We do not believe all facilities should be required to meet performance standards for reducing impingement mortality and entrainment losses based solely on a reduction in intake flow to a level commensurate with that which can be attained by closed-cycle recirculating system. Numerous economic, land use, operational, safety, and other factors often make the consideration of closed-cycle cooling infeasible. Likewise, we do not believe this standard should be applied based on a specific water body type or proportion of water body flow withdrawn. Further, there should be broad allowance and flexibility to use innovative technologies, operational changes, and/or restoration to achieve mortality reduction.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.091.008

Author Name Karen W. Couch
Organization GE Aircraft Engines

Subject Matter Code 21.09
Permit applications/implementation schedule

Permitting Issues Should be Taken into Consideration

EPA's intent to implement this rule through individual NPDES permits raises a series of issues. In many cases a considerable length of time (two to three years) will be required to propose a data collection plan, obtain approval for such plan, collect and analyze the data, use the data to determine performance status and evaluate potential technologies, and prepare a Best Technology Available (BTA) recommendation. Sufficient time for all of these steps, including the Agency approval steps, should be built into the permitting process, either through a schedule set out or suggested in the rulemaking itself, or as part of the individual NPDES permit. Where permittees have already submitted a renewal application when the final rule is issued, or their renewal application is due within two-three years, they should be "grandfathered" from the CWIS rule requirements until the next permit application; otherwise they will have to completely revamp their renewal application to incorporate these requirements, and considerable permitting delays would likely result. For facilities that do not have sufficient time to go through the entire process of gathering and analyzing data to support BTA recommendations before the renewal application is due, the permit could incorporate a reasonable compliance schedule for gathering the necessary data. Finally, EPA proposed rule indicates that at every permit renewal, a "comprehensive reevaluation" of the 316(b) demonstration is appropriate. GEAE believes that there is no need to repeat this very expensive and time-consuming analysis every five years; absent significant changes in plant operations or significant adverse changes to the populations at issue, the initial demonstration should not be reconsidered so long as the operating technology or other measures are being maintained.

EPA Response

See response to comments 316bEFR.021.008 and 316bEFR.035.019.

Comment ID 316bEFR.091.009

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Karen W. Couch

Organization GE Aircraft Engines

The Rule Should Provide for use of Relevant Existing Data

On page 17143 of the rule (first column), EPA indicates that "Owners and operators may use existing data for the Study as long as it reflects current conditions at the facility and in the water body from which the facility withdraws cooling water." We agree that the metric for data acceptability should not be its age, but its relevance. We recommend that available existing data be presumptively considered to be representative of current conditions, unless significant and documented changes have occurred in the watershed subsequent to its collection. Only where known or documented events have occurred since the data collection event(s) that have likely substantially altered the community of shellfish and finfish within the source water body should these data be discounted. To resolve questionable data sets, we suggest that EPA consider a small-scale supplemental data collection effort that could validate a subset of the historical sampling effort. This would provide a means to verify whether historical data are still generally representative of current conditions. Similar comparative methods have been used by the Federal Energy Regulatory Commission to meet hydroelectric relicensing data requirements

EPA Response

EPA agrees that existing historical data, as long as it reflects current conditions, should be available for use in completing studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.091.010

Subject Matter Code 7.02
Performance standards

Author Name Karen W. Couch
Organization GE Aircraft Engines

EPA Should Clarify How Baseline Mortality and Impacts are to be Determined

The description of the calculation of baseline is confusing and unclear. Specifically, the description of the baseline calculation with respect to impingement does not provide sufficient detail to evaluate what constitutes a "shoreline intake with the capacity to support once-through cooling and no impingement mortality controls." This description does not address variations among facilities, such as design capacity, actual annual water usage, and site specific variables such as intake location relative to a specific water body and/or locations of fish and shellfish populations. The proposed regulations seem to suggest that the baseline may be estimated either by evaluating existing data for a nearby facility with no impingement or entrainment control technology, or by evaluating the abundance of organisms in the source water body in the vicinity of an intake structure potentially susceptible to impingement and/or entrainment.

It is suggested that the calculation of baseline be a function of the design capacity of the cooling water system, the annual usage of the system at full capacity, and the density of organisms in the zone of influence of the CWIS. Compliance with the performance criteria would then be based on the percentage reduction in impingement and entrainment from baseline (i.e., capacity) to actual use. This approach credits facilities that employ operational controls to operate at less than full design capacity, in addition to other technologies that may be employed to reduce impingement and entrainment from a worst case baseline impact.

We recommend that an equivalent-adults model be used on an annual basis to evaluate impingement reductions. Equivalent-adults per year, rather than fish per volume of water, more fairly evaluates the overall impact of a given facility on the environment. Impingement/entrainment reduction goals are in essence a mortality reduction goal. However, the biological necessity of this reduction at smaller facilities with minimal impacts is unclear. For example, facility A is found to impinge X number of larval fishes, which equate to Y number of equivalent adults. If the number of impinged adult equivalents is insignificant compared with other sources of mortality (e.g., predation, commercial fishing, recreational fishing, etc.) then reductions may have little or no benefit on a biological basis. In cases like this, stock-recruitment models could be used to assess the significance of impacts. They can evaluate whether the impacts could be readily off-set by the compensatory reserve of a given population (i.e., the capacity of the population to offset increased mortality).

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.091.011

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 21.03

Monitoring requirements

The Purpose of Compliance Monitoring Should be to Verify Proper Operation and Maintenance of the Appropriate Technologies

Since EPA's performance technologies are based on well-defined intake technologies that are in widespread use and that have been found to be effective (i.e. intake screens, etc.), the best way to assure compliance following installation of BTA is to ensure that the selected technologies are being installed, maintained and operated correctly in accordance with design. Compliance monitoring requirements that involve further studies to determine whether specific mortality reductions are in fact being achieved are very expensive and time consuming; in addition, given the complexity and variability of aquatic communities and the many variables involving in assessing potential impacts in a waterbody, they may generate misleading results. As currently proposed, compliance monitoring is therefore likely to generate large expenses, but produce little certainty or environmental benefit. Therefore, once BTA has been established, GEAE recommends that the focus of compliance monitoring be to document that the selected technologies have been implemented and are being properly maintained.

EPA Response

Please see EPA's responses to comments 316b.EFR.041.119 and 316bEFR.074.023.

EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. Please see EPA's response to comment 316bEFR.017.003 for an explanation of what constitutes compliance with today's performance requirements. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.091.012

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Watershed Should be Defined Broadly

We recommend use of the USGS eight-digit hydrologic unit to define watershed relative to restoration opportunities. This scale of watershed allows flexibility but also helps to keep any restoration efforts relevant to facility-related impacts. However, we would encourage EPA not to limit permittees to this particular watershed area in all cases. It is important to allow for a situation where a permittee may need to go outside this hydrological unit to find a high benefit to cost ratio opportunity with a high potential for permanent success. We suggests that, if a permittee wishes to conduct restoration activities outside of this hydrologic unit, that EPA require permittees to provide written justification stating why the hydrological unit containing the facility does not afford a feasible restoration opportunity, and how a project outside of the hydrologic unit is relevant to the facility-related impacts. This provides obvious value for watersheds that affect coastal ecosystems where benefits in a broad reach of the shoreline could be expected to benefit the natural resources of the estuaries and the marine environment regardless of whether their precise location is in a single watershed.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures and of the permitting authority's role, see EPA's response to comment 316bEFR.212.001 and 316bEFR.059.008.

Comment ID 316bEFR.091.013

Author Name Karen W. Couch
Organization GE Aircraft Engines

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

The Rule Should Encourage Consideration of Multiple Approaches to Meeting Performance Standards, Including Emphasis on Restoration Activities

Because of the tremendous variation that will be encountered in implementing these rules (every watershed will have unique characteristics, and each facility will also vary), the Phase II rule should provide for maximum flexibility in the approach to meeting performance standards for impingement and entrainment. This flexibility should include the potential for exclusive use of restoration actions as a method of compliance.

Pages 17146 through 17148 discuss the role of restoration in the Rule. We support the use of restoration to compensate for ongoing impacts and encourage EPA to allow a broad range of restoration measures that can be directly or indirectly linked to increases in the abundance of shellfish and/or finfish affected by CWIS. For example, restoration of nursery and refugia habitat, implementation of storm water control measures, removal of exotics or other undesirable species, watershed management programs, and the placement of land into conservation are steps that could be taken to ultimately improve the health of shelffish and finfish populations.

Restoration actions will provide benefits beyond those that can be directly linked to shellfish and finfish. For example, tidal wetland restoration would provide habitat for terrestrial and semiaquatic mammals and birds. Restoration activities will also likely reduce the level of environmental stress attributable to factors other than the facility (e.g., urban runoff). One of the long-term benefits of meeting performance standards through restoration will be that the restoration action will provide permanent value, regardless of facility operational status. For example, if a facility ceases to operate, the environment will benefit greatly because the facility-associated impact will cease and the restoration, which was conducted to offset the impact, will continue to provide ecological services. Allowing restoration to be used to meet performance standards will result in healthier ecosystems through time, with fewer environmental stressors.

EPA Response

EPA believes the requirements for restoration measures in the final rule offer permitting agencies and permit applicants substantial flexibility.

Restoration measures may be used in lieu of or as a supplement to design and construction technologies and operational measures.

All restoration measures must meet the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.091.014

Author Name Karen W. Couch

Organization GE Aircraft Engines

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Use of the Habitat Equivalency Analysis Method to Determine Compensation for CWIS Impacts

We encourage EPA to address the use of natural resource economic models, such as the Habitat Equivalency Analysis (HEA) method, to demonstrate full compensation when restoration is used to offset impingement and/or entrainment impacts. Methods such as HEA can be used to show that the level of ecological service provided by the proposed restoration activity is equal to or greater than the ecological service loss associated with the amount of impingement and/or entertainment in excess of performance standards. This economic asset replacement model, which utilizes an ecological service-to-service approach, was developed by the US Department of the Interior and the National Oceanic and Atmospheric Administration. It is widely used and has been applied to many different habitat types. The method is supported by many Federal Agencies (NOAA, 1997; EPA/DOI, 1999) and in Federal Court Rulings (USA vs. M. Fisher et al. 1997) as a valid approach for determining compensation for environmental impacts. The origin of this approach is presented in the 1991 EPA commissioned paper entitled "Scientifically Defensible Compensation Ratios for Wetland Mitigation." The service-to-service approach has been used in many states (California, Texas, New Jersey, South Carolina, Virginia, Indiana, Louisiana, Florida, Oregon, Idaho, Alabama, Maryland, plus others). Several peer-reviewed journal articles and federal government reports discuss the merits of this approach (King and Adler, 1991; Unsworth and Bishop, 1994; NOAA, 1995; NOAA, 1997; NOAA, 1998; Fonseca, et al., 2000).

The HEA approach is effective in that its success is built around the participation and expertise of stakeholders. By using a team or consensus approach to define the assumptions and parameters of the model, stakeholders "own" the results from the model. The HEA approach also takes into account the changing value of a restoration action through time. As EPA indicates, the value of a restoration action will likely be manifested overtime, with the full level of ecological service not being realized for several years. HEA can be used to scale the size of the action accordingly to result in no net loss of ecological services through time.

EPA Response

EPA does not require in the final rule one particular approach to assessing the appropriate level of performance from a restoration measure. Habitat Equivalency Analysis (HEA) is one of a variety of methods that may offer some useful perspectives to permitting authorities, permit applicants, and the public.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Any restoration measure must meet all of the requirements described in the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Arthur E. Smith, Jr.

On Behalf Of:

NiSource Corporate Service

Author ID Number:

316bEFR.092

Comment ID 316bEFR.092.001

Author Name Arthur E. Smith, Jr.
Organization NiSource Corporate Service

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

DEFINITION OF ADVERSE ENVIRONMENTAL IMPACT

EPA should define "Adverse Environmental Impact" (AEI). The loss of a single fish or a single egg, or even a large number of them does not constitute an AEI. There are at least two reasons why even large losses of forage species may not damage an aquatic community or population. One is the large losses (especially of eggs and larvae) occur already in nature, and the Cooling Water Intake Structure (CWIS) loss may be insignificant compared to these other losses. There is also evidence entrainment mortality in once through cooling water systems is significantly lower than EPA's estimates. The other reason is fish populations have "compensatory" mechanisms that produce more or larger fish in response to the lower fish densities. Due to their size, larger water bodies such as the Great Lakes offer abundantly more opportunities for the natural compensatory process to replenish losses of the aquatic communities. An appropriate definition of AEI would recognize that (1) as a matter of basic biology, losses occur naturally even without a CWIS and have little or no effect on the vigor of the aquatic populations or community and (2) such losses often have little or no effect on the public's use and enjoyment of aquatic resources.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. For more information regarding entrainment survival, please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.092.002

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 7.03

Available I&E technologies

EPA's performance standards in this rule are based on certain specific intake technologies that EPA says are found to be effective (e.g., wedge wire screens, fine mesh fish screens, or aquatic fabric filter systems or a traveling screen with fish return systems). Applications of these systems are limited and have experienced inherent maintenance problems when used in certain situations. These systems are prone to pluggage, particularly from zebra mussels and are susceptible to adverse weather conditions (i.e., icing and storm damage).

EPA Response

In establishing the performance standards for today's final rule, EPA focused on the most widely-deployed and commercially-available technologies used to mitigate impingement and entrainment. EPA disagrees with the commenter's assertion that application of the systems evaluated as part of today's rule is limited. While no one technology is universally applicable, and all systems will experienced diminished performance if not properly maintained, EPA believes that today's rule maintains a desired flexibility for facilities to decide between any combination of design and construction technologies, operational measures, or restoration measures to meet today's requirements.

Comment ID 316bEFR.092.003

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

EPA must elevate its consideration of the use of site-specific alternatives to cooling towers, to meet the entrainment and impingement requirements in this rule. Alternative measures could include wetland construction and mitigation, fish restocking and relocation of intakes. The application of these alternatives or combinations of these alternatives versus the installation of cooling towers could provide a wide range of benefits for entire watershed ecosystems throughout the Great Lakes and other areas of the country. For example, constructed wetlands could be utilized for fish hatcheries and restocking programs. The trout and salmon populations in the Great Lakes are exclusively the result of stocking. Wetlands would establish breeding grounds in additional locations and in areas not affected by existing CWIS. We feel the use of these alternative measures would increase the variety and types of benefits and could offer long lasting solutions to the entrainment/impingement issues associated with traditional cooling towers and standard intake technologies.

EPA Response

Cooling towers are not required in the final rule.

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.092.004

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

We also have several concerns with cooling towers, which are as follows:

-Cooling towers are consumptive water users. This is contrary to the nationwide movement to promote water conservation. This movement includes the Annex 2001 rule, which is attempting to reduce future uses of water from Lake Michigan. Water conservation is even part of new home construction codes in many communities. The codes regulate the use of low flow toilets and water conserving appliances.

-There are air pollution issues and energy penalties associated with cooling towers.

-Cooling towers cause icing problems with plant equipment and surrounding towns and industries. To prevent icing of equipment, cooling towers must be installed certain distances from electrical substations and must allow for wind drift. Cooling towers installed in operating facilities will encounter problems with existing substructure pipelines, underground electrical lines and natural gas lines. There can also be simple space limitations at existing facilities for retrofitted cooling towers. Two of our facilities have very limited property space and will encounter problems if required to install a cooling tower.

-Costs of cooling towers are high. Our experience indicates the initial capital cost of a cooling tower for a new 500 MW generating facility is in excess of twenty (20) million dollars and annual O&M costs are approximately $50,000.00.

-There is evidence that the mortality of aquatic organisms is one hundred (100) percent in the cooling tower recirculating water systems..

EPA Response

See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.092.005

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 3.05

Facilities not covered by today's proposal

BEST PROFESSIONAL JUDGMENT (BPJ)

The proposed Phase II rule contains a provision that is potentially the source of regulatory uncertainty. Proposed 40 CFR, Part 125.90(c) states: "Existing facilities that are not subject to this sub part (the Phase II rule) must meet requirements under Section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPS) basis." This provision confuses the distinction between Phase II and Phase III facilities. It seems that EPA is directing permit writers to impose BPJ Section 316(b) conditions on Phase III facilities before the Phase III rule is promulgated and on Phase II facilities which fall below the applicability thresholds included in this rule. The benefits of the phased rulemaking addressing different types of facilities in different rules will be eliminated by including this provision in the Phase II rules. EPA claims that the authority for applying 316(b) BPJ interpretations already exists even though it has never included such a requirement in its regulations. If EPA believes that its rules have always allowed imposition of case-by-case requirements for cooling water intake structures, there is no need to modify the regulations now. We suggest the 125.90(c) section be deleted from this rule.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.092.006

Author Name Arthur E. Smith, Jr.
Organization NiSource Corporate Service

Subject Matter Code 21.09
Permit applications/implementation schedule

125.92 COMPLIANCE SCHEDULES

This section simply states a facility “must comply with this subpart when an NPDES permit containing requirements consistent with this subpart is issued”. Time is needed to collect the required data and prepare the application. A large amount of biological data will have to be collected and analyzed. The calculation baseline required in the rule will have to be developed and reviewed. If changes in the intake are needed or alternative compliance measures are chosen, engineering studies and construction schedules will be required. If part of the solution is a restoration of a wetland or building a fish hatchery, time will be needed to complete these projects. Reasonable compliance schedules must be included by EPA in this regulation, particularly for facilities with administratively extended NPDES permits.

EPA Response

See response to comment 316bEFR.066.005.

Comment ID 316bEFR.092.007

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

EPA's proposed rule also suggests "a comprehensive re-evaluation of the 316(b) demonstration must be completed every time a permit is renewed." Once a successful 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be enough, unless conditions have so changed that the aquatic community is threatened or significant changes have occurred in plant operations. Surely, Congress did not intend through the CWA to require electrical generating stations to redesign and rebuild their CWISs every five years.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.092.008

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 2.04

EPA's legal authority to:

125.94 (a) (1) and (2)

This section describes the three alternatives available to a Phase II existing facility to minimize adverse environmental impact. The first two alternatives state "operational measures" can be used to meet the requirements of this subpart and hence the requirements of Section 316(b) of the Clean Water Act. 316(b) states "Any standard established pursuant to Section 301 and section 306 of this Act and applicable to a point source shall require that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." This definition does not include reference to "operational measures" as an option to meet the requirements of 316(b). In this proposed rule, EPA makes several references to the use of operational measures as a way to meet the 316(b) requirements. EPA does not have the legal authority, under Section 316(b) of the CWA, to regulate operation of cooling water intakes and with this subpart has bypassed due process of law. Curtailment of the operations of electrical generating facilities would have serious detrimental effects on local businesses with reduced power supplies and could impact the ability to meet requirements of other authorities for system reliability. We suggest EPA remove all "operational measures" phrases and references in this proposed rule.

EPA Response

See response to 316bEFR.041.079.

Comment ID 316bEFR.092.009

Author Name Arthur E. Smith, Jr.
Organization NiSource Corporate Service

Subject Matter Code 10.07.02
RFC: Appropriateness of "significantly greater"

125.94 (a) (3)

This is option number three for minimizing adverse environmental impact from entrainment and impingement and is based on a site-specific demonstration. To be able to utilize this option, a facility must demonstrate that the costs or benefits are "significantly greater" than the other two options. The proposed rule offers no definition or guidance regarding the term "significantly greater". We wish to express our concern with this issue and feel the "significantly greater" test is ambiguous and will be difficult to prove or meet.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.092.010

Author Name Arthur E. Smith, Jr.
Organization NiSource Corporate Service

Subject Matter Code 8.03
Proposed standards for Great Lakes

125.94(b) PERFORMANCE STANDARDS

This section contains the specific 316(b) requirements for the different types of U.S. water bodies. The requirements for the Great Lakes are more stringent than fresh water rivers, streams and other lakes. Facilities located on the Great Lakes must reduce entrainment as well as impingement of aquatic organisms. This additional requirement indicates EPA believes the Great Lakes are uniquely sensitive to entrainment and impingement. NiSource agrees the Great Lakes represent a unique resource deserving special protection. With regard to impingement and entrainment, EPA seems to be confusing uniqueness and sensitivity. We feel the Great Lakes are unique and have a unique fish population, but these fish are not uniquely sensitive. To the contrary, the fish communities in the Great Lakes are probably less sensitive to entrainment than in many other lakes and reservoirs.

The unique feature of the Great Lakes fish population is the presence of large numbers of both native and introduced salmonids. Although an unusual resource, the life history of these species indicate the opposite is true and that the population is more resilient than in more confined ecosystems.

The adults and juveniles of these coldwater species spend much of their time in the offshore cooler water. Thus, for most of the year, they are not vulnerable to impingement. It is important to note that trout and salmon populations in Great Lakes are exclusively the result of stocking. Thus, there are no trout, salmon eggs, or larvae to be entrained. This assessment is supported by data EPA provided in the 316(b) Phase I Rule. None of the 15 species most commonly impinged is a salmonid (Table 11-8 EEA). Only one salmonid (lake trout) appears in EPA's entrainment table (Table 11-6), it was at a single plant (out of 25 plants on Lake Michigan alone, Kelso and Milburn 1979), and it was entrained in low numbers.

Therefore, given the life history characteristics of the group of fishes of most concern in the Great Lakes (i.e., salmonids), no special level of concern is warranted. We feel the sampling requirements for the Great Lakes should be commensurate with potential sensitivity, and certainly no more stringent than those for lakes or reservoirs.

Among non-salmonids, most of the highly valued recreational Great Lakes fishes are also relatively insensitive based on life history characteristics. Besides salmonids, four species form the bulk of the Great Lakes sport catch: yellow perch, small mouth bass, northern pike, and walleye.

Yellow perch is of particular concern in Lake Michigan now because their population is currently very low. Yellow perch lay their eggs in long gelatinous strips, which greatly reduces the likelihood that their eggs will be entrained. Some yellow perch populations spawn well offshore, further reducing the likelihood of either entrainment or impingement losses.

Small mouth bass are nearshore nest builders. Upon hatching, the male guards the fry for a number of days. Because of this nest guarding, non-drifting behavior, smallmouth bass larvae are not frequently entrained, even where adult populations may be abundant (EA 1987).

Northern pike are primarily restricted to shallow embayments along the Great Lakes (which is not where the power plants are). They spawn in very shallow areas over dense aquatic vegetation. No intakes are located in any such areas. Walleye are uncommon in the open areas of the Great Lakes, except Lake Erie; thus, entrainment and impingement of walleye will generally not be an issue for Great Lakes power plants.

In summary, the fishes that make the Great Lakes unique (i.e., the salmonids) or constitute the nonsalmonid recreational fishery (i.e., yellow perch, smallmouth bass, northern pike, and walleye) are not at particular risk because of their life history characteristics. Therefore, increased levels of entrainment and impingement sampling are not warranted for Great Lakes intakes. Instead, the Great Lakes should be subject to the same requirements as smaller lakes and reservoirs and should not have to reduce entrainment.

Additionally, the size alone of the Great Lakes could effect entrainment and impingement of aquatic organisms. Fish simply have more room to exist and reproduce than in other smaller lakes and reservoirs. The location of CWISs also can reduce entrainment and impingement of aquatic organisms. Populations are lower in open sandy basins and intakes located in these areas of the Great Lakes would be less damaging to overall fish communities.

This section also lists specific entrainment and impingement reduction percentages for specific water bodies. For the Great Lakes, we must reduce entrainment and impingement of fish and shellfish by 80 to 95% to meet the requirements of this proposed rule. There is no allotment for the entrainment and impingement of nuisance species, particularly zebra mussels and round goby. Zebra mussels entered the Great Lakes in the ballast water of oceangoing ships several years ago. These mussels reproduce in great numbers and attach themselves to underwater structures in shallow areas. These colonies enter generating stations CWIS and cause major problems by plugging condensers, fire protection water systems, and other essential plant equipment. At this time, NiSource uses thermal treatment exclusively to control the zebra mussel population. To reduce entrainment and impingement mortality of zebra mussels by 80 to 90 percent would have serious effects on our operation. EPA should modify the rule language to exempt nuisance species from 316(b) entrainment/impingement requirements.

If the special entrainment reductions for the Great Lakes remain in the rule, EPA should consider replacing entrainment with entrainment mortality, as there is evidence that once through cooling water intake systems entrainment mortality rate is significantly less than EPA's estimates. In our future site-specific demonstrations, we plan to measure entrainment mortality to determine the effect our actual present intake systems have on aquatic organisms' mortality rates.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies and the presence of nuisance species.

Please refer to the response to comment 316bEFR.041.086 for more information about species-specific comments.

Please refer to the chapter on entrainment survival in the Regional Studies document (DCN 6-0003 in OW-2002-0049, the docket for the final rule).

Comment ID 316bEFR.092.011

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 18.01

RFC: Definition of “adverse environmental impact”

NiSource feels there are several areas in this rule that need clarification by EPA. We feel the application or implementation of these definitions will be difficult. A list of these areas are as follows:

-Adverse Environmental Impact

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.092.012

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 7.02

Performance standards

NiSource feels there are several areas in this rule that need clarification by EPA. We feel the application or implementation of these definitions will be difficult. A list of these areas are as follows:

-Calculation Baseline of Entrainment and Impingement for shoreline facility - How will this be determined?

EPA Response

Please see response to comment 316bEFR.063.022 and 316bEFR.063.005.

Comment ID 316bEFR.092.013

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

NiSource feels there are several areas in this rule that need clarification by EPA. We feel the application or implementation of these definitions will be difficult. A list of these areas are as follows:

-Restoration Measures

Fish Restocking - How many fish will have to be restocked to replace entrained or impinged fish? Will the replacement rate be 1:1? Will this ratio be applied to forage species as well as game fish?

EPA Response

The final rule gives permitting authorities the flexibility to make determinations of the feasibility of restoration measures on a site-specific, case-by-case basis.

For a discussion of the roles and responsibilities of the permitting authority and the permit applicant, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.092.014

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

NiSource feels there are several areas in this rule that need clarification by EPA. We feel the application or implementation of these definitions will be difficult. A list of these areas are as follows:

-Wetland Mitigation - How will benefits from wetland restoration or mitigation be applied to offset entrainment and impingement losses? What guidance procedures or documentation will be utilized by EPA to determine these benefits?

EPA Response

The final rule gives permitting authorities flexibility to make determinations of the feasibility of restoration measures on a site-specific, case-by-case basis.

For a discussion of the roles and responsibilities of the permitting authority and the permit applicant, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.092.015

Author Name Arthur E. Smith, Jr.

Organization NiSource Corporate Service

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

TRADING POLICIES

We feel that EPA should develop and utilize watershed trading policies to meet the entrainment and impingement requirements of this rule. Costs and problems associated with cooling towers throughout many watersheds could be avoided or minimized through the implementation of such trading policies, while the overall benefits to aquatic organisms intended by the rule will still he realized.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John A. Poole, Jr.

On Behalf Of:

Alabama Dept of Environmental Management

Author ID Number:

316bEFR.093

Comment ID 316bEFR.093.001

Author Name John A. Poole, Jr.

Organization Alabama Dept of Environmental Management

Subject Matter Code SUP

General statement of support

The Alabama Department of Environmental Management supports the proposed rule. In particular we find the cost/benefit approach to retrofitting to be a rational approach.

EPA Response

EPA notes the comment. No response necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

[omitted]

On Behalf Of:

[omitted]

Author ID Number:

316bEFR.094

Comment ID 316bEFR.094.001

Author Name [omitted]

Organization [omitted]

Subject Matter Code MISC

Miscellaneous comment

This letter was removed from the 316(b) comment index, as it was directed towards a separate rulemaking.

EPA Response

No response necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gary L. Fulks

On Behalf Of:

Associated Electric Cooperative, Inc.

Author ID Number:

316bEFR.095

Notes

NRECA (316bEFR.067)

Comment ID 316bEFR.095.001

Subject Matter Code 3.03

Definition: Waters of the U.S.

Author Name Gary L. Fulks

Organization Associated Electric Cooperative, Inc.

Cooling Lakes. Constructed cooling lakes should be exempted from the regulations or specific regulatory consideration provided. AECI completed construction of the Thomas Hill Power Plant Unit 1 and the Thomas Hill Reservoir in 1966. Management of the reservoir and adjacent properties were turned over to the Missouri Department of Conservation for use as a managed public wildlife area with the reservoir developed as a valuable fishing area for the central area of Missouri. The Thomas Hill Reservoir was constructed for and continues to serve as the once through cooling water system for the power plant. Impingement studies conducted for the plant, with a shoreline intake structure, indicate that the number of fish impinged represents less than five percent of the total reservoir fish population. The fish population that exists in the reservoir represents an introduced fish population.

The proposed rule, at 125.95(b)(3)(ii), requires persons in their studies to determine the temporal/spatial characteristics of species in the vicinity of the intake structure. This term, vicinity of the intake structure, is not defined and, therefore, leads the person to believe you are looking at impacts in only the area of the intake structure, as opposed to the waterbody. This presents several issues for constructed cooling lakes: the population in the vicinity of the intake structure is not a natural population; and, there was no fish population before the lake was constructed.

Next, at 125.94(d) Restoration Measures. persons may mitigate impacts by increasing populations in the waterbody. In past studies it was demonstrated at the Thomas Hill Power Plant, as stated above, that the impingement impact was less than 5% of the reservoir fish population. Based on 125.95 we could not use this data as it represented the waterbody and not the vicinity of the intake structure. If there is no overall impact in the waterbody, what are you mitigating? Are we trying to populate species above that which is “balanced”?

Consideration should be provided in the rules for constructed cooling lakes that have introduced fish populations and are demonstrated to have limited impact by impingement. We recommend that EPA establish constructed cooling lakes a “closed-cycle recirculating system” and is, therefore, in compliance with the 316(b) rule if it can be demonstrated that the impingement rate is minimal, e.g. less than 10% of recreational important fish species.

EPA Response

See responses to 316bEFR.006.001 and 316bEFR.015.003.

Comment ID 316bEFR.095.002

Author Name Gary L. Fulks

Organization Associated Electric Cooperative, Inc.

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Cost - Benefit Test. The cost-benefit test is the key to the successful implementation or failure of this rule. If EPA adopts their framework as proposed, it is essential that this test be included in the final rule and given the same significance it has in the proposed rule.

EPA Response

See EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.095.003

Author Name Gary L. Fulks

Organization Associated Electric Cooperative, Inc.

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

"Significantly Greater". The proposal provides for a site-specific determination of the "best technology available" if the costs of compliance at a site would be "significantly greater" than either the benefits of meeting the performance standards or the cost of what the agency considered. EPA must provide a clear definition of what is meant by "significantly greater." To maximize net benefits to society, economic theory would dictate that this should be interpreted to mean any cost benefit ratio greater that 1:1. This reflects the most cost-effective, performance-based outcome.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.095.004

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Gary L. Fulks

Organization Associated Electric Cooperative, Inc.

Application to Existing Facilities. The proposal should include a process for approving existing intake technologies as “best available” if it can be shown that the facility is not causing adverse environmental impact or the technologies have been deemed “best available” by the state. Such a process is reasonable since Section 316(b) has been in effect since 1972 and has been implemented case-by-case at many sites. There are many electric generating facilities for which there is already a high degree of confidence that the facility is not causing adverse environmental impact or that it has already installed the best technology available. In addition, if the facility has data indicating that the amount of entrainment and impingement is so small that there is no significant harm to the aquatic community or the environmental impact is of so little economic and environmental significance that the costs of a comprehensive 316(b) study would be significantly greater than its benefits, then there should be no need for either further studies or for additional intake technology.

EPA Response

See response to 316bEFR.006.004.

Comment ID 316bEFR.095.005

Author Name Gary L. Fulks

Organization Associated Electric Cooperative, Inc.

Subject Matter Code 21.04

Determination of compliance

Compliance Assessment. Since there is such variability in biological systems, it is not practical to require the permittee to meet a specific numerical reduction in affected organisms. The proposed performance criteria should not be directly implemented as enforceable permit limitations. Rather, when the existing technology is not the “best available”, the permit should require the installation of technology identified collaboratively by the permittee and the state. Then compliance with the permit would be based on installation, operation and maintenance of the selected technology.

EPA Response

Please see EPA's response to comment 316bEFR.081.006.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Walter P. Bussells

On Behalf Of:

JEA

Author ID Number:

316bEFR.096

Notes

APPA (316bEFR.028), LPPA (316bEFR.021), UWAG (316bEFR.041)

Comment ID 316bEFR.096.001

Author Name Walter P. Bussells

Organization JEA

Subject Matter Code 22.06

UMRA/Impacts on local governments

There are a number of provisions in the EPA's proposed rule on cooling water intake systems for existing facilities that my utility finds particularly encouraging. However, we remain concerned that the EPA has underestimated the potential impact on public power systems. Public power systems are utilities are owned and operated by local government.

EPA Response

Please refer to the response to comment 316bEFR.028.008 in subject matter code 22.03.

Comment ID 316bEFR.096.002

Author Name Walter P. Bussells

Organization JEA

Subject Matter Code 17.08

Option: UWAG's recommended approach

JEA endorses the technical and legal comments submitted to the EPA from Utility Water Act Group (UWAG), Large Public Power Council/American Public Power Association (LPPC/APPA) and the separate critique on public power economic impacts submitted by APPA.

EPA Response

No response is required. EPA notes the commenter's support for these comments.

Comment ID 316bEFR.096.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Walter P. Bussells

Organization JEA

EPA should be complimented for considering a variety of alternative approaches to the regulation. JEA is encouraged that the EPA proposal-explicitly-recognizes that-alternative technology selection may be warranted based on site-specific factors that affect the technical practicability of meeting the proposed standards. Specifically, the EPA recognizes that there may be situations where the costs of meeting the proposed standards at a specific facility may be significantly higher than the costs considered by the EPA in establishing these standards. In those: instances the proposal provides the facility with the opportunity to justify an a1ternative technology selection.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.096.004

Author Name Walter P. Bussells

Organization JEA

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The EPA proposal explicitly recognizes that alternative technology selection may be warranted based on site-specific-factors that indicate that the costs of meeting the performance standards are not warranted by the projected benefits at that facility. This is potentially very good. The proposed rule allows facilities to select an alternative level of compliance where the costs of compliance with the EPA's performance levels would be significantly greater than the expected benefits of achieving these levels. This explicitly recognizes the site-specific variations in the waterbodies (with varying ecological conditions) and can help account for controls already in place at many facilities.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.096.005

Author Name Walter P. Bussells

Organization JEA

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The EPA has chosen a flexible approach to compliance that allows facilities to meet the performance standards through a number of options, including creation or voluntary restoration of habitats and other non-traditional approaches. This approach allows for continued innovation in addressing the potential adverse environmental impacts associated with impingement and entrainment at power generating facilities. This also leaves significant discretion in determining how best to comply with the standards to state permitting authorities and facilities managers who have developed a great deal of expertise on these issues over the past 25 years. JEA has a good working relationship with the state and believes in deferring where possible, to the state regulators.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule. This rule preserves an important role for states.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.096.006

Author Name Walter P. Bussells

Organization JEA

Subject Matter Code 22.06

UMRA/Impacts on local governments

Criticism: the EPA has underestimated the impact on public power systems. JEA believes that the EPA should consider these impacts on local government. (See section titled Assessment of Unfunded Mandates Analysis on Public Power in the Comments submitted by the American Public Power Association).

JEA agrees with the APPA that the EPA should encourage states to implement the new 316(b) requirements by coordinating with states to ensure reliable grid operations.

JEA is very concerned with the unintended consequences of downtime in the utility industry when 316(b) requirements are implemented. If the EPA and states attempt to do these too quickly or at the same time, there may be electricity price spikes as public power generators purchase power from IOUs or other public power entities during a one to three month down time. The final rule should encourage state flexibility in setting sensible deadlines for 316(b) retrofits when the utility would -have scheduled outage, maintenance or have lower demand. The EPA's proposed-rule ignored this potential consequence that could be serious in a region (or watershed) where several utilities face NPDES permit renewal, imposition of 316(b) requirements, and planned outages in the same year. If not timed wisely, the region's customers could face unexpected utility bill increases - particularly during a peak use time such as mid summer or mid winter.

The EPA and states should take a common sense approach to new 316(b) requirements. This common sense approach would minimize potential cost spikes and energy disruptions and would avoid placing too high a demand on the few dozen consulting engineering firms that have considerable expertise in biological studies and the various intake technologies.

EPA Response

For a response to comments on potential impacts on public power systems, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

For a response to comments on implementation of new 316(b) requirements, please refer to comment 316bEFR.028.007 in subject matter code 21.09.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Daniel J. Orr

On Behalf Of:

Xcel Energy

Author ID Number:

316bEFR.097

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), EPSA (316bEFR.045), UWAG (316bEFR.041)

Comment ID 316bEFR.097.001

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 7.01
RFC: Three-option framework for determining BTA

The EPA has chosen to address the cooling water intake issues by requiring fish protection technologies at the cooling water intake structures rather than requiring cooling towers at all Phase II facilities. Xcel Energy appreciates the Environmental Protection Agency's (EPA, The Agency) recognition that a solution to the 316(b) issue requires a flexible regulation that considers the highly variable nature of fish protection at intake structures. A national requirement for cooling towers at all facilities would have significant adverse implications for individual generating facilities and the industry as a whole despite the fact that minimal environmental benefit would be produced at many facilities.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

For a variety of reasons, EPA did not select a regulatory scheme based on the use of closed-cycle, recirculating cooling systems at all existing facilities. Please see Section VII.E in the preamble to the final rule for additional information.

Comment ID 316bEFR.097.002

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.08

Option: UWAG's recommended approach

Xcel Energy favors the implementation of 316(b) permitting via a site-specific permitting process. EPA has failed to demonstrate that impingement and entrainment are a universal problem at cooling water intake structures mandating nationally prescribed performance standards. A site-specific determination is the method that has been used by permitting agencies for the past 25+ years resulting in a significant body of expertise and legal precedent to guide the process. We have one significant concern with the two site-specific proposals put forward by EPA. Both of these proposals assume that adverse environmental impact is occurring at cooling water intake structures and therefore some mitigation is required unless cooling water use is the equivalent of closed cycle cooling. Xcel Energy feels the site-specific proposals offered by UWAG and PSEG offer better site-specific alternatives. The proposals include a definition of adverse environmental impact, which EPA has chosen not to define.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.097.003

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Xcel Energy appreciates that EPA has recognized the variability inherent in providing fish protection at cooling water intakes in the preferred alternative they have chosen in the proposed regulation. We support the flexibility provided by allowing facilities to use a suite of options to meet the requirements. Permittees can choose to install intake technologies, implement operational modifications, or undertake restoration measures to meet the performance standards. In addition EPA offers a cost-cost or a cost-benefit test that allows facilities to demonstrate they qualify for reduced performance standards based on excessive costs of the prescribed methods.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.097.004

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Xcel Energy supports EPA's use of the design intake flow for applying the 50 MGD criteria but favors the use of actual intake flows for the 5% criteria for entrainment protection. The design flow is appropriate given the definition of existing facilities and the ability to modify them if no increase above the design flow is proposed. The 5% criteria though should be based on actual water use to avoid imposing costly entrainment protection based on possible water use.

EPA Response

Please see response to comment 316bEFR.019.003.

EPA disagrees with the commenter's suggestion to use actual intake flows rather than design flows for the 5% mean annual flow criterion for entrainment protection. Design intake flow is a fixed value set based on the design of the facility's operating system and the capacity of the circulating and other water intake pumps employed at the facility. This allows a clear and timely classification of facilities. The design intake flow does not change, except in those limited circumstances when a facility undergoes major modifications or expansion, whereas actual flows can vary significantly over sometimes short periods of time. EPA believes that an uncertain regulatory status is undesirable because it impedes both compliance by the permittee and regulatory oversight, as well as achievement of the overall environmental objectives. Further, using actual flow may result in the NPDES permit being more intrusive to facility operation than necessary since facility flow would be a permit condition and adjustments to flow would have to permissible under such conditions and applicable NPDES procedures. It also would require additional monitoring to confirm a facility's status, which imposes additional costs and information collection burdens, and it would require additional compliance monitoring and inspection methods and evaluation criteria, focusing on operational aspects of a facility.

Comment ID 316bEFR.097.005

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

In addition, we feel that EPA has no legal basis to apply 316(b) regulations to facilities that have only general storm water permits as they have proposed to do. Xcel Energy also requests clarification on the permitting of intake structures that obtain their water from second parties not covered by 316(b) requirements. Requiring fish protection at one intake among a series of numerous intakes seems a little capricious.

EPA Response

See response to 316bEFR.035.001. The final rule specifies that use of a CWIS includes obtaining cooling water by any sort of contract or arrangement with an independent supplier (or multiple suppliers) of cooling water if the supplier or suppliers withdraw(s) water from waters of the United States and is not itself a point source. As indicated in the rule, this provision is intended to prevent circumvention of the final rule requirements by creating arrangements to receive cooling water from an entity that is not itself a point source.

Comment ID 316bEFR.097.006

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Xcel Energy maintains that it is impossible to minimize something that is not defined. EPA needs to define adverse environmental impact and base the definition on principles of fishery population biology and not individual organism impacts.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.097.007

Subject Matter Code 7.02

Performance standards

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy requests clarification pertaining to the methodology to assess impingement mortality and entrainment reductions proposed by EPA. In particular, the relationship between impingement (and resulting impingement mortality) and entrainment complicates the assessment of the required percent reductions. EPA must clarify in the regulation how these reductions are to be measured and how to account for the proportionate increase in impingement (and likely mortality) caused by the implementation of entrainment protection at a cooling water intake. Based on several years of experience, the assessment of the survival of entrainable organisms when subjected to impingement is very difficult to accomplish with any degree of certainty.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.097.008

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy has a number of concerns regarding implementation of the proposed rule. In particular how the proposed study requirements fit into the NPDES permit renewal application requirements. The regulation requires completion of extensive studies prior to submitting an NPDES renewal application. There are also agency approvals necessary before proceeding to the next step in the evaluation. We have concerns with the permittees ability to complete the required studies especially if their permit application is due within three years after implementation of the regulation. EPA must clarify how the conditions of the regulation will be implemented especially in the first few years.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.097.009

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 21.04

Determination of compliance

EPA should also define what constitutes compliance with the regulation. Xcel Energy supports establishing compliance schedules in the newly issued NPDES permit. This would provide permittees with clear expectations on how to remain in compliance with their permit.

EPA Response

Please see EPA's response to comment 316bEFR.081.006.

Comment ID 316bEFR.097.010

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

We also are concerned with the seemingly endless study requirements in the regulation. We feel that once compliance with the performance standards is demonstrated there is no need to revisit the studies with each subsequent NPDES permit application. Additional studies should be necessary only if changes are made at the facility that impact the cooling water intake operations or significant changes have occurred in the source water body ecosystem.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.097.011

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Xcel Energy urges EPA not to adopt its alternate proposal to limit water use to that achieved by closed cycle cooling at any or all facilities. Imposition of a national performance standard is not justified based on the inherent variability of cooling water intake structures and the lack of a demonstrable universal impingement and entrainment problem. EPA has not accounted for several important issues in its analysis of the economics of the cooling towers option. Some of these ignored issues include; lack of physical space, availability of materials and manpower to meet the schedules and cost estimates, and the increased consumptive use of water in water-limited areas of the country.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.097.012

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Xcel Energy supports the EPA's decision to not impose a national performance standard requiting facilities to meet closed-cycle cooling system water use limits at any or all facilities. The Agency has recognized and stated several times in the preamble to the proposed rule the highly variable nature of determining adequate fish protection at cooling water intake structures. Because of this need for flexibility, Xcel Energy supports the adoption of a site-specific determination option proposed by EPA in the Preamble to the proposed regulation. In the final Section 316(b) Rule for New Facilities EPA opted for a universal standard of cooling towers at all facilities. The agencies reasoning was that cooling towers could be more efficiently and cost effectively designed and installed at new facilities where there were no pre-existing conditions or limitations. The need for flexibility in a rule pertaining to existing facilities is critical to allow facility owners a range of options to meet the fish protection requirements.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.097.013

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Xcel Energy prefers the choice of a site-specific permitting process as discussed by EPA in Section VI.C of the Preamble. The site-specific alternatives discussed offer more flexibility than EPA's preferred alternative permitting process. The Agency initially proposed Section 316(b) rules and guidance in the 1970s. Since that time, state permit writers and environmental protection agencies have made Section 316(b) decisions on a case-by-case basis. During the intervening years a substantial volume of research, administrative precedent, and case law have been developed pertaining to Section 316(b) implementation. Many state permitting agencies have developed 316(b) permitting procedures following the 1977 EPA Guidance Document that have been continuously refined and have functioned well over the years. In addition permittees have spent many years and significant resources conducting research and monitoring of previous 316(b) facility permitting decisions. It seems highly inefficient and wasteful not to better utilize this significant investment in the permitting process by parties from both sides of the issue.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94. (see § 125.90(c)).

Comment ID 316bEFR.097.014

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 6.01
Overview of I & E effects on organisms

A site-specific approach is also supported by the fact that EPA has made no demonstration that impingement and entrainment losses are a universal problem creating adverse environmental impacts at all cooling water intake structures. EPA cites a few examples of facilities where there may have been impacts but in fact most are being or already have been addressed by the facility owners through the existing permitting process. Hundreds of other facilities have been sited under the existing permitting procedures where there has been a lack of demonstrable impact as a result of the cooling water intake structure. The Agency even recognized, in the Notice Of Data Availability (NODA) for the new facility rule, the highly variable nature of cooling water intake structure impacts citing, for example, the lower entrainment susceptibility of fresh-water riverine fish species.

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion on the environmental impacts associated with cooling water intake structures. Today's final rule allows for a site-specific approach as one of the alternatives for meeting the requirements of § 125.94(a).

Comment ID 316bEFR.097.015

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

Xcel Energy has one concern with the two site-specific proposals outlined in the proposed regulation by EPA. Both of the proposed options for site-specific determinations (the Sample Site-Specific Rule and the 1977 Draft Guidance based alternative) assume that there will be adverse environmental impacts and that some mitigation or restoration will be required at all sites. This unsupported assumption also contributes to EPA's unwillingness to define adverse environmental impact The EPA proposals use the significantly greater than estimated benefits as the cost/benefit test but do not define how significantly greater would be interpreted.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.097.016

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.08

Option: UWAG's recommended approach

Xcel Energy feels the site-specific proposals offered by UWAG and PSEG present a workable permitting process that insures protection of aquatic life. The proposed permitting procedures include a population-based definition of adverse environmental impact but do not assume that adverse environmental impact occurs at all sites. The UWAG process incorporates the use of the EPA's ecological risk assessment process (used successfully in many other federal and state permitting programs) to assess the potential and magnitude of adverse environmental impacts. The UWAG process also actively involves the various stakeholders in the impact evaluation procedures. As a result of the risk assessment evaluation the cost/benefit test produces a result that maximizes net benefits for selecting technology for minimizing adverse environmental impacts.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.097.017

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 21.08
Burden on permitting agencies (general)

The Agency's reluctance to support a site-specific permitting process based on increased regulatory agency burden concerns Xcel Energy. While the burden placed on regulators is an issue to all involved in NPDES Permitting, the imposition of costly environmental requirements lacking any demonstrated benefits at numerous generating facilities contradicts this Administration's mandate for cost-effective regulation. Site-specific regulation, with accompanying Guidance from EPA based on nearly 30 years of experience, can produce an efficient permitting process.

EPA Response

EPA has included the site-specific determination of BTA in today's final rule in addition to four other compliance alternatives. Please see response to comment 316bEFR.019.014 for a discussion of site-specific considerations.

Comment ID 316bEFR.097.018

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 7.01
RFC: Three-option framework for determining BTA

EPA's Preferred Alternative

Xcel Energy appreciates that EPA has recognized the variability in cooling water intake structures and the importance of site-specific determinations in the preferred permitting alternative The Agency has proposed. We support the proposals flexibility that allows facilities to meet the performance standards by using a combination of intake protection technology deployment, voluntary operational modifications or restoration measures, and possibly a trading program. By having a suite of measures to choose from facilities will be able to best accommodate individual facility conditions and most effectively meet the performance standards. In addition the preferred alternative recognizes the importance of developing environmentally protective but cost effective solutions to impingement and entrainment impacts through the use of a cost-cost and a cost-benefit test to determine if less restrictive protection measures are justified.

Xcel Energy supports the flexibility the proposed alternative offers to facilities attempting to evaluate the compliance options available to meet the impingement mortality and entrainment reduction performance standards proposed. We do however have some concerns with parts of the proposal. Specifically there needs to be additional clarification included in portions of the regulation.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.097.019

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Xcel Energy supports the use of a facility's design flow in the 50 MGD applicability criteria given the definition of existing facilities as including future modifications to the facility that do not increase the full design flow capacity of the intake structure. However, we feel the actual water use would be more appropriate in regard to the 5% of source water flow criteria affecting which performance standards the facility will have to meet A facility that has reduced its water use through operational modifications should not be penalized by having to meet the much more costly requirement of installing entrainment protection based on a potential for water use. If the facility decides, in the future, to expand its water use to the design flows (or actual flows above the 5% criteria) then it would have to meet the entrainment protection standards. Xcel Energy favors utilizing actual water (an average value over a given number of years) use as the determining criteria for the installation of entrainment protection.

EPA Response

Please see response to comment 316bEFR.019.003 and 316bEFR.097.004.

Comment ID 316bEFR.097.020

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

EPA defines Phase II existing facilities as those that have or require an NPDES Permit to discharge pollutants including storm water. Xcel Energy is extremely concerned with the EPA proposal to include among Phase II existing facilities those facilities with only NPDES general storm water permits. We do not feel that EPA has the legal authority to indiscriminately expand the 316(b) program to unassociated areas of the NPDES permitting program. Facilities that do not have a regular NPDES permit likely have already taken steps to reduce their overall environmental impact. In addition, general storm water permits require the facility have a storm water pollution prevention plan in place to prevent contaminated runoff from leaving the site. There is no logical connection between a storm water discharge and a cooling water intake structure. There also are no provisions for regulating cooling water intake structures under general storm water permits. This would require permitting agencies to write individual storm water permits for these facilities further increasing the agency's permitting burden.

EPA Response

See response to 316bEFR.035.001. Although few facilities permitted only for storm water may be subject to this rule, there is no reason to believe that such facilities, as a result of storm water requirements, would have already addressed their cooling water intake structure impacts. In cases where 316(b) requirements are applied to facilities permitted only for storm water, Directors will follow all applicable and appropriate permit issuance or permit modification requirements.

Comment ID 316bEFR.097.021

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 3.04.01

RFC: Application to "unique" facilities

Xcel Energy has some concerns with the provision in the applicability criteria incorporating facilities that obtain their cooling water from second parties. We have facilities in western states that obtain their cooling water through extensive systems of canals that also serve numerous other water users of various types. It is not clear to us how cooling water intake structure regulations would be incorporated at one of multiple water users where the supplier is not subject to Section 316(b) regulation. Requiring an electric generating facility to install fish protection measures on its intake where a significant portion of the remaining water use is for irrigation (and consequent loss of all aquatic life) seems unreasonable in the extreme.

EPA Response

The comment does not provide sufficient information to respond regarding how such facilities are likely to be addressed under this rule and, even if such specific information was provided, the applicability of the criteria in section 125.91 of this final rule to a specific facility will be determined on a case-by-case basis, as is normal practice, to ensure consideration of all relevant factors. Nevertheless, numerous factors are relevant to the application of 125.91(c) to the general scenario described in the comment including, but not limited to, whether some or all of the canals are waters of the U.S., whether the supplier withdraws water through a cooling water intake structure from waters of the U.S., and whether the facility has a contract or arrangement with one or more independent suppliers. If these facilities meet the provisions of 125.91(c), EPA expects that the facilities, as purchasers or users of the water, would work with the independent supplier via contract or independent arrangement to ensure that the supplier meets 316(b) Phase II requirements, so that the purchasers could continue to do business with that supplier.

Comment ID 316bEFR.097.022

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Definition of Adverse Environmental Impact

EPA has chosen not to define adverse environmental impact in the current proposal but instead assumes that adverse environmental impact occurs at all cooling water intake structures. In essence EPA is saying that loss of individual organisms is adverse environmental impact. This concept is contradictory to modern fish management practices used by resource management agencies across the country. Fishing seasons and harvest limits are established to permit a controlled take but prevent harm to individual species or fish populations. These regulations are predicated on the concept that loss of individual organisms does not necessarily equal adverse environmental impact. Environmental impact is assessed at the species population or fish community levels rather than individual organism levels. In order to evaluate whether there is adverse environmental impact, and how to minimize it, EPA will need to either define adverse environmental impact or define what is not adverse environmental impact based on sound biological principles.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.097.023

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.02

Performance standards

Relationship Between Impingement Mortality and Entrainment

Xcel Energy has a number of concerns with the impingement and entrainment criteria proposed and the use of a “calculation baseline” to assess environmental impacts. Most facilities will be required to meet an 80 to 95% reduction in impingement mortality compared to the calculation baseline. A lesser number of facilities (depending on the type of water body on which they are located or based on their water use volume) will also have to meet a 60 to 90% reduction in entrainment from the calculation baseline. It is not clear in the proposed regulation how these two reductions will be measured when both impingement mortality reductions and entrainment protection are required especially since the regulation states that both reductions apply to “all life stages of fish and shellfish”. The issue is complicated by the fact that to reduce entrainment requires that impingement be increased by a similar magnitude likely increasing impingement mortality. Based on our experience it would be impossible to meet the impingement mortality reduction goals if entrainment protection is installed due to the sheer volume of organisms that will be impinged.

EPA Response

Please see response to comment 316bEFR.063.005.

EPA notes that consideration must be made when developing both an impingement mortality and entrainment reduction strategy. In some cases, the introduction of an entrainment control has resulted in an unintended increase in impingement losses. EPA also notes, however, that these situations can often be overcome with modifications and adjustments to the technology during the course of its deployment.

Comment ID 316bEFR.097.024

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.03

Available I&E technologies

One method EPA lists for reducing entrainment is by the use of fine mesh screens. Xcel Energy operates the Prairie Island Generating Plant located on the Mississippi River downstream from Minneapolis-St. Paul. The plant employs a variable speed 3/8-inch mesh traveling screen system with a low-pressure screen wash and a low impact fish return. During the period from April through August the plant also installs 0.5 mm mesh screens that in effect all but eliminate entrainment of any fish life stages. Under certain conditions fine mesh screens may be capable of meeting the entrainment reduction stipulated in the rule and appear to return even the eggs and larval fish life stages to the river. However, the ability to assess the survival of the impinged organisms is another issue that needs to be addressed by EPA and those performing assessment sampling.

We have conducted screen survival studies for several years and have found highly variable results. Impingement survival is a function of the fish handling system, the volume of organisms in the water column, the species and life stages present, the volume of other organisms present, and the sampling induced mortality (Environmental Monitoring and Ecological Studies Program for the Prairie Island Nuclear Generating Report, 1988) (Summary reports of the screen survival studies and the sampling mortality studies are attached.). Overall impingement survival (without sampling mortality assessed) varied from 2.7 to 32.1 % depending upon the species and life stages present. We conducted sampling mortality assessments in an effort to get a better handle on some of the variability observed in the survival data (Environmental Monitoring and Ecological Studies Program for the Prairie Island Nuclear Generating Report, 1990). Results of the sampling mortality assessment revealed that sampling induced mortality could account for 73% of the mortality observed in impinged fish. Sampling mortality was related to the debris volume in the individual samples. Samples with high debris loads (generally zooplankton) suffered very high mortality due to the time required to process the samples. Based on our studies it will be nearly impossible to meet the specified impingement mortality reductions when entrainment protection is employed. EPA needs to clarify the methods that facilities will use to assess impingement mortality when entrainment reduction technologies are also required at a facility.

Another issue with the use of fine mesh screens is the O&M they require. The fine mesh screen panels need to be installed and removed at the appropriate times of the year. The fine mesh screens themselves are fairly fragile and need constant replacement as a result of damage from debris in the water column. When the zooplankton and other debris loading is heavy the screen surfaces can plug quickly increasing differential pressure across the screen face and creating additional mechanical wear on the screen drive mechanisms. Fine mesh screens may be capable of meeting the performance requirements but to do so they will require close operational attention and vigilant maintenance practices which both come at significant additional costs to the facility.

EPA Response

EPA agrees that fine mesh screens have shown promise under certain circumstances for reducing entrainment and require a diligent maintenance and repair regiment to ensure satisfactory performance. The commenter also notes, correctly in EPA's view, that fine mesh screens may not need to be deployed year-round but rather only during seasonal spawning or other high risk events.

EPA appreciates the ongoing evaluation of technologies such as fine-mesh screens that Xcel Energy and others have undertaken over past three decades and welcomes the submittal of any information that may be of value to other facilities.

Comment ID 316bEFR.097.025

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

Implementation Issues

Xcel Energy has concerns with a number of significant issues with how the proposed rule would be implemented given the five-year NPDES permitting cycle. We feel additional clarification is needed in the regulation regarding how or in what time frame the conditions would be implemented following the regulation adoption. The draft states that the permittee must be in compliance with the regulation when issued a new permit following adoption of the regulation. Given the extensive pre-permitting study requirements and the numerous levels of regulatory review and approvals required by the proposed regulation this could be difficult or impossible to achieve. At the time the final regulation is published there will be facilities in various stages of the NPDES permitting process. Permit applications that are due in the two to three years following the effective date of the regulation will not have had time to design and conduct the required studies or to evaluate intake protection technologies. The comprehensive demonstration and impingement and entrainment studies described by EPA must be approved by the agency prior to initiation and could require at least two years to complete. Following completion of the environmental studies an engineering analysis to evaluate the technology, operational, or restoration options would likely take about another year and would also require agency review and approval prior to implementation. EPA should consider either establishing the effective regulation date several years after the regulation is finalized or allow permitting agencies to establish a compliance schedule in the initial permit requiring the facility to conduct the required studies and. to design and install the technology, if required, to meet the performance standards sometime within the life of the newly issued NPDES permit.

EPA Response

See response to comment 316bEFR.045.007.

Comment ID 316bEFR.097.026

Subject Matter Code 21.04
Determination of compliance

Author Name Daniel J. Orr
Organization Xcel Energy

Xcel Energy feels that EPA's draft proposal has not clearly defined what constitutes compliance with the regulation's requirements especially during the initial permitting cycle. This issue is important so that facilities will not be deemed out of compliance with their NPDES Permit during the study, design, installation, and evaluation phases of the mitigation process. Xcel Energy suggests that at least initial compliance be based on meeting steps established in a compliance schedule included in the NPDES Permit. EPA also should clarify when and how to deal with technologies that, for some reason, do not meet the performance standards so that additional measures are required. Xcel Energy would like to suggest that the subsequent permit renewal period be the appropriate time. This would allow the permittee access to data on what has and has not worked for other facilities.

EPA Response

EPA has included in today's final rule five alternatives for achieving compliance, and an option to demonstrate compliance with a Technology Installation and Operation Plan in place of numeric performance requirements. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.097.027

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy urges the EPA to allow use of previously performed 316(b) studies to meet some of the study requirements of the proposed regulation. This would be appropriate where current facility and environmental conditions have not changed significantly since the studies were performed. Permittees and permit writers have invested time and resources in conducting and reviewing these studies and their efforts should not be overlooked.

EPA Response

EPA agrees that existing historical data, as long as it reflects current conditions, should be available for use in completing studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.097.028

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Xcel Energy has serious reservations about the need for the seemingly continuous studies that will be required to demonstrate compliance with the regulation. EPA is requiring extensive studies be completed by permittees prior to submitting an NPDES Permit application. In addition there are compliance monitoring studies that are required following installation of fish protection technologies, operational modifications or restoration measures to assess effectiveness of the implemented technologies. In addition, it appears that EPA is requiring that follow-up studies be conducted prior to each subsequent permit renewal application for the facility. This requirement would result in nearly continuous studies being conducted at NPDES facilities adding substantial burden on the permittee as well as on the permitting agency to review the studies. EPA needs to add some clarification to this section of the proposal refining the subsequent study requirements to apply only when changes have occurred to the facility operations that may impact the function of the cooling water intake structure or significant improvements have occurred in the water quality of the source water body.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.097.029

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Xcel Energy also supports EPA's decision to allow restoration measures, alone or in concert with other technologies, to meet the performance standards. Xcel Energy also encourages EPA to provide flexibility in the use of restoration measures by allowing projects that may not be targeted at the specific cooling water intake structure impacts but never the less provide significant fisheries or aquatic wildlife related benefits. The use of restoration measures however, must be at the option of the facility not required a regulatory requirement. In some cases restoration measures may achieve greater gains in aquatic populations than intake technologies for similar cost. Use of habitat improvement or fish restoration programs would also lend themselves to an effective benefits trading program offering permittees yet another alternative to use in their efforts to meet the performance standards.

EPA Response

All restoration measures must meet the requirements described in the final rule.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

For a discussion of trading programs, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.097.030

Subject Matter Code 21.03

Monitoring requirements

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy would like to suggest a change to the stated reporting requirements. We urge EPA to alter the wording of the annual status reporting requirement to allow the permitting agency Director to specify the reporting frequency rather than EPA specifying an annual report. Some facilities may require annual reporting to assess progress on meeting the performance standards whereas at other facilities annual reporting may not be necessary.

EPA Response

In today's final rule, reporting will be required on a bi-annual basis, not annually.

Comment ID 316bEFR.097.031

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Xcel Energy has several serious concerns with EPA's alternative permitting strategy that would require facilities to meet an intake flow requirement the equivalent to that which would be used by a closed-cycle recirculating cooling system. This alternative would in effect require the installation of cooling towers at most Phase II facilities. This proposal ignores EPA's own admission that protection of organisms at cooling water intakes is highly variable. The proposal also fails to recognize that impingement and entrainment do not cause adverse environmental impacts universally.

Installation of cooling towers is not a viable option at many facilities where physical space to locate the towers is unavailable. This is especially true at many older metropolitan area plants that are surrounded by other facilities. The impacts of dealing with cooling tower plumes and subsequent fog and icing in metropolitan areas also needs to be considered.

Another issue EPA should consider in requiring universal installation of cooling towers is the availability of materials and manpower to undertake the extensive number of cooling tower installations during a limited period of time. Xcel Energy recently completed extensive maintenance to the towers at one facility and had difficulty finding an adequate number of skilled craftsmen to complete the project. The limited availability of materials and manpower caused by such a national mandate would result in significantly increased costs to get the work completed (if even possible) within the required time frame.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.097.032

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 2.04.01

Require closed cycle cooling

Xcel Energy is also concerned with some other water use issues related to cooling towers that EPA seems to have overlooked. Although cooling towers reduce overall water appropriation by a facility they actually increase the consumptive water use (loss) due to evaporation losses from the towers. These water use changes could impact facilities in two ways. Once-through cooling systems return nearly all of the water appropriated back to the system for subsequent downstream uses so the net loss to the system is minimal. In areas of the country where water use is closely regulated, facilities may not be able to acquire water rights to account for the additional water required to meet the increased consumptive losses. This increase in consumptive water use could also be a significant issue at facilities that are constrained by instream flow requirements to protect aquatic life. This increased water loss could be especially pronounced during drought periods. Additionally, in states with prior appropriation water laws, failure to make use of your full water right results in forfeiture of that water volume not used. If facilities are required to reduce intake flows to the equivalent of closed-cycle flows they would not be able to utilize the full water rights and have to abandon them or try to sell them likely at reduced prices. The loss of those water rights would be considered a regulatory taking and would require compensation for the loss under the 5th Amendment.

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.097.033

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 10.1

General: cost tests

Economics and Benefits Assessments Issues

Xcel Energy feels that EPA has made some erroneous assumptions regarding the costs of technology installations and particularly on the cooling tower installation costs. From data we have seen the costs to install cooling towers is significantly higher than the cost used by EPA in their benefits analysis. In addition we feel EPA has over estimated the benefits attributed to the regulation in terms increased fishery production by overlooking entrainment survival. EEI and UWAG have spent considerable time and resources evaluating the benefits and costs used by EPA to justify this regulation. Their comments provide a detailed arid extensive analysis of the costs and benefits data and are fully supported by Xcel Energy.

EPA Response

EPA notes that the commenter's assertions regarding cooling tower retrofit costs reinforce and support the Agency's decision to not base the requirements of the final rule on this technology.

The Agency disagrees with the assertion that the Agency has overlooked the issue of entrainment survival. See response to comment 316b.EFR.306.516.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Ted Bach

On Behalf Of:

South Carolina Chamber of Commerce

Author ID Number:

316bEFR.098

Comment ID 316bEFR.098.001

Subject Matter Code 3.01

Definition: Existing Facility

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

The applicability section of the rule should be revised to clarify that manufacturing facilities are not covered by the Phase II rule.

Section 125.1 of the proposed rule provides a description of what existing facilities are covered by the Phase II rule. Wording is contained in several sections of the preamble indicating that the Phase II rule does not apply to manufacturing facilities including this statement contained in section IV, “Today’s rule does not apply to facilities whose primary business activity is not power generation, such as manufacturing facilities that produce electricity by co-generation.” Under the proposed section 125.1, it is not clearly evident that power generation activities meeting the criteria stated in that section would be exempt from the rule if the power generation was owned or operated by, and used, solely for the support of the manufacturing facility. As discussed in the preamble, a provision stipulating that these facilities would be exempt from the Phase II rule should be added to the applicability section (125.1) of the rule.

EPA Response

See response to 316bEFR050.002.

Comment ID 316bEFR.098.002

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 3.05

Facilities not covered by today's proposal

The provision requiring best professional judgment (BPJ) requirements for all existing CWIS not covered by the Phase II rule should be eliminated.

Section 125.90(c) requires that existing facilities not covered by the Phase II rule must meet 316(b) requirements as determined by the Director on a case-by-case, best professional judgment (BPJ) basis. Inclusion of this subpart is unnecessary and could be interpreted to mean that all existing CWIS not covered by the phase II rule require BPJ based requirements for their CWIS, regardless of their size, location, etc. In addition, since EPA is not providing any guidance on how to apply BPJ requirements to these CWIS, the provision will cause confusion and uncertainty for both the permit writers and the regulated facilities. Since the existing provisions of 316(b) already cover permitted facilities and a Phase III CWIS rule will be forthcoming, there is no need to include this provision.

EPA Response

See response to 316bEFR.063.021.

Comment ID 316bEFR.098.003

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Actual flow should be considered in the threshold for applicability.

A permittee whose actual CWIS flow is less than the 50 MGD threshold should be allowed to request exemption from the Phase II rule. Facilities may choose to operate at flow volumes below the design flow of the CWIS and should not be penalized for this voluntary flow reduction. If a facility chooses to select this option, EPA could institute maximum flow limits in the rule or individual permit to ensure that the threshold flow is not exceeded. Also, the facility would likely be covered under the Phase III CWIS rule thereby ensuring adequate protection.

EPA Response

Please see response to comment 316bEFR.019.003. In addition, EPA notes the commenter's suggestion that facilities that meet the 50 MGD total design intake flow threshold can be excluded from the rule if they agree to binding maximum flow limits. EPA did not adopt this approach because it is EPA's experience that facilities' average intakes are not constant, but rather fluctuate over time. In order to be protective, EPA chose to define the intake threshold based upon design capacity rather than actual cooling water use. Facilities with low capacity utilization rates; however, will be subject to less stringent requirements under § 125.94. Please see the final rule preamble for an explanation of the basis for today's final rule.

Comment ID 316bEFR.098.004

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling ponds or lakes created specifically for cooling purposes should be considered as closed-cycle cooling systems.

Cooling ponds or lakes that were created specifically for cooling purposes should considered as closed-cycle cooling systems. The cooling ponds or lakes should be considered as part of treatment systems of the facility, not as "waters of the United States." In these situations the CWIS flow determination should be measured at the CWIS used to provide the makeup water for the cooling pond or lake, not by the cooling water flow through the facility.

EPA Response

See responses to 316bEFR006.001. and 316bEFR.015.002.

Comment ID 316bEFR.098.005

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

The proposed performance standard is based upon technology standards, which fail to consider if adverse environmental impact is occurring.

The proposed performance standards are based upon entrainment and impingement reductions that could be achieved if certain technologies are implemented. Although the proposed rule does not specific what technology must be used to meet the performance standard, the standard is technology based with an option to use restoration measures to supplement or replace implementation of technologies. The proposed rule with its performance standard, as well as the technology-based approaches under consideration, both ignore the fact that adverse environmental impact may not be occurring in all cases. Therefore both of these approaches may result in significant expenditures of resources that are unwarranted by site-specific conditions.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.098.006

Subject Matter Code 7.02

Performance standards

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

In addition, EPA states that the performance standard of reduction of impingement and entrainment is a “relatively easy and certain metric”. While impingement and entrainment studies may be relatively easy and certain, the performance standard being proposed requires the use of a “calculation baseline” from which the impingement and entrainment reductions are compared to demonstrate compliance. We believe that there is no scientifically sound manner to calculate that baseline where there is an existing CWIS in place, therefore the assessment of the performance standard can be seriously flawed.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.098.007

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 17.06

Option: Site-specific determination of BTA

A site-specific approach should be used to determine if adverse environmental impact (AEI) is being caused by an existing CWIS, and for determining the best technology available (BTA) to minimize the adverse impact if it is occurring.

EPA stated in its 1977 draft guidance document for evaluating adverse impact of CWIS that, “The environment-intake interactions in question are highly site-specific and the decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis.” EPA also recognizes that there is major impact differences associated with CWIS based upon water body types (i.e., freshwater streams and rivers, lakes and reservoirs, tidal rivers and estuaries, and oceans). It should be obvious that there are also many other site-specific factors that affect potential CWIS impacts that cannot be dealt with in a prescriptive manner. EPA indicates that it is considering various site-specific based options for the Phase II rule. A site-specific based approach is the most appropriate method for determining BTA, and the most appropriate approach for determining AEI. If a site-specific based approach is implemented for the final Phase II rule, the applicability of that rule should not change from what is being proposed in the preamble to the proposed rule with the exception of comments presented above.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.098.008

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Site-specific process for determining the best technology available for minimizing adverse environmental impact and the role of costs and benefits

An evaluation of cost-effectiveness (i.e., the incremental cost to benefit) should definitively be a component of the analysis to determine best technology available (BTA) for minimizing adverse environmental impact (AEI). We also believe that a test based upon the “benefits should justify the cost” would be more appropriate than the “wholly disproportionate” cost-to-benefit test currently used, or the “significantly-greater” cost to benefit test proposed in the sample-site specific rule. EPA should not establish minimum standards by regulation for cost evaluation studies due to the complexities involved with a site-specific approach. EPA should develop guidance for conducting these types of studies and provide examples of a variety of methods that may be used at the option of the permittee.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.098.009

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Voluntary Restoration Measures or Enhancements

Facilities should be able to undertake restoration or enhancement projects in combination with, or in lieu of, technologies to minimize AEI. There are certainly cases where much greater environmental benefit can be achieved by these types of projects. The objectives of enhancement or restoration projects should be established and agreed upon in advance, and appropriate monitoring and/or reporting obligations would be conducted to confirm that the objectives of the projects have been achieved.

EPA Response

Under the final rule, restoration measures may be used in lieu of or as a supplement to design and construction technologies and operational measures.

EPA agrees that the objectives of restoration measures should be established and agreed upon in advance and appropriate monitoring and reporting should be conducted to confirm that the objectives have been achieved. EPA believes the requirements in the final rule will aid permit applicants and permitting authorities in this process.

Comment ID 316bEFR.098.010

Subject Matter Code 21.04

Determination of compliance

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Compliance Monitoring Issues

Once a facility and the permitting authority have agreed upon the appropriate BTA and it has been properly installed, operated, and maintained, the facility should be considered in compliance with the conditions of their permit. If compliance monitoring indicates that a performance standard or restoration/enhancement objectives are not being achieved, this should not be considered as noncompliance with the provisions of the permit. Because of the time and inherent variability involved with monitoring fish populations over multiple seasons, or the success or failure resulting from restoration/enhancement projects, we do not believe that re-opening of permits would be necessary except in extreme cases. Therefore, any modifications to 316(b) requirements should be dealt with during the normal permit renewal process.

EPA Response

Please see EPA's response to comment 316bEFR.081.006.

Comment ID 316bEFR.098.011

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 21.08

Burden on permitting agencies (general)

Burden to Regulatory Agencies from Site-Specific Decision Making

EPA has expressed concerns about the burden that will be placed upon regulatory agencies if a site-specific approach is adopted. The promulgation of new CWIS rules for existing facilities will place burdens on both permittees and the regulating authorities, regardless of the approach adopted. However, we believe that any burdens arising from a site-specific approach may be less than the potential costs of complying with a prescriptive performance standard. We also believe that greater environmental benefit will be achieved with the use of a site-specific approach. It is also likely that the use of a scientifically sound, site-specific approach will result in fewer legal challenges, thereby reducing some of the burden to the regulatory agencies that may occur under a prescriptive approach.

EPA Response

EPA has included the site-specific determination of BTA in today's final rule in addition to four other compliance alternatives. Please see response to comment 316bEFR.019.014 for a discussion of site-specific considerations.

Comment ID 316bEFR.098.012

Author Name Ted Bach

Organization South Carolina Chamber of Commerce

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

EPA has also invited comment on whether the resource requirements of the site-specific approach serve as a disincentive to a comprehensive revisiting of section 316(b) permit conditions during each renewal, despite advances in technologies for reducing impingement mortality and entrainment. We believe that once a facility has installed BTA there is no need for a comprehensive review at each permit renewal. It is unlikely that possible advances in technologies for prevention of entrainment and impingement will improve to the point that would warrant retrofitting of technology during each five-year permit cycle, nor would it be practical to expect permittees to make expensive technology changes on such a frequent basis. A facility should only have to demonstrate during permit renewal that there are no significant changes in the operation of the permitted BTA, and that conditions in the water body are similar to those occurring during the original 316(b) demonstration. If comprehensive re-evaluations are deemed necessary, they should be conducted on a minimum of a ten-year cycle (every other permit renewal), which would reduce the burden to the permitting authority.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. However, permit conditions will be reviewed at each permit cycle and adjustments, if any, will be made as appropriate. Please see response to 316bEFR 041.126 for a discussion.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

R. McLean

On Behalf Of:

State of Maryland Dept of Natural Resources

Author ID Number:

316bEFR.099

Comment ID 316bEFR.099.001

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

[T]he State of Maryland believes that our existing 316(b) CWIS regulations have been and continue to be protective of the environment and the State's natural resources. For this reason, we suggest that the Phase II rule include the option of a State's existing regulations being accepted as satisfying 316b requirements. We strongly support a site-specific approach for determining BTA to minimize Adverse Environmental Impacts (AEI). We also believe that AEI should be considered at the species or ecosystem-effects levels and not simply on the numbers of organisms entrained and impinged.

EPA Response

Today's final rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. Additionally, § 125.90(d) states that nothing in today's rule precludes a State or Interstate Agency from adopting or enforcing any requirement that is not less stringent than those required by Federal law. Today's rule does not preclude the consideration of environmental impacts at the species or ecosystem-effects level. For more information regarding the topic of environmental impact, please see the response to comment 316bEFR.025.018 and for more information regarding the definitions for adverse environmental impacts rejected by EPA, please see response to comment 316bEFR.011.041.

Comment ID 316bEFR.099.002

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 3.06

RFC: Cooling water withdrawal thresholds of 25%

Because the 50 MGD cut off is used to establish whether a facility should be covered under the Phase II or Phase III rule, the exact figure used for that cutoff is not of major concern. The 50 MGD withdrawal rate seems to be a reasonable criteria for separating the large, once-through cooling facilities from smaller cooling water users, as does the 25% cooling water use threshold.

EPA Response

EPA notes the comment. No response required.

Comment ID 316bEFR.099.003

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Cumulative impacts of multiple intake structures in same watershed and in already impaired waterbody; effects of multiple intakes on fish stocks (V: 17136)

PPRP has evaluated cumulative effects of impingement and entrainment in Maryland. Because Maryland generating facilities have a rather broad geographical distribution, the biological populations exposed to the effects of these widespread plants are often distinct, with little or no intermingling. For example, species such as white perch and striped bass have tributary-specific stocks, such that impingement of white perch at the Morgantown facility on the Potomac River is of no biological consequence for white perch stocks in the vicinity of the Vienna facility on the Nanticoke River. Conversely, other species, such as Atlantic Menhaden (Brevortia tyrannus) may have a single stock that moves throughout the Chesapeake Bay. Thus, the total number of menhaden impinged at all of the power plants in Maryland is of potential relevance to the fate of the single menhaden stock. Maryland has tracked cumulative impingement losses across all power plants for species, such as menhaden, that may occur over a wide range of salinity regimes. However, in lieu of complicated and imprecise population modeling, the losses due to impingement were simply compared to other sources of menhaden loss to place them within a reasonable context. These comparisons showed that the cumulative magnitude of impingement of menhaden, as an example, is a small fraction of the commercial harvest of the species, and a small fraction of estimates of the amount of this species consumed by predators. On that basis, the state has concluded that the levels of impingement by Maryland's power plants do not represent a significant threat to this important resource species in the bay.

EPA Response

Please see response to comment 316bEFR.056.017 for the discussion regarding cumulative impacts associated with multiple intakes in a watershed. Also, please see the response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.099.004

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

If an adverse cumulative impact to a watershed ecosystem is suspected or indicated, we recognize that considerable uncertainties may exist in the identification of individual contributors to the problem and the assignment of responsibility for ameliorating these impacts. Our research into this issue (Hochberg et al., 1993) has indicated that the lack of a regional land use or water quality management plan would make it difficult to sort out effects of power plants from other influences. In the absence of knowledge about other influences on the receiving water body or ecosystem, any assessment of cumulative impact and the effect of a single action (e.g., discharge permit approval) would be flawed. Minimizing the effects of power plants within a watershed would reduce the likelihood that such plants could contribute to environmental degradation. However, we believe that to require facility owners, and thus consumers, to incur substantial cost to do so when the benefits of such measures are unknown would be unreasonable. For this reason, Maryland has continued to support the concept of site- and facility-specific impact assessments, including those relating to cumulative impacts.

EPA Response

EPA agrees with this commenter that it is extremely difficult to separate the effects of any one factor causing stress on the environment when so many work concurrently. The intention of section 316(b) of the Clean Water Act is to minimize the adverse environmental impact of cooling water intakes structures specifically. Reducing impingement and entrainment will serve to aid in alleviating stress on nearby fisheries and prevent any hindrance these structures may be having on other programs that serve to reduce other types of stress. Please see the response to comment 316bEFR.025.018. The permitting authority should consider the cumulative impacts of multiple intakes in a watershed as part of its section 316(b) decisionmaking process because stricter controls may be necessary when more than one facility kills large numbers of individuals of the same species in the same watershed.

Comment ID 316bEFR.099.005

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

With regard to Maryland's experience, cumulative impacts have been temporally addressed implicitly within the State through long-term monitoring of the status of important resource species. None of these diverse monitoring programs have suggested that an adverse cumulative impact to the State's fisheries have resulted from the effects of power plants operating in Maryland (Richkus and McLean, 2000; Ringger, 2000).

EPA Response

Please see the response to comment 316bEFR.099.004 by the same author.

Comment ID 316bEFR.099.006

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

With regard to use of watersheds as the basis for evaluating cumulative impacts of multiple facilities, cumulative impacts would only occur in circumstances where the multiple facilities are likely to be impacting the same ecosystem elements. For example, the effects of plants located on non-tidal waters in a watershed are unlikely to have impacts that would be cumulative to those of plants located on tidal portions of the same watershed (except with the possible exception of diadromous fish). We believe that cumulative impacts should be considered on the basis of affected resources and not simply on a watershed basis.

EPA Response

Please see the response to comment 316bEFR.099.004 by the same author. Diadromous species are exactly the type of species EPA believe need to be protected by considering the cumulative impact of multiple intakes in the same watershed. Multiple facilities located in the same watershed are more likely to be affecting the same population of a particular species. These types of impacts should be considered by the permit director as part of the 316(b) decisionmaking process. Please see response to comment 316b.EFR.099.004.

Comment ID 316bEFR.099.007

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Ecosystem level effects (food webs, nutrient-carbon-energy transfers, habitat alteration, species composition and biodiversity alteration) (V: 17137)

The diverse array of ecosystem level effects that are discussed in this portion of the proposed rule appear to be very speculative in nature, with minimal scientific support and citations. PPRP has conducted numerous studies of all ecosystem components at most of the generating facilities in Maryland over the past thirty years. We have recorded one clear ecosystem consequence of once-through cooling: benthic communities in the vicinity of power plant discharges tend to be enhanced (e.g., higher biomass densities), most likely due to increased availability of food in the form of planktonic organisms killed as a result of entrainment and settling out of the water column in the discharge area. This ecosystem response is restricted to a relatively small region, consisting of the immediate vicinity of the discharge plume. It is not inherently an adverse impact, since benthic organisms are an important food source for many of Chesapeake Bay's important resource species, such as blue crab and many fish species. From all other studies, no effects on other ecosystem elements have been noted, and no long term alterations in ecosystem structure or function have been observed that could be attributed to power plant operations (CEIR, 1986). Thus, we do not believe that existing data, information and literature support the occurrence of the speculative ecosystem level effects you describe.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level.

This author has pointed out an ecosystem effect caused by the killing of many organisms via entrainment. Enhanced benthic communities in the vicinity of the discharge of power plants is clear evidence that the food chain of the ecosystem has been disrupted which may lead to long term alterations in ecosystem structure and functions. Entrainment of eggs and larvae has disintegrated these organisms so they are no longer a food source for larger predatory fish, but instead are only available as a food source for detritivores and other benthic (bottom-dwelling) organisms.

Comment ID 316bEFR.099.008

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 7.02.02

RFC: Directors set performance levels for a facility?

Require greatest possible reduction based on EPA's performance standard technologies or allow performance level decision to be made by the Director (VI..A.1.a: 17142)

The specification of a performance level, in the absence of knowledge of what the benefits of performing at that level may be, could place an undue burden on plant owners, the states, and consumers. We believe that the Director would be more likely to have the local knowledge needed to make a reasoned decision on what performance level would be acceptable. Thus, we strongly support having the Director assume responsibility for determining the appropriate performance level.

EPA Response

For a discussion on the methods of determining compliance please see response to comment 316bEFR.063.005 and the preamble to the final rule.

Comment ID 316bEFR.099.009

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Appropriateness of "significantly greater" cost test for evaluating alternative requirements (Site-specific determination) (VI..A.4: 17146)

Maryland concurs with EPA's decision to utilize a "significantly geater" cost test in this Phase II rule. We agree that, for existing facilities, cost of retrofit should be a major factor to be considered in determining BTA. However, we have not done a detailed review of the basis for the costs in EPA's record to determine whether they are reasonable and valid.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.099.010

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

Allow restoration measures only as a supplement to technology or operational measures (VI..A.5: 17146)

Designation of restoration measures only as supplements to technology or operational measures may be too restrictive. There may be circumstances in which the cost of technology or operational measures to achieve modest environmental gains is very high, in which case much greater benefit to the State's resources could result from use of those same funds purely for restoration or resource enhancement. Thus, Maryland would prefer to retain restoration on a case by case basis as an acceptable alternative to technology or operations measures and not just as a supplement.

EPA Response

For a discussion of the use of restoration measures as a supplement to technology, see EPA's response to comment 316bEFR.060.023.

Comment ID 316bEFR.099.011

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Appropriate spatial scale for restoration measures: waterbody, watershed, State boundary (VI..A.5: 17146)

We believe it is reasonable to implement restoration measures within the same ecosystem and watershed within which the generating facility is located. This would be the most direct means of ensuring that the ecosystem and stakeholders with interest in the ecosystem (e.g., residents, fishermen) would be compensated for whatever impacts the generating facility may be having, even if that compensation is out-of-kind. An example within Maryland of such acceptable and beneficial restoration is PEPCO funding of anadromous fish migration blockages in the Patuxent River watershed as mitigation for entrainment (discussed in detail in comment 9 below).

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.099.012

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

Nature and extent of consultations with Federal, State, and tribal fish and wildlife agencies and information to be included in consultation request to Fish and Wildlife agencies (VI..A.5: 17146)

While we believe that a state's resource agencies would generally have the most comprehensive knowledge of the status of species potentially affected by a CWIS, other agencies, such as USFWS and NMFS, share regulatory authority for management of many species with the individual states. Requiring consultation by the permitee with such agencies on power plant impacts would make the 316b rules consistent with other federal regulations that deal with environmental impacts, such as NEPA. Such consultation would also bring to the process the special expertise often available from these other agencies.

EPA Response

For a discussion of the role of authorities other than the permitting authority, see EPA's response to comment 316bEFR.320.007.

Comment ID 316bEFR.099.013

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 11.0

Role of Restoration

How to measure "substantially similar performance" of restoration measures; methods to reduce uncertainty of restoration activities; margins of safety for restoration measures, basis for safety margins, appropriate authority to establish; how to consider additional environmental benefits to fish and shellfish in restoration projects; role of restoration in addressing CWIS impacts and alternative approaches (VI..A.5: 17147, 17148)

We believe that mitigation can play a valuable role in resolution of 316(b) issues on a site-specific basis. We use the term mitigation here to refer to something aside from alternative intake technologies or operating strategies which might be used to minimize impacts of cooling water intakes. The mitigation we refer to takes the form of some alternative measure which can compensate for resource losses in some other way.

Empirical studies of entrainment at Chalk Point (formerly owned by Potomac Electric Power Company or PEPCo, now Mirant) indicated the potential for significant losses of forage species (bay anchovy, naked goby, silversides) in the Patuxent River estuary. Such losses can inhibit the successful completion of the life cycles of other important species that use the Patuxent as a spawning and nursery area (MMES 1985). Based on field studies, PEPCo concluded (Loos and Perry, 1989) that the reduction in anchovy recruitment for the Patuxent was 4% and that entrainment mortality could cause a reduction in forage fish biomass of about 3,000 to 15,000 pounds (dry weight). These estimates were based on field measurements of population size in the Patuxent and entrainment by Chalk Point. An independent analysis conducted by the state of the same data indicated that loss of bay anchovy in the estuary due to entrainment was approximately 14 to 51% (most probably 20 to 30%) annually (Versar, 1989). PEPCo (Loos and Perry, 1989) calculated the value of the entrainment losses at $150,000 per year (1989 dollars) based on its loss estimates. PEPCo also calculated the cost of BTA alternatives (cooling towers and wedgewire screens) as ranging from $10,000,000 to $288,000,000 (1989 dollars). According to PEPCo, the alternatives evaluated varied in effectiveness in reducing entrainment from almost none to 100%. Maryland negotiated a mitigation plan in discussions with PEPCo. This plan was developed as a result of a number of factors, including the fact that there was a substantial difference between the cost of requiring BTA (such as cooling towers) and the environmental benefits. There was also substantial uncertainty regarding the magnitude of benefits and the nature of the impacted species. The negotiated settlement resulted in an NPDES permit requirement that PEPCo spend $200,000 per year on striped bass aquaculture or other species as requested by the Maryland Department of Natural Resources (DNR), and $50,000 per year for aquaculture of yellow perch or other species as agreed upon by DNR. This permit condition contemplated the production of 200,000 striped bass and 50,000 yellow perch per year. The permit additionally required PEPCo to provide $100,000 per year to the state for environmental education or for projects to remove obstructions to anadromous fish.

We believe a sound decision was made based on the success of this mitigation program. In this case, this program included creating a fish hatchery for potentially impacted fisheries and provision of funds for removal of obstructions to migratory fishes on tributaries, by removing dams or providing fish passage facilities. Results of the hatchery and stocking program resulted in the production and release of 3.5 million juvenile striped bass to date, the total estimated weight of which exceeded the estimated weight of forage fish lost from entrainment at Chalk Point. At the end of 1997, 750,000 shad had also been produced; this species is currently the focus of fishery restoration efforts in Maryland. Each of these benefits is directly related to the enhancement of the State's fisheries. However, no specific "valuation" approach was used to arrive at the enhancement objectives; the agreement on numbers of fish to be reared and amount of funds to be used for passage enhancement were based on technical expertise of agency staff and PEPCo staff and consultants, and targeted the State's resource management objectives.

We believe that a critical component of the regulation is to assure the provision of substantial flexibility to allow States to direct restoration and enhancement measures to their most pressing resource management needs. Placing rigid, restrictive criteria within the regulation would impose constraints on regulators that may not result in the greatest benefits to resources of concern and the resources of the states that are impacted.

EPA Response

For a discussion of the role and implementation of restoration measures in the final rule, see EPA's response to comment 316bEFR.081.007.

The final rule does not require a specific valuation approach to determine appropriate restoration measures. For specific requirements for restoration measures addressing species other than those impinged and/or entrained by a facility's cooling water intake structure, see section 125.95 in the final rule. EPA believes that the requirements for restoration measures in the final rule are important for ensuring a restoration measure addresses those adverse environmental impacts that derive from a cooling water intake structure.

Comment ID 316bEFR.099.014

Subject Matter Code 12.02

RFC: Monitoring frequencies

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Narrative criteria sufficient to support various BTA approaches to minimize AEI; require specific, minimum monitoring frequencies and consider uncertainty in I&E estimates; require 2 years of monitoring, at least once per month for 24 hours for I and biweekly for 24 hours for E during critical periods; require more frequent sampling to assess diel, seasonal and annual variation in I&E losses; less frequent monitoring for compliance, depending on technologies implemented (VI..A.6.a: 17148, 17149)

EPA notes the difficulties that are encountered in monitoring CWIS impacts, and Maryland's experience supports EPAs views on this issue. Because of the great diversity of natural conditions that could impact the accuracy and precision of estimates of CWIS impacts, we believe that it may be more appropriate to specify monitoring goals (e.g., certain levels of precision or documentation of impacts during a spawning season) and allow permittees to propose the means of achieving those goals. This would provide the flexibility needed to design monitoring programs that take into account site-specific environmental conditions. Setting any specific minimum sampling frequencies runs the risk of either "overkill" or insufficient sampling. Sampling designs can be reviewed by the Director to determine if they are sufficient to meet the objectives of the regulation.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.099.015

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Approaches to estimate entrainment mortality for compliance with performance standard; studies documenting entrainment survival rates (VI..A.7: 17149); review of quality of entrainment survival studies and inclusion of entrainment mortality and survival estimates in benefits assessment (VI..A.8.a.(3).b: 17150)

Maryland is aware of many of the entrainment survival studies conducted at facilities throughout the country in the 1970s and 1980s. One point to be made regarding these studies is that it is the nature of the power plant's cooling system rather than the nature of the CWIS that primarily determines the extent of entrainment mortality. Due to the diverse nature of these studies and the high degree of variability in some of the results, Maryland has in the past taken a conservative approach in our assessment of entrainment by assuming 100% mortality of all entrained organisms. We took this approach because the objective of our assessment was to determine whether the direct effects of entrainment might result in significant impact to the designated RIS species or ecosystem function. As we described earlier, most of our assessments lead us to conclude that entrainment effects did not result in significant impacts. The potential for substantial survival of entrained organisms becomes significant when the total number of organisms lost to entrainment is the focus of an assessment (e.g., in determining the economic value of entrainment losses). In such circumstances, we believe it appropriate to take into consideration the fact that all entrained organisms may not be killed. However, the onus is clearly on the permitee to provide scientifically valid support for such a position.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.099.016

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Appropriate methodology for benefits assessment (VI..A.8.a: 17149)

The procedure defined in Maryland regulations for determining BTA for impingement employs a very simple cost/benefit evaluation. The value of fish killed due to impingement is calculated using the dollar values of the affected species that are also included in Maryland regulation. The American Fisheries Society (AFS) has issued and regularly updates a listing of fish species and their dollar value, and these values are commonly used throughout the country in assessing dollar value damages in cases of environmental perturbations that result in fish kills (e.g., spills of toxic compounds). We believe there is thus precedence for use of the AFS fish values for calculating benefits of BTA. We believe that there is a high degree of uncertainty and controversy with regard to the many methods that have been developed to estimate non-use values of living resources, and thus do not strongly support their use in this regulation. However, we have not conducted a detailed review of the economic valuation procedures used by EPA in developing this Phase II rule.

EPA Response

EPA agrees that there is precedence for using American Fishery Society (AFS) fish values for approximating forage benefits under the rule. Note that replacement costs based on fish stocking are used routinely to monetize the damages associated with fish kills, including fish losses resulting from impingement and entrainment (e.g., by the Maryland Power Plant Program). While all parties acknowledge that these hatchery-based replacement “costs” are not true “benefits values” per se, in the absence of information on public values, these are accepted and used as the only available alternative for monetizing damages. In fact, in its publication presenting estimates of fish replacement costs, the American Fisheries Society states that such costs can be considered a “proxy for value.”

However, in the analyses for the NODA and the final rule, EPA has chosen to use the preferred foregone production method. In this method losses among forage species are translated into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A5: Methods Used to Evaluate I&E.

Please also note that for the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN # XX).

Comment ID 316bEFR.099.017

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 13.0

More Stringent Requirements

Allow states to require more stringent measures where recovery of a species or community could be delayed without these measures (VI..A.9: 17151)

Maryland believes that states should be permitted to require more stringent measures where necessary to protect key species.

EPA Response

Today's rule recognizes a State's authority to adopt more stringent requirements.

Comment ID 316bEFR.099.018

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 14.0

5% Flow Threshold in Rivers

Adequacy of 5% flow threshold in rivers or alternative of: 5% of spawning season flow, 10-15% of mean annual or spawning season flow, or 25% of the 7Q10, species-specific flow threshold (VI..A.11: 17151)

This issue is only potentially applicable in Maryland to the two plants located on the riverine portion of the Potomac River (Dickerson and R.P. Smith). For the Dickerson facility, 5% of the spawning season flow is 614 cfs in May, based on USGS Point of Rocks flow data; 10-15% of the mean annual flow is 951-1427 cfs; 25% of the 7Q10 is 215 cfs. Based on these flow ranges, the Dickerson facility could be subjected to entrainment reduction requirements depending on which criterion is chosen (maximum plant intake flow is about 400 mgd or about 620 cfs). Yet entrainment data collected at that facility has lead Maryland to conclude that no significant impacts result from entrainment. Any of these criteria are by their very nature arbitrary. For this reason, Maryland believes that it is more reasonable to consider the magnitude of entrainment and how that entrainment might affect a fish community rather than using an arbitrary flow cutoff percentage.

EPA Response

EPA believes it has presented ample evidence demonstrating a significant decrease in the level of entrainment when intake flow is minimized in relation to the flow of the source waterbody. The documents DCN# 2-013L-R15 and 2-013J support the proposition that flow is related to entrainment. EPA believes the intake capacity standard established under today's final rule provides an appropriate level of protection.

Comment ID 316bEFR.099.019

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Allow State to demonstrate adoption of alternative regulatory requirements with comparable environmental performance in I&E reduction within a watershed (VI..A.11: 17151)

The State of Maryland believes its regulations are protective of its natural resources and would like the opportunity to demonstrate that its regulations are of comparable environmental performance. However, it is not at all clear how a state would be able to make such a demonstration short of re-evaluating all of its facilities. EPA needs to provide clear and reasonable guidance to states on how they may make this demonstration if they desire to do so. Such guidance must be economically reasonable for the state to implement.

EPA Response

Today's final rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. EPA will review and approve a State's alternative regulatory requirements. EPA has left the decision on whether to attempt to make this demonstration to the discretion of the State. Such a demonstration may require re-evaluating all of its facilities. EPA does not see this as economically unreasonable because each facility should be re-evaluated with each permit cycle (every 5 years). Also as with any new rule, existing State section 316(b) determinations must be revisited to determine compliance with the new requirements.

Comment ID 316bEFR.099.020

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 15.0

State or Tribal Alternative Requirements

Appropriate definition of watershed for achievement of comparable environmental performance (VI.A.11: 17151); use of USGS 8-digit hydrologic unit as maximum geographic scale for alternative requirements; appropriate watershed scale definition and boundary of watershed units at State boundary unless adjoining states jointly propose alternative requirements (VI.A.11: 17152)

We addressed this issue under item 2 above. As we noted there with regard to use of watersheds as the basis for evaluating cumulative impacts of multiple facilities, cumulative impacts within a watershed would only occur in circumstances where the multiple facilities are likely to be impacting the same ecosystem elements. For example, the effects of plants located on non-tidal waters in a watershed are unlikely to have impacts that would be cumulative to those of plants located on tidal portions of the same watershed (except with the possible exception of diadromous fish). We believe that impacts should be considered on the basis of affected resources and not simply on a watershed basis. Thus, the scale to be used in defining a watershed is less relevant than the geographical distribution of the affected resource entities relative to the locations of the power plants. In cases, where affected resource stocks cross state boundaries, it would be reasonable to consider cumulative impacts of facilities located in adjacent states.

EPA Response

Today's final rule maintains the prerogative of a permitted State to demonstrate to the Administrator that it has adopted alternative requirements which will result in reductions in impingement mortality and entrainment comparable to those that would be achieved under § 125.94.

EPA has deferred a formal definition of "watershed" to the Director for the purposes of today's final rule. Because of the potentially numerous variables that interact in various waterbodies, EPA believes the Director will be best suited to make a determination of an appropriate watershed boundary for his or her constituency.

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.099.021

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 10.06.01

RFC: Incorp. costs/benefits without burden on Dir.

Minimum standards for Comprehensive Cost Evaluation Study; cost-benefits of meeting performance requirements and estimates of burden to regulatory agencies (VI.A.12: 17153)

Maryland concurs that EPA should establish minimum standards for cost evaluation, to ensure a “level playing field” for all facilities that wish to pursue this alternative within the regulation. Provision of guidance for conducting such an evaluation may alleviate some of the burden on the Director who would be required to review such evaluations. The more specific the guidance, the less burden imposed on the Director.

EPA Response

EPA agrees and has provided additional information on the Comprehensive Cost Evaluation Study in the final rule. See discussion regarding site-specific compliance alternative in the preamble to the final rule and the regulatory language for detailed information.

Comment ID 316bEFR.099.022

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Adequacy of capacity utilization threshold (15%); facilities operating at less than 15% capacity utilization required to implement BTA only for impingement and not entrainment (VI.A.14: 17154)

Maryland concurs with the use of the capacity utilization threshold within the regulation for the purpose stated. We also believe that the 15% threshold is not unreasonable, although, as with many of the thresholds established, it is arbitrary. Given it's arbitrary nature, it may be appropriate to provide to the permitee an opportunity to demonstrate that even at a somewhat higher utilization they should only be required to implement BTA for impingement.

EPA Response

The Agency disagrees that the 15 percent threshold for capacity utilization rates is arbitrary as the commenter asserts. The Agency provides the reasonable basis for the capacity utilization threshold at DCN 6-3586. Therefore, the Agency does not agree with the commenter's request that higher utilization rates thresholds be implemented. See response to comment 316b.EFR.041.238.

Comment ID 316bEFR.099.023

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Inclusion of regulations on impacts to local water resources other than I&E (VI..B: 17154)

This question appears to contemplate water use restrictions where evaporative losses can have a significant impact, e.g. in rivers and lakes. Maryland's regulations already include provisions for considering water losses at power plants within its water appropriations permit system. If EPA chooses to include such regulations in its 316(b) rule, it should permit states with existing regulations for this issue to adopt its own regulations as an alternative.

EPA Response

If a State 316(b) program is approved according to 125.90(c) of today's rule, a State will have flexibility to address evaporative losses as best suits the local environment.

Comment ID 316bEFR.099.024

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 17.05

Option: I&E reduction without regard to WB type

Intake capacity commensurate with close-cycle cooling systems based on waterbody type (VI.B.1,2: 17155); based on waterbody type and proportion of waterbody flow (VI.B.1,2: 17156)

Maryland supports EPA in not proposing the option of requiring intake capacity commensurate with close-cycle cooling systems based on waterbody type. Our evaluations of major estuarine power plants in Maryland, such as Calvert Cliffs, indicate that all estuarine facilities do not cause significant impacts as a result of entrainment. Thus, this option could impose significant costs on plant owners and customers without generating any environmental benefits. Maryland does not support the option that brings in the proportion of water body flow as a decision factor. The threshold value specified (>1% of flow) is arbitrary and has no scientific support. States should be given the flexibility to consider the significance of ecological and resource impacts in imposing BTA rather than being automatically required to impose requirements that are based only on an arbitrary threshold value.

EPA Response

EPA agrees that requiring intake capacity commensurate with close-cycle cooling systems based on waterbody type was not the optimal approach, and has not chosen that approach in today's final rule. For EPA's rationale for rejecting that compliance framework, please refer to the final rule preamble in the section entitled Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling Systems Based on Waterbody Type, and also, Intake Capacity Commensurate with Closed-Cycle, Recirculating Cooling System Based on Waterbody Type and Proportion of Waterbody Flow.

Comment ID 316bEFR.099.025

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Site-specific rule for determining BTA to minimizing AEI and framework for implementing (VI.C.1: 17159-17161)

Maryland is in general agreement that the framework presented is an appropriate site-specific approach for implementing the Phase II rule.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.099.026

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Various definitions of Adverse Environmental Impact, including that any I&E is adverse, or use a threshold approach (VI.C.5: 17162-17164)

As we noted earlier, Maryland regulations consider CWIS impact at the level of RIS or ecosystem function. We believe that this is a scientifically and valid basis for determining if adverse impact is occurring. We disagree that the numerical magnitude of organisms entrained and impinged is, by itself, indicative of adverse environmental impact.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.099.027

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Use of previous 316(b) demonstrations for AEI and BTA and criteria for current adequacy (VI.C.5.b(4): 17165)

Maryland strongly supports the use of prior 316(b) studies for demonstrations of AEI and BTA, but is in agreement with several of the caveats that EPA presents. Most importantly, we concur that results of prior studies are only valid and useful if the basic nature and composition of the source water body ecosystem has not changed substantially. If there have been major shifts in biological communities and major changes in relative species abundances, it is appropriate that the permitee be required to collect and submit data representative of current conditions.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.099.028

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 18.04

RFC: Role for fish & wildlife agencies for site-specific

Appropriateness of cost-effectiveness evaluation of CWIS technology or other measures to determine BTA for minimizing AEI (VI.C.5.c(3): 17165)

We believe that the use of an incremental cost-benefit assessment as a procedure for establishing BTA is reasonable. As suggested by PSEG, the costs of a series of potential BTA technologies would be estimated concurrently with the incremental environmental benefits that would result from implemention of those technologies. It appears that a requirement for such a sequential assessment may place a substantial burden on both the permitee as well as the Director, since the validity of each of the cost estimates would have to be evaluated. This may be a procedure that could be included as guidance, rather than being incorporated into the regulation itself.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests. Also see 316bEFR.345.003.

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Comment ID 316bEFR.099.029

Subject Matter Code 11.0

Role of Restoration

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Permit voluntary restoration or enhancement measures to be included for compliance (VI.C.5.d: 17166)

As we indicated in item 6, above, we believe that restoration or enhancement measures should not be considered to be only supplemental to BTA determination. Thus we are supportive of voluntary measures being accounted for in permitting decisions, to the extent that they are consistent with, and supportive of, a state's resource management goals and objectives.

EPA Response

Under the final rule, facilities may use restoration measures either in lieu of or as a supplement to design and construction technologies and/or operational measures that reduce impingement mortality and entrainment.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

A restoration measure may be designed to be consistent with and supportive of state resource management goals and objectives provided that the measures also meet the requirements for restoration measures described in the final rule, including those in sections 125.94 and 125.95.

Comment ID 316bEFR.099.030

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 21.08

Burden on permitting agencies (general)

Burden of implementing site-specific 316(b) rules on permitting agencies (VI.C.6:17167)

Maryland agrees that a site-specific approach does pose a substantial burden on the agencies with responsibility for reviewing and approving 316b applications. Because PPRP is unique within the country (e.g., a small surcharge on electric bills provides funding for the evaluation of power plant impacts), we recognize that many other states may not have comparable technical and financial resources to be applied for that purpose. However, as we have noted above, we strongly believe that a site-specific approach to 316b implementation is the most cost-effective means of maximizing benefits to our citizens from this new rule. Our suggestion to EPA for minimizing the burdens to other states would be to develop guidance documents for implementation of the rule that are clear and detailed, so that the information to be presented to the agencies is relatively standardized and done in a manner that enhances the likelihood that the findings are applicable, and technically sound.

EPA Response

EPA has included the site-specific determination of BTA in today's final rule in addition to four other compliance alternatives. Please see response to comment 316bEFR.019.014 for a discussion of site-specific considerations. In addition, EPA agrees with the commenter on the need for guidance and plans to develop guidance on implementation for today's final rule.

Comment ID 316bEFR.099.031

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Comprehensive Demonstration Study: specify particular submission time frame; require approval by Director (VII.B.4.a:17175)

We believe that approval of the demonstration study by the Director is very important, so we do not support removing that requirement. It appears reasonable to establish specific time frames for submission, but, given the substantial uncertainties that surround environmental studies, it is also reasonable to provide substantial flexibility to the Director in enforcing compliance with those time frames.

EPA Response

EPA agrees that with the commenter's statement that the approval of the Comprehensive Demonstration Study (CDS) by the Director is a crucial part of ensuring proper implementation of 316(b) requirements. EPA also agrees that the Director must have flexibility in establishing time frames for submittal of the CDS components. Please see 316bEFR.075.093 for a discussion of what to do in the instance that a facility needs additional time to complete studies.

Comment ID 316bEFR.099.032

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

State alternative regulatory requirements that are “functionally equivalent” and EPA decision criteria for evaluating them; role of restoration and habitat enhancement projects in these (VII..F: 17180)

As we have stated above and in prior submittals to EPA, Maryland believes that its existing 316b regulations have successfully protected our State’s aquatic resources and ecosystems. Thus, we strongly support including in the Phase II rule an allowance for accepting a State’s existing 316b regulations. However, the suggestion in this proposed rule is that the state would have to demonstrate that implementation of their regulations are “functionally equivalent” to implementation of 125.94. As we have noted above, Maryland considers adverse environmental impact at the RIS or ecosystem effects level, as opposed to 125.94 which encompasses total entrainment and impingement mortality caused by the plant. Thus, Maryland’s regulations may be determined by EPA to not be “functionally equivalent” to the regulation proposed in 125.94. We are very supportive of the incorporation of restoration and habitat enhancement as acceptable elements of state regulations.

EPA Response

Under 125.90(c) of today's final rule, EPA allows any State/Tribe to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within each relevant watershed that is comparable to the reductions in impingement mortality and entrainment that will be achieved under § 125.94. A State program would be evaluated at the watershed level, not the facility level, such that if reductions in impingement mortality and entrainment at the watershed level are expected to be similar to that which would be achieved under § 125.94, the program may be considered as functionally equivalent.

Comment ID 316bEFR.099.033

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Subject Matter Code 7.02

Performance standards

Definition of what constitutes entrainment vs. impingement

By definition, organisms that pass through a traveling screen and enter the cooling system are entrained, while those too large to pass through the screen are impinged on the screen. Thus, the size of the mesh on the traveling screen has bearing on what is entrained and what is impinged. A 3/8" mesh traveling screen is the conventional separation between the two. EPA should consider specifying the mesh size that would represent the standard for distinguishing between entrainment and impingement.

EPA Response

EPA has modified the definition of calculation baseline to include 3/8-inch mesh traveling screens to aid facilities in distinguishing between "entrainable" and "impingeable".

Comment ID 316bEFR.099.034

Subject Matter Code 11.0

Role of Restoration

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Use of out-of-kind mitigation

While restoration and enhancement is addressed at various points in the proposed rule, out-of-kind mitigation is not explicitly addressed. We have made the point under item 9, above, that a State should be allowed the flexibility to identify the enhancement or restoration measures that would provide the greatest benefit to their constituents, even if those measures represent out-of-kind mitigation. We describe the Chalk Point permit agreement above, in which striped bass and American shad juveniles were raised and released as mitigation for entrainment losses.

EPA Response

"Out-of-kind" restoration measures are permitted in the final rule insofar as they adhere to the general requirements for restoration, including those in sections 125.94 and 125.95. EPA believes the inclusion of the option to use restoration measures in the final rule provides permitting authorities and permit applicants with additional compliance flexibility.

Comment ID 316bEFR.099.035

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Frequency of detailed permit evaluations

While the standard NPDES permit renewal period is 5 years, in most instances ecosystems do not change substantially over such a short time period. Thus, it may be reasonable to require a detailed 316b reassessment perhaps only every third permit renewal, unless there is reason to believe there is a substantial change in the affected ecosystem or that plant operations are likely to be causing some significant impact.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. See response to comment 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.099.036

Subject Matter Code 12.02.01

RFC: Uncertainty in I&E mortality estimates

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Quantifying impingement

In many instances, large episodes of impingement occur as a result of already impaired or dead fish accumulating on intake screens. Such situations have occurred where large number of fish such as menhaden accumulate in small confined areas and die as a result of lack of oxygen, and are then drawn into intake screens. Similar situations sometimes occur where unusually cold water immobilizes fish, such as alewife on the Great Lakes. EPA should specify in their guidance documents some means of accounting for such pre-impingement mortality in assessing the need for BTA.

EPA Response

Please see EPA's response to comment 316bEFR.306.116 for an explanation of EPA's position on factoring naturally dead or moribund organisms. For EPA's position on upset or bypass provisions for episodic impingement mortality and/or entrainment events, please refer to the preamble and EPA's response to comment 316bEFR.034.017.

Comment ID 316bEFR.099.037

Subject Matter Code 7.02

Performance standards

Author Name R. McLean

Organization State of Maryland Dept of Natural Resources

Performance ranges vs. a single compliance target and performance baseline

We find the presentation of a range of performance targets somewhat confusing, and do not see that the provision of a range has any ecological significance. We understand that the range presented arises from information available on the efficacy of available intake technologies. However, if the range is based on performance of technologies, perhaps it would be more appropriate just to specify acceptable technologies and not attempt to specify a reduction target. Even in this circumstance, however, the intended reduction only has meaning when a baseline for comparison is established. While the proposed rule indicates what is considered to be a baseline (e.g., a shoreline intake with no protective screening), no guidance is presented on how to use existing or new data to extrapolate what baseline impacts might be. This is a critical missing element in the proposed rule, since compliance with the rule will have to be based on comparison of monitoring results after a BTA determination is made with these projected baseline values.

EPA Response

Please see response to comment 316bEFR.307.064.

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Celeste Canti

On Behalf Of:

State Water Reources Control Board

Author ID Number:

316bEFR.100

Comment ID 316bEFR.100.001

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 22.03

Other regulatory requirements

Background

The Proposed Rule would affect 19 existing power plants in California. These power plants are listed in the Enclosure. Of these 19 facilities, nine draw water from the Pacific Ocean. The others draw water from bays, harbors, deltas, and estuaries. Environmental factors have affected the aquatic populations in these water bodies. These factors include pollution, reduction of freshwater inflows, loss of wetland habitat, invasive species, overfishing, thermal discharges and water intakes.

California recently deregulated its electrical utilities and required its privately owned utilities to sell their power plants to other companies. The purpose of this was to separate the delivery of power from the generation of power. The privately owned utilities complied with this requirement and sold their power plants, except for two nuclear power plants, the San Onofre Nuclear Generating Station and the Diablo Canyon Nuclear Power Plant. The new owners have been modernizing the power plants by adding new combined cycle units or replacing existing simple cycle units with combined cycle units Projects of this type have been completed at Huntington Beach, are under construction at Moss Landing, have been approved at Contra Costa, and are under review at Potrero, Morro Bay, and El Segundo. The modernization will most likely continue until all the old single cycle units, except for the nuclear units, are replaced.

The modernization projects are being reviewed by the California Energy, Conservation and Development Commission (California Energy Commission) and the Regional Boards. To complete these reviews, the agencies have required biological studies to be completed to evaluate the impacts of the cooling water intake structures. These projects have been controversial. For various reasons, including the effects of the cooling water intakes, the public has expressed concerns about the continued use of the sites for power generation.

Federal Clean Water Act (CWA) section 316(b) studies were completed for California's power plants in the early 1980s. In some cases, the Regional Boards have required that these studies be revised if the new studies showed that modifications of the intake structures would be effective in reducing impingement and entrainment, the Regional Boards mandated the modifications.

Our experience is that existing technologies for once-through cooling water systems are good at preventing impingement but are poor at preventing entrainment, the effect of which is a challenge to model since the effect concerns impacts on complex biological systems. A parameter that the Central Coast Regional Board has been using for analyzing the effect is the proportional loss of larval productivity caused by entrainment. The proportional loss is determined by comparing the number of larvae entrained to the number of larvae in the source water. The method assumes that larval mortality through the cooling water system is 100 percent and that ecological systems do not compensate for the loss in productivity in a positive way. If this method is used, a once-through cooling water system located in a small bay or harbor will be shown to have a greater impact than a system located in an ocean. Exceptions for ocean intakes may occur when the intake is located in a small cove or an area of highly productive habitat.

California has an environmental review law called the California Environmental Quality Act (CEQA) that requires environmental review for projects, such as power plant modifications. In general, CEQA requires that for each significant impact identified in an environmental impact report (EIR), the EIR must discuss feasible measures to avoid or substantially reduce the project's significant environmental effect. CEQA gives public agencies in California the authority to require feasible changes in any or all activities involved in a project to substantially lessen or avoid significant effects on the environment. This authority, however, is not unlimited, and there must be a clear nexus between the impact and the proposed mitigation. Under CEQA, the California Energy Commission is the lead agency for review of power plant modifications and has its own environmental review process.

California brought new power plants on line last year, and, at this time, it has enough power generation capacity to meet its energy needs. (These new plants do not have water intakes.) It does not, however, have a surplus of power generation capacity, and some power plants recently approved for construction are not initiating construction because of uncertainty in California's energy markets. Hence, any rule that requires an extended down time for plant modifications in the near future could create energy supply problems in California.

EPA Response

Today's rule provides facilities with several options for complying with the requirements such that EPA does not expect that extended downtime will be needed by facilities.

Comment ID 316bEFR.100.002

Subject Matter Code 3.01

Definition: Existing Facility

Author Name Celeste Canti

Organization State Water Reources Control Board

Under the definition in the Proposed Rule, additional units or units that replace existing units would be classified as existing facilities. Although site constraints may prevent the installation of recirculating cooling water towers on these new units, for other upgrades the cost of constructing a recirculating cooling water tower may be equivalent to the cost of constructing a recirculating cooling water tower at a new facility. USEPA should consider this in developing its standards. The issue is whether existing facilities should always be “grandfathered” into the lower standard of the existing facility rule or whether they should be placed into the higher standard of the new facility rule as existing units are replaced.

EPA Response

See response to 316bEFR.064.002. As indicated in section II of the preamble to the final rule and the referenced response, changes at existing facilities are not always "grandfathered" and regulated as existing facilities. Such changes can be regulated as new facilities, depending on what they are. EPA notes that the Agency's national cost estimates indicate that it is more expensive (and more difficult) to retrofit close-cycle cooling towers at existing facilities than to install them at new facilities.

Comment ID 316bEFR.100.003

Subject Matter Code 7.02
Performance standards

Author Name Celeste Canti
Organization State Water Reources Control Board

The proposed rule lists performance standards that a power plant must meet. For a power plant that generates more than 15 percent of its maximum capacity, the standards are:

-An 80 to 95 percent reduction in impingement from what would occur if the power plant had no facilities to reduce impingement (i.e., an onshore intake with a trash rack) and

-A 60 to 90 percent reduction in entrainment from what would occur if the power plant had no facilities to reduce entrainment.

The Proposed Rule is unclear as to how to measure the required reduction in impingement and entrainment. Do you measure the reduction by counting the organisms impinged and entrained? Do you weigh the organisms impinged and entrained? If so, do you use dry weight or wet weight? Do you have to measure the reduction for each life stage, or do you lump all life stages together and use a combined count or weight?

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.100.004

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 7.03

Available I&E technologies

The technologies available to meet the required reduction in entrainment are unproven. Table 5-1 in the development document shows three technologies that can meet a 60 to 90 percent reduction in entrainment. These are the Gunderboom aquatic filter barrier, fine mesh traveling screen, and fine mesh wedgewire screen. The Gunderboom aquatic filter barrier has only been used at one facility; it may be susceptible to biofouling; and it may not work in conditions of heavy currents or wave action. Fine mesh traveling screens have had limited seasonal applications and require frequent maintenance, especially in marine environments. Wedgewire screens are more suitable for closed-cycle make-up intakes because the large size of the screens limits their applicability.

EPA Response

EPA disagrees with the commenter's assertion and maintains that the technologies forming the basis for the entrainment reduction range contained in the performance standards of today's rule are economically practicable for Phase II facilities considered as a group. A facility may opt for any combination of design and construction technologies, operational measures, or restoration measures to reduce entrainment as required by today's rule. Site-specific requirements are also available based on cost-cost or cost-benefit considerations.

EPA does not agree with the commenter's assertion that wedgewire screens are more suitable for closed-cycle make-up intakes; closed-cycle facilities do not necessarily withdraw small volumes of water. Wedgewire screens are typically limited in their application by debris loads in the source water, ambient current, and through-screen velocity. Larger-volume intakes may require more screen assemblies than would a smaller-volume intake. In these cases, the limiting factor may be the availability of sufficient space to locate the structures.

EPA agrees with the commenter's assertion that fine mesh screens require frequent maintenance and are typically deployed on a seasonal basis. EPA does not agree that this makes the technology limited in its applicability. While maintenance requirements for fine mesh screens may be greater than for standard wide mesh systems, EPA does not believe that an increased maintenance demand makes it an undesirable or economically-unfeasible option to reduce entrainment. Seasonal deployments of this technology may, in fact, be the desired option. Because entrainment events are typically associated with spawning seasons, fine mesh screens may not need to be deployed year-round. As with all design and construction technologies, the optimal deployment scenario must be tailored to the waterbody conditions and intake structure configuration unique to each individual facility.

EPA agrees that the aquatic filter barrier technology (Gunderboom) has only been deployed and evaluated at a limited number of facilities. Initial studies have shown promise to reduce both entrainment and impingement under certain waterbody conditions. It is too soon to make any determination in this rule as to the broad applicability of this technology.

Comment ID 316bEFR.100.005

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Because of the uncertainty of the available entrainment reduction technologies, applicants will most likely decide not to install them and instead will request site-specific determinations or will propose restoration measures as an alternative to meeting the performance standards Otherwise, the owners would risk violating their NPDES permits and being subject to fines and requirements to modify or replace their entrainment reduction facilities.

EPA Response

EPA recognizes that it can be difficult to demonstrate compliance with the national performance standards, e.g., because of variability in the ambient conditions. Therefore, EPA has authorized facilities, with the approval of the Director, to demonstrate compliance using a TIOP.

Comment ID 316bEFR.100.006

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

In situations where once-through cooling is being allowed, SWRCB supports a process in which the applicant is required to evaluate alternative technologies for impingement and entrainment reduction and to select the most effective available technology for the site. This selection would be subject to approval from the permitting authority.

EPA Response

EPA agrees that the permitting authority has a central role in the selection of the most effective intake technology. The final rule contains five compliance alternatives from which a permittee may choose. For a discussion of these alternatives and the methods for determining compliance, please refer to the preamble to the final rule.

Comment ID 316bEFR.100.007

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 7.01.03

Option 3--Site-specific determination

As an alternative to meeting the performance standards, the Proposed Rule allows a site-specific determination to be made when:

-The cost to comply with the performance standards would be significantly greater than the costs considered by USEPA when developing the performance standards; or

-The costs to comply with the performance standards would be significantly greater than the benefits.

Our experience is that it is difficult to obtain agreement on costs or benefits. The result is a long series of arguments involving dueling cost/benefit analyses. Cost estimates vary widely between estimates generated by the applicant and those generated by independent consultants. Estimates of biological impacts are even more variable, and the applicant often asserts that there will be no net impact. Even if agreement could be obtained on the benefits to a biological community of meeting the performance standards, agreeing on the monetary value on this benefit would still be difficult. If USEPA decides to adopt this portion of the Proposed Rule, we request that the Proposed Rule require the applicant to fund an independent analysis.

EPA Response

EPA does not believe that a large percentage of facilities will opt for a site-specific determination of BTA, reducing the risk of a protracted debate over the cost-cost or cost-benefit test. Please refer to the response to comment 316bEFR.202.002 for more information.

EPA also believes that the burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say "you [the facility] must demonstrate to the Director" when stating a requirement.

Comment ID 316bEFR.100.008

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 10.07.01

RFC: Appropriateness of "wholly disproportionate"

We also request that "wholly disproportionate" be substituted for "significantly greater" to ensure that site-specific determinations will only be used in unusual circumstances. A rule that requires cost/benefit analyses for most decisions will be difficult to administer.

EPA Response

See response to 316bEFR.006.003. This rule does not require a site-specific determination of best technology available for every Phase II existing facility. Rather, it provides five compliance alternatives, including the ability of facility to seek a site-specific determination of best technology available based on the facility's demonstration, that its compliance costs would be significantly greater than the costs determined by the Administrator in establishing the final rule performance standards, or if its costs of compliance are significantly greater than the benefits of complying with the performance standards at the facility. Given the diversity among Phase II existing facilities, different compliance alternatives are likely to be most cost-effective for different facilities. Given this fact, and the fact that implementing a site-specific determination of best technology available is a potentially more involved process than other available compliance alternatives, EPA expects that the overall rule will not be unreasonably difficult to administer. Costs and benefits have been considered as appropriate in 316(b) decisions made to date, and EPA has included reasonable criteria in the rule to guide this process.

Comment ID 316bEFR.100.009

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Celeste Canti

Organization State Water Reources Control Board

In lieu of or in combination with impingement and entrainment reduction technologies the Proposed Rule allows the use of restoration measures as an alternative to meeting the performance standards. Under the Proposed Rule, the applicant must demonstrate that the restoration measures will maintain fish and shellfish within the water body, including the community structure and function, to a level comparable to those that will result if the performance measures were met.

Although restoration efforts may create a net benefit, it may be unrealistic to expect the restoration effort to restore the original structures to the aquatic community. A cooling water intake structure will affect each aquatic species differently. Therefore, it may be difficult to demonstrate that the original community structure and function is being maintained.

EPA Response

Restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.100.010

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 11.02

RFC: Restoration measures as supplement only?

In cases where the cost of complying with the best technology available requirements would be wholly out of proportion to the benefits, it may be preferable to use a less effective technology combined with restoration measures. The emphasis of the Proposed Rule, however, should be the installation of facilities to minimize impingement and entrainment.

EPA Response

For a discussion of the use of restoration measures as a supplement to technology, see EPA's response to comment 316bEFR.060.023.

Comment ID 316bEFR.100.011

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

The Proposed Rule requires the applicant to complete a comprehensive demonstration study at least 180 days before the existing permit expires. As proposed, the comprehensive demonstration study must include:

-A proposal for information collection;
-Source water flow information;
-An impingement and entrainment characterization study;
-A design and construction technology plan;
-Information to support proposed restoration measures;
-Information to support a site-specific determination of best technology available for minimizing adverse environmental impact, and
-A verification monitoring plan

The proposal for information collection should be submitted at least two years before the submittal of the other portions of the comprehensive demonstration study to allow time to review the proposal and complete necessary monitoring.

For the design and construction technology plan, it is not clear as to how to calculate the baseline rate of impingement and entrainment. Rates for impingement and entrainment are site specific, and the only way to accurately characterize them would be to dismantle the existing technology and to measure the subsequent rate of impingement and entrainment. Since the baseline rates will later be used for the purpose of determining compliance, both applicants and regulatory agencies will probably not find estimated rates based on other sites to be acceptable.

EPA Response

Please see the preamble to today's rule and EPA’s response to comment 316bEFR.034.013 for an explanation of the calculation baseline.

Comment ID 316bEFR.100.012

Author Name Celeste Canti

Organization State Water Reources Control Board

Subject Matter Code 5.0

Char. of Industries Potentially Subject to Prop. Rule

CA SWRCB submitted with its comments (OW-2002-0049, 4-1.100 in the docket or 316bEFR.100 in this database): “Power plants in California that have cooling water intake structures.”

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

D.W. Coleman

On Behalf Of:

Energy Northwest

Author ID Number:

316bEFR.101

Comment ID 316bEFR.101.001

Author Name D.W. Coleman

Organization Energy Northwest

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

It is possible that an existing facility could operate an intake structure servicing a recirculating cooling water system and meet all of the applicability criteria, including the 50 MGD threshold. Since reduction of intake capacity commensurate with operation of a closed-cycle, recirculating system is a performance standard for demonstrating minimal adverse impact (proposed 40 CFR l25.94 (b)(1)), the applicability criteria (proposed §125.91) should simply "screen out" such systems (i.e., recirculating cooling systems). Also, if the cooling water withdrawn by a power producing facility is makeup to a recirculating system, the performance standard is met and there is no need for facility owner/operator to furnish all the detailed permit application information specified in proposed §122.21 and §125.95.

EPA Response

EPA agrees that facilities with closed-cycle, recirculating cooling systems meet the performance standards and are subject to fewer application requirements. Please refer to § 125.94(a)(1) for more information.

Comment ID 316bEFR.101.002

Subject Matter Code 7.02

Performance standards

Author Name D.W. Coleman

Organization Energy Northwest

Under another performance standard the facility must reduce impingement mortality by 80 to 95 percent of the calculation baseline (§125.94(b)(2)). The calculation baseline assumes a shoreline intake structure with no impingement controls. This could be interpreted as no trash racks, screens, and other devices against which fish and shellfish can be entrapped. This is problematic because, for this case, there could be no baseline impingement for measuring improvements.

EPA Response

Please see response to comment 316bEFR.063.022.

Comment ID 316bEFR.101.003

Author Name D.W. Coleman

Organization Energy Northwest

Subject Matter Code 21.03

Monitoring requirements

EPA is soliciting comments on appropriate monitoring frequencies for demonstrating compliance with impingement and entrainment standards. We believe it is not appropriate to specific monitoring frequencies in regulation. There are too many variables of location, design, and operation that must be factored into a monitoring program. Offshore intakes in locations exposed to swift currents have special safety considerations, particularly in cold weather regions. Collecting 24-hour samples once per month over two years (EPA suggestion at 67 FR 17149) constitutes excessive exposure in many situations. These elements need to be negotiated with the permitting authority on a case-by-case basis.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed Super

On Behalf Of:

Riverkeeper Inc.

Author ID Number:

316bEFR.102

Comment ID 316bEFR.102.001

Author Name Reed Super

Organization Riverkeeper Inc.

Subject Matter Code MISC

Miscellaneous comment

This comment was replaced by an updated version from the author. Please see 316bEFR.206.

EPA Response

Please see EPA’s response to the comment referenced in the comment text.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gary Aydell

On Behalf Of:

Louisiana Dept of Environmental Quality

Author ID Number:

316bEFR.201

Comment ID 316bEFR.201.001

Subject Matter Code 2.04

EPA's legal authority to:

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

EPA should not promulgate guidelines for cooling water intake structures. When facilities build intake structures located in waters of the US, they are required to obtain permits from the Corps of Engineers (COE) - either under Section 404 of the Clean Water Act (CWA) or Section 10 of the Rivers and Harbors Act. On a case-by-case basis, the COE can prepare an environmental impact statement for those projects expected to have negative environmental impacts. It is redundant for both the COE and EPA to regulate the same activity. This is a waste of federal and state dollars. EPA should seek to have the CWA amended to remove the requirements of 316(b).

EPA Response

The U.S. Army Corp of Engineers implements section 404 of the CWA in conjunction with EPA, whereas in this rulemaking, EPA is implementing section 316(b) of the CWA. These sections have different requirements and different environmental objectives.

Comment ID 316bEFR.201.002

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code MISC

Miscellaneous comment

Regulating the use of ground water has become a major issue with the Louisiana Legislature. New legislation has been passed to regulate the withdrawal of ground water. Some facilities are making efforts to convert from ground water to surface water. These 316(b) regulations will hinder efforts to reduce ground water withdrawals. As proposed, the requirements on intake structures will encourage existing facilities to covert from surface water to ground water for cooling purposes and will discourage facilities that are willing to converting from ground water to surface water. Whenever adequate surface water is available, it is better to use surface water and conserve ground water for potable water usage.

EPA Response

Today's final rule implements section 316(b) of the Clean Water Act. Ground water issues are beyond the scope of this rulemaking. While what Louisiana Dept of Environmental Quality asserts may be true, no one has demonstrated to EPA that conversions from surface water to ground water have become an issue. The facilities regulated under the Phase II final rule are large facilities that withdraw at least 50 million gallons per day of water. EPA believes that it is highly unlikely that such facilities would be able to pump ground water at this rate. Furthermore, water rights issues are beyond the purview of the section 316(b).

Comment ID 316bEFR.201.003

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code 21.08

Burden on permitting agencies (general)

In our opinion EPA vastly under estimated the resources necessary for the agency to implement the 316(b) requirements for new sources and Louisiana has no reason to believe EPA has done anything differently for Phase II. Throughout the proposed regulations, reference is made to site-specific determination of best technology available, restoration measures, comprehensive demonstration study, etc. being submitted to the Director for approval. The states and EPA already have a backlog of major and minor permits to issue or re-issue. Where will the states and/or EPA get the resources to review all the submittals required by these new regulations? Louisiana made a similar comment on the proposed 316(b) regulations for new facilities. Well, Louisiana currently has a new facility applying for a new permit under the 316(b) regulations and the staff time to review and evaluate the submittals is enormous. Existing permit writers do not have the experience to review the biological data being submitted. We are having to depend on personnel from our standards section to assist in evaluating the biological data and our engineering section to review some of the design information associated with the intake screen.

EPA Response

EPA appreciates the lack of resources at some State agencies and plans to provide guidance concerning implementation of today's final rule. In addition, EPA has added many efficiencies to the final rule to streamline study requirements and speed permitting. See response to comment 316bEFR.034.005 and response to comment 316bEFR.064.016.

Comment ID 316bEFR.201.004

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

There should be some correlation between the criteria for the intake structures and the size of the rivers. The Mississippi River has a 7Q10 flow rate of 141,955 cfs or 9.2 X 1010 GPD and a harmonic mean flow rate of 366,748 cfs or 2.4 X 1011 GPD. One of the larger cooling water intakes on the Mississippi River uses 1040 MGD. The 1040 MGD represents 1% of the Mississippi River's 7Q10 flow rate and 0.4% of the harmonic mean flow rate of the Mississippi River. On the other hand, 2 MGD is more than the critical flow of some of the rivers in Louisiana. Therefore, it is not appropriate to apply the same requirements for all size rivers.

EPA Response

EPA disagrees that the final rule applies the same requirements to all freshwater rivers. Facilities withdrawing greater than 5% of the mean annual flow from freshwater rivers and streams (and having a capacity utilization rate greater than 15%) are required to meet both impingement and entrainment requirements. Facilities withdrawing less than 5% of the mean annual flow are subject to impingement requirements only. EPA acknowledges that intakes are located on waterbodies of varying sizes and therefore pursued an approach based on the percentage of the waterbody withdrawn rather than a fixed intake threshold to determine which facilities would be required to meet both impingement and entrainment requirements.

Comment ID 316bEFR.201.005

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

It appears a large amount of information will be necessary for an existing discharger to justify the continued use of once-through cooling water. As stated in comment #3, a large amount of staff time will be required to evaluate this information. The proposed regulations require the existing facilities to submit information to 'document' justification to continue the use of once-through cooling water. This is like saying they are 'quilty until proven innocent'. The regulations should be changed so that the facilities could continue to use once-through cooling water unless EPA or the state determines that the use of once-through cooling water is having a negative impact on the waterbody.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.201.006

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code 6.08

Non-aquatic impacts

Zebra muscles have become a significant problem along the Mississippi River in Louisiana and it is expected to spread to other waterbodies in the state. It has been reported that one method to combat the accumulation of zebra muscles is to maintain a velocity in piping and intake structures of 15-17 ft/sec. If these velocities aren't maintained and zebra muscles accumulate inside intake structures and piping, additional chemicals will be needed to combat the accumulation of zebra muscles. Consideration should be given for exemptions from the requirements when appropriate to control nuisance organisms.

EPA Response

The Agency makes no requirements in the final rule regarding either intake or "inside-the-pipe" velocities. The final rule includes a provision that allows for consideration of invasive species in the calculation of the reduction standards. As such, the commenter's request for flexibility in this matter is met. In addition, as the commenter states, utilizing extreme intake velocities is but "one method" to combat zebra mussels. The Agency notes that no facility responding to the 316(b) survey reported intake velocities approaching 15 to 17 ft/sec. The median intake velocity reported by existing facilities within the scope of this rule is 1.5 ft / sec. Nonetheless, the Agency estimated the costs of controlling zebra mussels in locations such as the Mississippi River in Louisiana (through materials selection on retrofitted intake structures) in the final rule's analysis. See the Technical Development Document for further information on the costs developed to support the final rule and the inclusion of zebra mussel mitigation costs for these technologies.

Comment ID 316bEFR.201.007

Author Name Gary Aydell

Organization Louisiana Dept of Environmental Quality

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

The proposed regulations say that 'restoration measures' must be in the same waterbody. The regulations should allow for restoration measures in other waterbodies. Along the Mississippi River the federal government and the state have spent millions of dollars to divert water from the Mississippi River to adjacent waterbodies and estuaries. The state has been negotiating with some existing facilities to divert some of their once-through, non-contact cooling water to the natural drainage (away from the Mississippi River) to enhance the adjacent waterbodies. Thus, the enhancement (or restoration measures) will not be in the same waterbody.

EPA Response

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Bradley M. Campbell

On Behalf Of:

NJ Dept of Environmental Protection

Author ID Number:

316bEFR.202

Comment ID 316bEFR.202.001

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code OPP

General Statement of Opposition

As articulated throughout the enclosed comment document, the Department has a number of concerns regarding the proposed rule. One significant concern is that the proposed rule substantially weakens the 316(b) review process employed over the past 25 years, without any offsetting benefit in efficiency or predictability.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.202.002

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA had committed to simplifying the 316(b) process and making it more predictable and consistent, by minimizing the need for the resource-intensive case-by-case BTA evaluations that we have been doing for 25 years. The proposed rule does nothing to address these goals. Instead, it will perpetuate the need for case-by-case evaluations in most cases, because the most attractive option for most facilities will be to avoid the performance standards by seeking a site-specific BTA determination.

EPA Response

EPA acknowledges the substantial burden associated with a site-specific permitting process for both permittees and regulators. To alleviate this burden, EPA has crafted this final rule to include compliance alternatives that greatly reduce the effort required by both parties during the permitting process. For example, a permittee can demonstrate to the Director that its current cooling water intake structure configuration meets the applicable performance standards (see § 125.94(a)(2)) or demonstrate to the Director that it has installed is properly operating and maintaining a rule-specified approved design and construction technology (see § 125.94(a)(4)). Facilities with closed-cycle recirculating cooling and facilities with a design through-screen velocity of 0.5 ft/sec or less (see § 125.94(a)(1)) also meet some or all of the performance standards. These compliance alternatives meet the performance standards, generally without the permitting burden associated with the site-specific compliance option. As such, EPA does not expect inordinate numbers of facilities to seek a site-specific determination of best technology available.

Additionally, EPA expects some facilities to opt to conduct a Technology Installation and Operation Plan (TIOP), as described under § 125.95 and in section IX of the preamble.

Comment ID 316bEFR.202.003

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Case-by-case evaluations under the proposed rule will be far less environmentally protective than the evaluations the states currently conduct. Currently, a facility must demonstrate that the costs of reducing impingement and entrainment impacts are "wholly disproportionate" to the benefits. EPA has proposed to weaken that standard, allowing a facility to avoid meeting performance standards if the costs are merely "significantly greater" than the benefits, or if the costs are "significantly greater" than what EPA estimated in developing the rule. This is especially problematic when the EPA has acknowledged that its estimate of compliance costs is shaky at best. Time constraints prevented the EPA from running an economic model to obtain cost data for the regulatory option included in the proposed rule.

EPA Response

Under this final rule, EPA has established national performance standards for the reduction of impingement mortality and, when appropriate, entrainment (see § 125.94). These performance standards reflect the best technology available for minimizing adverse environmental impacts determined on a national categorical basis.

Today's rule also preserves each State's right to adopt or enforce more stringent requirements.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.202.004

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Another significant concern with the site-specific option is that it is likely that a facility will contend that there are no cost-effective fish protection technology alternatives and will then argue that it is justified in doing nothing to minimize impingement and entrainment effects. The Department is also concerned that the regulated community will use this alternative as a means to declare that they have no adverse impact and investigation and/or implementation of fish protection alternatives is unnecessary. The permittee would then devote resources into disproving it has an impact where that effort could be better spent in developing a technological solution to minimize impingement and entrainment effects. The rule, therefore, is likely to result in protracted dialogue between the permittee and the regulatory agency, undue and wasted effort, and delayed implementation of the required improvements.

EPA Response

This rule does not require a determination of whether an adverse environmental impact is occurring as a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.202.005

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 22.01
Executive Orders (except EO 13211)

The Department is concerned that in proposing this rule, the EPA has disregarded state interests protected by a Presidential Executive Order (Executive Order 13132) on federalism. The rule, as proposed, differs greatly from what the EPA had submitted to the Office of Management and Budget in December 2001. Most importantly, the draft submitted to the OMB included the site-specific alternative as narrow exception to be used sparingly, to a freely available alternative to complying with performance standards. The proposed rule implicates federalism because it affects the policymaking discretion of the States in a manner that is not mandated by federal statute.

The expansion of the site-specific alternative from an exception (as contained in the December 2001 draft) to a freely available third regulatory option imposes an enormous additional administrative burden on the States with a commensurate increase in direct implementation costs, and no additional funding.

EPA Response

EPA has followed Executive Order 13132 regarding federalism and concluded that this rule does not have federalism implications.

Comment ID 316bEFR.202.006

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 2.04.04
Use cost-benefit tests

The imposition of a formal cost/benefit analysis as a central focus of the regulation is not mandated (or even authorized) by Section 316(b) of the Clean Water Act or by any other federal law.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.202.007

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01
RFC: Definition of "adverse environmental impact"

Use of Term Adverse Environmental Impact

General Comment, Several Locations

The Department suggests replacement of the term "minimizing adverse environmental impact" with the term "minimizing impingement and entrainment effects" wherever possible. It is the Department's current policy to consider the death of any fish at or through a cooling water intake to be an "adverse impact" which must be minimized under Section 316(b). This position makes sense and simplifies an already complex analysis.

A debate regarding whether or not an adverse impact is occurring is not a productive use of time or resources. The Department is concerned that use of the term "adverse environmental impact" will contribute to the debate between the regulated community and regulatory agencies concerning whether or not an adverse environmental impact is occurring instead of on ways to minimize impingement and entrainment effects. This debate could last for years and include discussions regarding the population measure of a given fish species, let alone many fish species. The results of biological population studies and modeling can be very subjective because it is difficult to identify, measure, and attribute the impact of each of the many variables (what's happening on a coast wide basis, or what's happening with the climate) affecting populations of each of the impacted species. Rather than engage in this kind of biological debate, time and resources would be better spent focusing on the magnitude of the impingement and entrainment losses in relation to the costs and benefits of implementing various technologies to avoid or minimize the impact. This focus is appropriate for Section 316(b) which the Department feels is a technology-driven provision.

The Department is hereby requesting that the term "minimizing adverse environmental impact" be replaced with the term "minimizing impingement and entrainment effects" at the following locations in the proposed regulation:

122.21(r) (ii)	125.94(a)	125.94(e)	125.98(b)(1)(iii)
125.90(a)	125.94(a)(3)	125.94(f)	
125.90(b)	125.94(c)(2)	125.95(b)(6)	
125.94	125.94(c)(3)	125.94(b)(6)(ii)	

While it is suggested that the term "minimizing adverse environmental impact" be replaced with the term "minimizing impingement and entrainment effects" in all the above referenced locations, it is particularly important that these changes be made wherever the site-specific alternative is specified. Given that requests for consideration under the site-specific alternative are inherently subject to consideration of site-specific factors and hence site-specific decision-making, it is particularly important that the regulation language be clear as to its intent in minimizing impingement and entrainment effects. Therefore, it is critical that this language substitution be made at the following locations:

122.21(r)(ii)   125.95(b)(6)
125.94(c)(2)   125.94(b)(6)(ii)
125.94(c)(3)   125.98(b)(1)(iii)

Additional detail concerning this issue is included in Comment 6 below.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. See also preamble to the final rule.

Comment ID 316bEFR.202.008

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01

Submittal of required information

Application for a permit

122.21(r)(ii), Phase II existing facilities

The Department supports the criteria defined in items (2) – (5) as it defines many areas of concern for Section 316(b) and will likely ensure that the necessary information will be submitted with a NJPDES application.

EPA Response

EPA appreciates the support of the State.

Comment ID 316bEFR.202.009

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01

Submittal of required information

122.21(r)(2)(iii), Locational Maps

It is not clear what is meant by the term "locational maps". This should be clarified to indicate whether this means a locational map of the facility; locational map of the cooling water intake structure; or some other meaning.

EPA Response

Locational maps are required with respect to the source water physical data. Maps showing the location of the source water body with respect to the geographic surroundings are required.

Comment ID 316bEFR.202.010

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01.03
Cooling water system description

122.21(r)(5)(i), Phase II Existing Facility Cooling Water System Data

This item should be expanded as follows:

(i) A narrative description of the operation of each of your cooling water systems, relationship to cooling water intake structures, proportion of the design intake flow that is used in the system, number of days of the year in operation and seasonal changes, if applicable, <ADD: and a listing of other cooling water intake structures on the same watershed within a ten mile radius.>

A listing of other nearby cooling water intake structures would be helpful for the regulatory agency for many reasons including, but not limited to: understanding the species of concern, identifying other Section 316(b) data that may already be available, and in identifying other intake protection technologies that may have been researched and/or implemented to address the species of concern.

[see hard copy for insert/strikeout text]

EPA Response

EPA has determined that it will not request from facilities a listing of cooling water intake structures located in their watersheds. Because permitting Directors will receive permit applications from each facility in their jurisdictions, and each applicant must name his or her facility's intake waterbody and locale, EPA did not feel it was necessary to include that additional requirement. EPA believes that requiring facilities to submit information that the Director will already have access to would be redundant.

Comment ID 316bEFR.202.011

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 3.01
Definition: Existing Facility

Clear Applicability

125.91 (a)-(d), What is a "Phase II Existing Facility" subject to this subpart?

The Department supports the language and criteria described in this section. It is imperative that the applicability of Section 316(b) be unambiguous and straightforward to ensure that State agencies can utilize their resources focusing as to how to minimize impingement and entrainment as opposed to debating as to when Section 316(b) applies. The Department supports these specific criteria and finds them reasonable in ensuring that existing facilities that are likely to have an impact will be addressed. The Department is particularly supportive of the threshold of 50 million gallons per day as it provides a clear boundary and, as noted by US EPA, addresses 99.04% of water withdrawn yet covers 539 of 942 plants (57%). These criteria will help ensure that regulatory agencies focus on the largest impacts.

EPA Response

Supports rule, particularly 50 MGD threshold. No response necessary.

Comment ID 316bEFR.202.012

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 3.02
Definition: Cooling Water Intake Structure

125.91(c), Source of Cooling Water

The Department would like to make specific mention of its support for the language in this section which states "Use of cooling water does not include obtaining cooling water from a public water system or use of treated effluent that otherwise would be discharged to a water of the U.S." The Department has an active reuse program (i.e. recycling and/or reuse of treated effluent to be used as a water source for other purposes such as cooling water) and interprets this language to encourage reuse practices. Specifically, the Department interprets this language to mean that if reuse water is used, this water will not be counted towards the twenty-five percent water withdrawal threshold cited as eligibility criteria under 125.91. The Department also supports this same philosophy that is articulated in the definition of cooling water at 125.83.

EPA Response

Comment supports excluding from cooling water use obtaining cooling water from a public water system or use of treated effluent. It also supports excluding from the 25 percent threshold cooling water used in a manufacturing process before or after use for cooling. Both provisions have been retained in the final rule. EPA agrees that reuse consistent with § 125.91(d) would not be considered cooling water use or counted towards the 25 percent threshold in § 125.91(a)(4).

Comment ID 316bEFR.202.013

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 21.09

Permit applications/implementation schedule

Use of Compliance Schedules

125.92, When must I comply with this subpart?

As discussed further in Comment 6B, the Department has concerns about the feasibility of complying with the performance standards in 125.94(b). As such the Department feels it is imperative that the issue of compliance schedules be addressed. Although the Department does have concerns regarding the feasibility of achieving performance standards in the short-term, the Department supports performance standards and suggests that incentives in the form of flexibility be offered to those facilities, which choose to comply with them. As such, the Department is suggesting that the language in 125.92 be expanded as follows:

(a) You must comply with this subpart when an NPDES permit containing requirements consistent with this subpart is issued to you. <ADD: Regulatory authorities can incorporate compliance schedules into a NPDES permit in order to implement and/or study fish protection technologies to meet the performance standards at 125.94(b). >

It should be noted that the Department has specifically mentioned 125.94(b), but has not identified 125.94(c). The Department does not agree that this same flexibility regarding compliance schedules should be offered to facilities that choose the site-specific alternative as identified under 125.94(c).

[see hard copy for insert/strikeout text]

EPA Response

See response to comment 316bEFR.045.007 and 316bEFR.071.004.

Comment ID 316bEFR.202.014

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Lack of Definition of Adverse Environmental Impact, Inclusion of Definition for "Significantly Greater"

125.93, What special definitions apply to this subpart?

The Department notes that the term "adverse environmental impact" has not been defined in this section. The Department suggests that this section be modified to include a definition where "adverse environmental impact" should be defined as "any impingement or entrainment of aquatic organisms". This is the same definition that the Department currently uses in applying its Section 316(b) policy for existing facilities. The Department considers the death of any fish at or through a cooling water intake to be an "adverse impact" which must be minimized under Section 316(b). This position makes sense and simplifies an already complex analysis as described above in Comment 1.

Although the above referenced definition would be the Department's first choice, another alternative would be to simply not define "adverse environmental impact" as has been done in the proposed rule. The Department supports this lack of definition as well.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.202.015

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The Department suggests definition of the term "significantly greater" with either a number or a range. The Department suggests a range of 6 to 7 where at least $6 or $7 of costs must outweigh $1 of benefits in order for a permitting agency to disregard a particular technology.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.202.016

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The Department suggests replacement of the term "significantly greater" in 125.94(c) with the term "wholly disproportionate" as described later in Comment 6G and Comment 19. The term "significantly greater" can be interpreted as being less stringent than the term "wholly disproportionate". Since "wholly disproportionate" is used in applying the Department's Section 316(b) policies based on case law, the Department has determined that use of "significantly greater" would be applying a less stringent standard which is inconsistent with the intent and philosophy of 40 CFR 122.44(l). If replacement of this term is incorporated, "wholly disproportionate" should be defined in this section as a range of at least 6 to 7 (or greater) as described above.

EPA Response

See response to 316bEFR.006.003.

Comment ID 316bEFR.202.017

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Site-Specific Alternative

125.94, How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?

The Department has numerous comments/suggestions regarding this section. As such, the Department has reiterated a portion of the rule, including suggested deletions and additions, and summarized its concerns below in individual comments.

125.94 How will requirements reflecting best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects> be established for my Phase II existing facility?

(a) You may choose one of the following three alternatives for establishing best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects> at your site.

(1) You may demonstrate to the Director that your existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards specified in paragraph (b) of this section;

(2) You may demonstrate to the Director that you have selected design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the performance standards specified in paragraph (b) of this section; or

(3) You may demonstrate to the Director that a site-specific determination of best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects> is appropriate for your site in accordance with paragraph (c) of this section.

[see hard copy for insert/strikeout text]

EPA Response

Please see response to comment 316bEFR.202.007 by the same author.

Comment ID 316bEFR.202.018

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Use of Term Adverse Environmental Impact

As stated above in Comment 1, the Department suggests replacement of the term "minimizing adverse environmental impact" with the term "minimizing impingement and entrainment effects".

(b) Performance Standards. If you choose the alternative in paragraphs (a)(1) or (a)(2) of this section, you must meet the following performance standards. <ADD: The permitting authority may incorporate a compliance schedule to allow the facility time to implement and/or study fish protection technologies to meet these requirements:>

EPA Response

Please see response to comment 316bEFR.202.007 by the same author.

Comment ID 316bEFR.202.019

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Compliance Schedules

As stated above in Comment 4, it is important to be clear on the issue of compliance schedules. The Department has determined that compliance schedules are appropriate in order to implement the performance standards at 125.94(b), particularly in the short-term.

(1) You must reduce your intake capacity to a level commensurate with the use of a closed-cycle, recirculating cooling system; or

(2) You must reduce impingement mortality <ADD: (initial mortality)> of all life stages of <ADD: representative important species (including> fish and shellfish) by 80 to 95 percent from the calculation baseline if <STRIKE: your facility has a capacity utilization rate less than 15 percent> your facility's design intake flow is 5 percent or less of the mean annual flow from a freshwater river or stream; or

(3) You must reduce impingement mortality <ADD: (initial mortality)> of all life stages of <ADD: representative important species (including> fish and shellfish) by 80 to 95 percent from the calculation baseline, and you must reduce entrainment of all life stages of <ADD: representative important species (including> fish and shellfish) by 60 to 90 percent from the calculation baseline if your facility <STRIKE: has a capacity utilization rate of 15 percent or greater and> withdraws cooling water from a tidal river or estuary, from an ocean, from one of the Great Lakes, or your facility's design intake flow is greater than 5 percent of the mean annual flow of a freshwater river or stream; or

<ADD: (4) You must meet the performance standards cited in (b)(1), (b)(2), or (b)(3) above if your facility has a capacity utilization rate of 10 percent or less. As an alternative the facility can: (a) accept a permit condition restricting operations to an average capacity factor of 10% over any three calendar years; (b) accept a permit condition restricting operations to a capacity factor of no more than 20% in any calendar year; (c) accept a permit condition that imposes seasonal restrictions as reasonably necessary to protect aquatic life; or (d) accept a permit condition requiring cessation of the use of once-through cooling no later than the expiration date of the permit.>

[see hard copy for insert/strikeout text]

EPA Response

For a discussion of the various ways to comply with today's rule, please see the preamble to today's rule.

Comment ID 316bEFR.202.020

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 12.02.01
RFC: Uncertainty in I&E mortality estimates

Performance Standards

Impingement mortality should be clarified to state "initial mortality". Reducing initial mortality will address the bulk of the mortality associated with impingement in many cases. Latent mortality is much more difficult to control and site-specific factors could cause the results to vary results tremendously. In establishing latent mortality, aquatic organisms are held in a laboratory environment in an effort to represent how many fish suffer from mortality after being released to the receiving water. Because a laboratory environment is very different from a receiving water environment, it is questionable whether latent mortality studies represent "real world" latent mortality.

EPA Response

Please see EPA's responses to comments 316bEFR.099.036 and 316bEFR.074.023.

Comment ID 316bEFR.202.021

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

"All life stages" should be expanded to clarify "representative important species". It would be virtually impossible to study and address all life stages at certain facilities, particularly those in estuarine environments. If this distinction is not made, facilities may be dissuaded from choosing the performance standards option.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.202.022

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

The Department does not agree with the capacity utilization rate of fifteen percent or less as a threshold for not requiring entrainment measures. Instead, the Department suggests a capacity utilization rate of ten percent or less as a threshold for alternate measures which is consistent with the definition of a peaking unit at 40 CFR 72.2 as contained in Federal Air Regulations. The Department also does not agree that facilities with low capacity utilization rates should be exempt from meeting performance standards. In many cases a facility that is operated as a peaking unit is an older facility. Older facilities can have substantial withdrawal rate volumes and hence significant impingement and entrainment effects on aquatic life during biologically critical times of the year even if the facility is operated infrequently. The Department suggests that these facilities be required to meet performance standards at 125.94(b). As an alternative, the Department suggests that these facilities be given the option to: (a) accept a permit condition restricting operations to an average capacity factor of ten percent over any three calendar years; (b) accept a permit condition restricting operations to a capacity factor of no more than twenty percent in any calendar year; (c) accept a permit condition that imposes seasonal restrictions as reasonably necessary to protect aquatic life; or (d) accept a permit condition requiring cessation of the use of once-through cooling no later than the expiration date of the permit.

EPA Response

The Agency has defined the capacity utilization rate threshold based on an analysis of the facilities within the scope of this final rule, and not based on federal air regulations. The definition of a "peaking unit" under the Federal Air regulations is not relevant to the cooling water intake of a power plant. The Agency notes that other commenters attempted to use the same logic (i.e., basing the capacity utilization rate on a definition of a peaking unit) to justify a rate higher than 15 percent. See DCN 6-3586 for the Agency's analysis of cooling water intake flows and capacity utilization of plants within the scope of the rule. See also preamble to the final rule.

The Agency cannot accept the suggestion that facilities be required to cease using once-through cooling at the expiration of their current permits. For the Agency's discussion of the rejection of the cooling tower retrofit options see section VII.E of the preamble to the final rule.

The Agency notes that seasonal (or strategic) restriction on cooling water intake flow can be a condition of a permit if that is part of the means by which a facility will attempt to meet the entrainment reduction standards. In addition, in the case where significant local issues justify standards more stringent than those imposed by this final rule, the Director may have the authority under state or other federal laws to require such seasonal restrictions in addition to the requirements of this final rule.

Comment ID 316bEFR.202.023

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.02

Performance standards

The Department emphatically supports the concept of performance measures. The Department views Section 316(b) as a technology driven provision and finds performance measures to be in line with this approach. The Department also finds it reasonable to set such measures as a range of values rather than a discrete value given the natural variability of impingement and entrainment effects. The Department finds the proposed performance measures stringent, but reasonable so long as flexibility is given to regulatory authorities in applying them. Given the stringent nature of these standards, particularly for entrainment, the Department has concerns about requiring such performance measures immediately. Although there are some impingement control technologies that can come close to or attain the impingement control performance measures specified in the rule at some sites, the same can not be said for entrainment at this time even at the lower range of 60% reduction. The Department is confident that promulgation of this rule in final form will generate research and development that will benefit the science of fish protection technologies for both impingement and entrainment. However, this research and development can take several years to complete, and developing something in a laboratory setting is very different from applying something at a particular site.

EPA Response

EPA agrees that facilities should have time to design, install and optimize technologies to achieve the requirements of this rule. Today's rule reflects this.

Comment ID 316bEFR.202.024

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.03

Available I&E technologies

In addition, given the development of behavioral technologies such as light and sound, it is critical that caution be exercised in applying these technologies at individual sites. There is always the risk that these technologies can cause more harm than good given attraction potential and the many confounding factors present in an aquatic environment. It is critical that time be given to develop and study these technologies before they are implemented and the regulated community is subject to compliance with such performance measures. Clarification on the issue of compliance schedules as noted above in Comments 4 and 6B will help to alleviate this concern.

(4) (5)If your facility withdraws cooling water from a lake (other than one of the Great Lakes) or reservoir:

(i) You must reduce impingement mortality <ADD: (initial mortality)> of all life stages of <ADD: representative important species (including> fish and shellfish) by 80 to 95 percent from the calculation baseline; and
(ii) If you propose to increase your facility's design intake flow, your increased flow must not disrupt the natural thermal stratification or turnover pattern (where present) of the source water, except in cases where the disruption is determined by any Federal, State or Tribal fish or wildlife management agency(ies) to be beneficial to the management of fisheries.

[see hard copy for insert/strikeout text]

EPA Response

EPA agrees that behavioral barriers, such as the light and sound deterrents mentioned by the commenter, can be effective under certain circumstances, but has not based the performance standards of today's final rule on any data evaluated for these technologies because of the limited study data detailing their effectiveness. EPA does not believe, however, that these technologies should be excluded from the options available to facilities in meeting the requirements of today's final rule.

For a discussion of compliance issues, see the preamble to the final rule.

Comment ID 316bEFR.202.025

Subject Matter Code 12.02.01

RFC: Uncertainty in I&E mortality estimates

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Performance Standards

Impingement mortality should be clarified to state “initial mortality” and “All life stages” should be expanded to clarify “representative important species” as discussed above in the first part of Comment 6C.

(c) (1) Site-Specific Determination of Best Technology Available. If you choose the alternative in paragraph (a)(3) of this section, you must demonstrate to the Director that your costs of compliance with the applicable performance standards in paragraph (b) of this section <STRIKE: would be significantly greater than the costs considered by the Administrator when establishing such performance standards, or that your costs> would be <STRIKE: significantly greater than> <ADD: wholly disproportionate> to the benefits of complying with such performance standards at your site. <ADD: The burden is on the person requesting the alternative requirement to demonstrate that alternative requirements should be imposed. Detailed cost/benefit analyses and ratios must be included for all fish protection technologies considered in any site-specific demonstration.>

[see hard copy for insert/strikeout text]

EPA Response

For the first part of this comment, please see EPA’s responses to comments 316bEFR.074.023 and 316bEFR.099.036.

Please see EPA’s response to comment 316bEFR.006.003 and 316bEFR.018.009 for a discussion of EPA’s decision to use the criteria “significantly greater” over the term “wholly disproportionate.”

Comment ID 316bEFR.202.026

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Site-Specific Determination

Regarding deletion of the phrase “would be significantly greater than the costs considered by the Administrator when establishing such performance standards”, please refer to Comment 6F below.

The Department has many concerns regarding (c)(1) above including the fact that this alternative will be extremely resource intensive for the permitting agencies. However, the Department’s biggest concern is that the regulated community will find that there are no fish protection technology alternatives for which the costs are not significantly greater than the benefits and will then argue that “doing nothing” to minimize impingement and entrainment is the only cost-effective alternative. The Department is also concerned that the regulated community will use this alternative as a means to declare they have no adverse impact and investigation and/or implementation of fish protection alternatives is unnecessary. The permittee would then devote time and energy into disproving that it has an impact where that time and energy could be better spent in developing a technological solution to minimize impingement and entrainment effects.

One way to dissuade the regulated community against this alternative would be to make clear that the burden is on the person requesting the alternative requirement to demonstrate that alternative requirements should be imposed. In addition, the permittee should have to include a detailed cost/benefit analyses along with its application under this alternative. Inclusion of these suggested changes will help to address some of these concerns.

The Department also suggests that incentives be given to persuade the regulated community to comply with the performance standards instead of this alternative. As discussed in Comment 4, clarifying that compliance schedules are acceptable may work to make compliance with the performance standards more reasonable for the regulated community.

<STRIKE: (2) If data specific to your facility indicate that your costs would be significantly greater than those considered by the Administrator in establishing the applicable performance standards, the Director shall make a site-specific determination of best technology available for minimizing adverse environmental impact that is based on less costly design and construction technologies, operational measures, and/or restoration measures to the extent justified by the significantly greater cost. The Director’s site-specific determination may conclude that design and construction technologies, operational measures, and/or restoration measures in addition to those already in place are not justified because of significantly greater costs.>

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EPA Response

Please refer to the response to comment 316BEFR.202.004.

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

EPA agrees that the burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say “you [the facility] must demonstrate to the Director” when stating a requirement. By implication, the burden of proof lies with the permittee.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

For information on compliance schedules, please refer to sections VII, VIII and IX of the preamble.

Comment ID 316bEFR.202.027

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Costs Considered by Administrator

The Department does not agree that facilities should be able to qualify for the site-specific alternative strictly based on the rationale that a facility's costs would be significantly greater than those considered by the Administrator in establishing the applicable performance standards. The costs of compliance with the performance standards will vary greatly site by site and costs developed on a national basis are almost certain to be different than costs incurred by a particular facility. Certainly, the waterbodies and locations of facilities are extremely diverse on a regional basis, where this is even more profound on a national basis.

Fish protection technologies are almost certain to evolve if regulatory agencies consistently require facilities to meet and/or study ways to achieve the performance standards. As a result, costs will decrease. So, the costs of fish protection technologies developed at the time of the rule-making may be biased high. It would be unfair to the permitting agencies to allow facilities "a way out" of complying with the performance standards in five, ten or twenty years based on outdated costing information. Based on these reasons, the Department suggests deletion of this alternative.

(3) (2) <STRIKE: If data specific to your facility indicate> <ADD: If a facility is able to present data and analysis that prove> that your costs would be <STRIKE: significantly greater than> <ADD: wholly disproportionate to> the benefits of complying with such performance standards at your facility, <ADD: any interested person can request that> the Director shall make a site-specific determination of best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects. that is based on less costly design and construction technologies, operational measures, and/or restoration measures to the extent justified by the <STRIKE: significantly greater> <ADD: wholly disproportionate> costs. The Director's site-specific determination may conclude that design and construction technologies, operational measures, and /or restoration measures in addition to those already in place are not justified because the costs would be <STRIKE: significantly greater than> <ADD: wholly disproportionate to. the benefits at your facility.

[see hard copy for insert/strikeout text]

EPA Response

See response to 316bEFR.006.003. EPA notes that if costs do indeed decrease over time, as the comment suggests, existing facilities would have a more difficult time meeting the rule threshold for a site-specific determination of BTA.

Comment ID 316bEFR.202.028

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.08
Burden on permitting agencies (general)

Burden of Proof

It should be clear in the rule that the facility bears the burden to show that costs would be wholly disproportionate to the benefits of complying with performance standards. The regulatory agency is not in possession of the facility's data and economic expertise to make this showing. Where a facility is essentially applying to have a relaxed standard apply to them, the burden should be placed firmly on their shoulders to show that they qualify for consideration under the site-specific alternative. Inclusion of the phrase "If a facility is able to present data and analysis that prove" and "any interested person can request that the Director make a site-specific determination of best technology available" will help make clear that the burden is on the person requesting the alternative requirement to demonstrate that alternative requirements should be imposed. This is consistent with the intent of Comment 6-E.

EPA Response

EPA agrees with the commenter that the burden of proof is upon the facility to demonstrate that it qualifies for site-specific performance requirements and has clarified the rule language accordingly.

Comment ID 316bEFR.202.029

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration Measures

125.94(d), Restoration Measures

First and foremost, the Department considers Section 316(b) to be a technology driven provision. Any technology for which the costs are not wholly disproportionate to the benefits must be either required and/or studied for existing cooling water intake structures. However, in the event that fish protection technologies are not currently available to meet the performance measures at 125.94(b) at a particular site, the Department supports mitigation measures to minimize impingement/entrainment losses. There is no debate that wetlands aid in producing fish and therefore help mitigate the effects of a facility's impingement and entrainment losses. This is especially important since shrinking open space and lost wetlands have become a critical environmental issue. In addition, since entrainment technologies are still evolving and wetlands aid in producing early life stages of fish, restoration is clearly a good idea in the short term. The Department supports the inclusion of restoration measures as part of Section 316(b) rules. However, this support is conditional on the premise that all technological options are carefully considered first and mitigation is not required as a substitute for technology.

To ensure that this concern is addressed, the Department suggests that 125.94(d) be changed as follows:

(d) Restoration Measures. In lieu of, or in combination with, reducing impingement mortality and entrainment by implementing design and construction technologies or operational measures to comply with the performance standards specified in paragraph (b) of this section or the Director's determination pursuant to paragraph (c) of this section, you may, with the Director's approval, employ restoration measures that will result in increases in fish and shellfish in the watershed. <ADD: Restoration measures can only be implemented after all appropriate intake protection technologies have been considered.> You must demonstrate to the Director that you are maintaining the fish and shellfish within the waterbody, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures to meet that portion of the requirements of paragraphs (b) or (c) of this section that you are meeting through restoration. Your demonstration must address species that the Director, in consultation with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by your cooling water intake structure, identifies as species of concern.

The Department prefers the restoration and/or preservation of wetlands to fish stocking. Fish stocking presents the risk of the introduction of disease and does nothing to remedy the problem of loss of aquatic habitat. Restoration and/or preservation of wetlands has the added benefit of enhancing fish production as well as creating and/or preserving habitat for those fish to live in. The Department also supports the installation of fish ladders as a mitigative measure to allow migratory fish to be re-introduced to historical spawning runs.

[see hard copy for insert/strikeout text]

EPA Response

For a discussion of the requirement in the final rule to consider technologies before choosing restoration measures, see EPA's response to comment 316bEFR.033.005. EPA does not want to preclude the use of restoration measures when they can achieve the environmental requirements of the final rule in a more cost-effective, more feasible, or more environmentally beneficial manner than design and construction technologies and operational measures.

The final rule gives permitting authorities the flexibility to make determinations on the feasibility of restoration measures on a site-specific, case-by-case basis. Permitting authorities should consider the net environmental benefits of any proposed restoration measure.

Comment ID 316bEFR.202.030

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Replacement of Term Minimizing Adverse Environmental Impact

125.94(e) and 125.94(f), More Stringent Standards, Nuclear Regulatory Commission

As discussed in Comment 1, the Department suggests that the term "minimizing adverse environmental impact" be replaced with "minimizing impingement and entrainment effects".

EPA Response

Please see response to comment 316bEFR.202.007 by the same author.

Comment ID 316bEFR.202.031

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Application Information

125.95, As an owner or operator of a Phase II existing facility, what must I collect and submit when I apply for my reissued NPDES permit?

The Department supports the information referenced in items (a) and (b). The items referenced in this section are comprehensive and cover all relevant information. The Department also supports the fact that the information identified in item (b) must be submitted with a renewal application, which will help by ensuring that the necessary information is submitted without delay and that a consistent timeframe is applied to all facilities.

However, the Department has a few comments/suggestions regarding particular portions of this section which are reiterated below:

(3) Impingement Mortality and Entrainment Characterization Study

(i) – (ii) No changes suggested

(iii) Documentation of the current impingement mortality <ADD: (initial mortality)> and entrainment of all life stages of <ADD: representative important species (including> fish and shellfish) at your facility and an estimate of impingement mortality and entrainment under the calculation baseline. The documentation may include historical data that are representative of the current operation of your facility and of biological conditions at the site. Impingement mortality and entrainment samples to support the calculations required in paragraph (b)(4)(iii) and (b)(5)(ii) of this section must be collected during periods of representative operational flows for the cooling water intake structure and the flows associated with the samples must be documented.

(iv) No changes suggested

Any time comprehensive information (such as a characterization study) is required pertaining to impingement and entrainment it is important that it be clarified that “initial impingement mortality” and “representative important species” be focused on.

EPA Response

EPA appreciates the New Jersey Department of Environmental Protection’s support of EPA’s application requirements. EPA disagrees, however, that it should change the language in the final rule to specify the terms “representative important species” and “initial impingement mortality.” Please see the preamble to today's rule and EPA’s responses to comments 316bEFR.017.003 and 316bEFR.063.005 for an explanation of how compliance is to be determined.

Comment ID 316bEFR.202.032

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 7.03
Available I&E technologies

(4) Design and Construction Technology Plan

…The plan must explain the technologies and operational measures you have in place or have selected to meet the requirements in 125.94 (Examples of potentially appropriate technologies may include, but are not limited to, wedgewire screens, fine mesh screens, fish handling and return systems, barrier nets, aquatic filter barrier systems, <ADD: sound deterrents>, and enlargement of the cooling water intake structure opening to reduce velocity.). Examples of potentially appropriate operational measures may include, but are not limited to, seasonal shutdowns or reductions in flow, and continuous operations of screens.)….

Sound deterrents are a new but proven technology in some circumstances and for some species (e.g. alosids) which shows a lot of promise for in-situ applications. As such, this technology should be mentioned in this example.

[see hard copy for insert/strikeout text]

EPA Response

EPA agrees that behavioral barriers, such as the sound deterrents mentioned by the commenter, can be effective under certain circumstances, but has not based the performance standards of today's final rule on any data evaluated for these technologies because of the limited study data detailing their effectiveness. EPA does not believe, however, that these technologies should be excluded from the options available to facilities in meeting the requirements of today's final rule.

Comment ID 316bEFR.202.033

Subject Matter Code 7.02

Performance standards

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

The Department supports specific mention of operational measures such as seasonal shutdowns and a reduction in flow as a means to minimize impingement and entrainment effects. The Department also supports the mention of a reduction in flow for facilities that recirculate a portion of their flow as stated later in 125.95(b)(4)(iii). A flow limit or mandatory reduction in flow is an effective way to minimize impingement and entrainment effects with little to no construction costs. This is important for existing facilities, particularly for those that have a limited life and it is not practical to invest significant capital in upgrades.

EPA Response

EPA agrees with the commenter. A discussion of operational measures, including seasonal flow reductions, can be found in the Technology Development Document for today's final rule.

Comment ID 316bEFR.202.034

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

(iii) Calculations of the reduction in impingement mortality <ADD: (initial mortality)> and entrainment of <ADD: representative important species (including> all life stages of fish and shellfish) that would be achieved by the technologies… you must assess the total reduction in impingement mortality ADD: (initial mortality)> and entrainment… Facilities that recirculate a portion of their flow may take into account the reduction in impingement mortality and entrainment associated with the reduction in flow when determining the net reduction associated with existing technology and operational measures….

Again, because comprehensive information is being requested in this section with respect to the design and construction technology plan, it is important that it be clarified that "initial impingement mortality" and "representative important species" are the focus of the information.

[see hard copy for insert/strikeout text]

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.202.035

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

(5) Information to Support Proposed Restoration Measures

(i) No suggested change

(ii) A <STRIKE: quantification> <ADD: demonstration> of the combined benefits from implementing design and construction technologies, operational measures and/or restoration measures and the proportion of the benefits that can be attributed to each. This <STRIKE: quantification> <ADD: demonstration> must include: the percent reduction in impingement mortality and entrainment that would be achieved through the use of any design and construction technologies or operational measures that you have selected (i.e., the benefits you would achieve through impingement and entrainment reduction); a demonstration of the benefits that could be attributed to the restoration measures you have selected <ADD: (can be quantified as a range)>; and a demonstration that the combined benefits of the design and construction technology(ies), operational measures, and/or restoration measures will maintain fish and shellfish at a level comparable to that which would be achieved under 125.94. If it is not possible to demonstrate quantitatively that restoration measures such as creation of new habitats to serve as spawning or nursery areas or establishment of riparian buffers will achieve comparable performance, you may make a qualitative demonstration that such measures will maintain fish and shellfish in the waterbody at a level substantially similar to that which would be achieved under 125.94.

As discussed previously in Comment 7, the Department supports restoration measures after all feasible technological measures have been considered. However, the benefits of restoration measures are extremely complex to quantify. The Department is concerned that the language in this section will deter permittees from pursuing restoration measures. As such, the Department has included minor changes to reflect that benefits from restoration are not discrete values but rather would be more appropriately expressed as a range.

(iii) – (v) No suggested changes.

[see hard copy for insert/strikeout text]

EPA Response

EPA agrees with the commenter that the benefits of restoration measures can be complex to quantify. However, EPA believes there are multiple aspects of every restoration measures that can be quantified. This quantitative analysis provides useful and important insight into the proper design, assessment, and implementation of restoration measures. Under the final rule, EPA requires quantitative analysis as part of the Restoration Plan.

Comment ID 316bEFR.202.036

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

(6) <ADD: Information to Support Site-specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact Impingement and Entrainment Effects.> If you have chosen to request a site-specific determination of best technology available for minimizing <STRIKE: adverse environmental impact. <ADD:impingement and entrainment effects. pursuant to 125.94(c) because <STRIKE: of costs significantly greater than those EPA considered in establishing the requirements at issue, or because> costs are <STRIKE: significantly greater than> <ADD: wholly disproportionate to> the benefits of complying with the otherwise applicable requirements of 125.94(b) and (e) at your site, you must provide ….

Please refer to Comment 1 regarding deletion of the term adverse environmental impact; Comment 6F concerning deletion of the phrase "costs significantly greater than those EPA considered…"; and Comments 5 and 6G concerning use of the term wholly disproportionate.

The Department supports additional requirements for a site-specific determination of best technology available as there should be disincentives for regulated entities to choose this option over performance measures.

(i) No suggested changes.

(ii) <ADD: Valuation of the Monetized Benefits of Reducing Impingement and Entrainment.> If you are seeking a site-specific determination of best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects. because of costs….

Please refer to Comment 1.

(iii) <ADD: Cost/Benefit Ratios. A cost/benefit ratio must be included for all fish protection technologies considered in any site-specific demonstration.>

(iv) <ADD: Site-Specific Technology Plan.> Based on the results of the Comprehensive Cost Evaluation….

As discussed in Comment 6E, cost/benefit ratios should also be included in addition to the information requested in items (i) and (ii) above. Item (iii) as contained in the proposed regulation should be moved to item (iv) where no other changes are requested.

[see hard copy for insert/strikeout text]

EPA Response

Please see response to comment 316bEFR.202.007 by the same author.

Comment ID 316bEFR.202.037

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.09
Permit applications/implementation schedule

Compliance Schedules

125.98, As the Director, what must I do to comply with the requirements of this subpart?

Section (b) of this regulation should be changed as follows:

(b) <ADD: Permitting Requirements.> Section 316(b) requirements are implemented for a facility through an NPDES permit. As the Director, you must consider the information submitted by the Phase II existing facility in its permit application, and determine the appropriate requirements and conditions to include in the permit based on the alternative for establishing best technology available chosen by the facility. <ADD: Regulatory authorities can incorporate compliance schedules into a NPDES permit in order to implement and/or study fish protection technologies to meet the performance standards at 125.94(b).. The following requirements must be included in each permit:

As discussed in Comment 4, the Department feels it is imperative that the issue of compliance schedules be addressed.

Section (iii) of this regulation should be changed as follows:

(iii) For a facility that requests requirements based on site-specific best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects>, you must review the application materials and any other information you may have that would be relevant to a determination of whether alternatives requirements are appropriate for the facility. If you determine that alternative requirements are appropriate, you must make a site-specific determination of best technology available for minimizing <STRIKE: adverse environmental impact> <ADD: impingement and entrainment effects> in accordance with 125.95(c). <ADD: The burden is on the person requesting the alternative requirement to demonstrate that alternative requirements should be imposed..

Please refer to Comments 1 and 6E.

[see hard copy for insert/strikeout text]

EPA Response

See response to comment 316bEFR.202.019.

Comment ID 316bEFR.202.038

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Summary of Rule and Differences from EPA's 1977 Draft Guidance

On page 17124 the following is stated:

Today, EPA proposes a national framework that would establish certain minimum requirements for the location, design, capacity, and construction of cooling water intake structures for large cooling water intake structures at Phase II existing facilities. In doing so, the Agency is proposing to revise the approach adopted in the 1977 draft guidance which was based on the judgment that "[t]he decision as to best technology available for intake design location, construction and capacity must be made on a case-by-case basis." Other important differences from the 1977 draft guidance include today's proposed definition of a "cooling water intake structure." Today's proposal also would establish a cost-benefit test that is different from the "wholly disproportionate" cost-benefit test that has been in use since the 1970s.

As described above in Comment 6E, the Department is very concerned about 125.94(c)(1). In fact, the Department anticipates that the majority of permittees will choose this option as it does not appear to be in their best interest to choose the significantly more stringent options under 125.94(b) or (c). In fact, the Department considers the option under 125.94(c)(1) to be essentially the same as the 1977 draft guidance. In addition, as discussed in Comment 5, it is the Department's opinion that the "significantly greater than" test is weaker than the "wholly disproportionate" test so 125.94(c)(1) could be viewed as less stringent than current case law.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Please refer to the response to comment 316bEFR.202.003 for a discussion of how today's rule is no less stringent than the previous BPJ implementation of 316(b).

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.202.039

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 3.01

Definition: Existing Facility

Definition of an Existing Facility – Exception for Some Facilities

On page 17128 the following is stated:

… Finally, under the proposed definition, any facility constructed in place of a facility that commenced construction before January 17, 2002, would remain defined as an existing facility if the newly constructed facility uses an existing cooling water intake structure whose design intake flow is not increased to accommodate the intake of additional cooling water.

Under this proposed rule certain forms of repowering could be undertaken by an existing power generating facility that uses a cooling water intake structure and it would remain subject to regulation as a Phase II existing facility. For example, the following scenarios would be existing facilities under the proposed rule:

-An existing power generating facility undergoes a modification of its process short of total replacement of the process and concurrently increases the design capacity of its existing cooling water intake structures;

-An existing power generating facility builds a new process for purposes of the same industrial operation and concurrently increases the design capacity of its existing cooling water intake structures.

The two bulleted items above appear to be in conflict with the statement "…any facility constructed in place of a facility that commenced construction before January 17, 2002, would remain defined as an existing facility if the newly constructed facility uses an existing cooling water intake structure whose design intake flow is not increased to accommodate the intake of additional cooling water." In both bulleted items, the design capacity of the existing cooling water intake structure has been increased; therefore, it seems appropriate that these facilities would be covered under the eligibility criteria for new sources for Section 316(b) rules. It is not clear what portion of the regulation is being referred to by "certain forms of repowering could be undertaken by an existing power generating facility that uses and cooling water intake structure and it would remain subject to regulation as a Phase II existing facility". In fact, after reading the regulation, this exception was still not clear. Perhaps this issue could be further clarified.

EPA Response

See response to 316bEFR.064.002. The items are not in conflict. Under the final rule, a modification to an existing facility that does not totally replace the process or production equipment, or the addition of unit that is not substantially independent of the existing facility, could remain existing facilities even if a new or expanded cooling water intake is installed. See, definition of existing facility at 40 CFR 125.93. Also see, 125.83. The discussion in section II of the preamble clarifies this definition and the issue of repowering under this definition.

Comment ID 316bEFR.202.040

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

Implementation of Measures in a NPDES Permit

On page 17129 the following is stated:

Based on the Agency's review of potential Phase II existing facilities that employ cooling water intake structures, the Agency anticipates that most existing power generating facilities that would be subject to this rule will control the intake structure that supplies them with cooling water, and discharge some combination of their cooling water, wastewater, and storm water to a water of the U.S. through a point source regulated by an NPDES permit. In this scenario, the requirements for the cooling water intake structure would be specified in the facility's NPDES permit. In the event that a Phase II existing facility's only NPDES permit is a general permit for storm water discharges, the Agency anticipates that the Director would write an individual NPDES permit containing requirements for the facility's cooling water intake structure. The Agency invites comment on this approach for applying cooling water intake structure requirements to the facility. Alternatively, requirements applicable to cooling water intake structures could be incorporated into general permits.

Any facility that has a cooling water intake structure that meets the criteria of 125.91 should be subject to intake protection technology requirements regardless of whether or not they have a NPDES permit. In fact, the Department does not interpret the criteria at 125.91, 125,92 or 125.93 as meaning that you are required to have a NPDES permit to be within the scope of the rule. Based on the flow chart included as "Appendix I – Section 316(b) Phase II Existing Facility Rule Framework" it appears that a facility is out of scope of the rule if they are not required to have a NPDES permit. This issue should be clarified to describe EPA's intent.

Nonetheless, the Department recognizes that the NPDES permit is the regulatory mechanism for which intake protection technology requirements will be implemented. If requirements are deemed necessary for regulating cooling water intake structures, it is feasible to incorporate site-specific intake protection technology requirements as an individual NPDES permit for that site, even if the only NPDES permit for that site is a general stormwater permit.

With respect to the statement "Alternatively, requirements applicable to cooling water intake structures could be incorporated into general permits", the Department is not clear as to whether this is intended to seek comment on incorporating intake protection technology requirements into a general permit (e.g. stormwater general permit) or if it is intended to seek comment on the appropriateness of issuing a general permit for regulating intake protection technologies.

If it is the former, it would be appropriate to incorporate intake protection technology requirements as a separate individual NPDES permit for that site as opposed to incorporating such complex requirements into the comparatively simpler general permit. Incorporation of individual requirements into a general permit defeats the goal of the general permit in keeping the conditions streamlined and simple. It would be preferable to keep the two regulatory mechanisms separate.

If it is the latter, the Department disagrees with the concept that a general permit could be issued to incorporate Section 316(b) conditions. By definition, a general permit prescribes a set of conditions for a number of facilities deemed eligible under those conditions. Establishment of appropriate cooling water intake structure technologies is dependent on numerous site-specific factors, where the regulatory authority should have oversight over any such choice. A general permit that prescribes a set of standard conditions will simply not work as it has the potential to eliminate the regulatory oversight of the permitting agency. It could also cause a problem in prescribing a "one size fits all" mentality for intake protection technologies which is simply not appropriate.

EPA Response

Section 125.91 of the final rule contains criteria that indicate which facilities constitute Phase II existing facilities subject to Part 125, Subpart J. Under this section, the first criterion provides that an existing facility must be a point source. As the comment acknowledges, the rule also provides under 125.90(a) that the requirements specified under section 316(b) are implemented through NPDES permits. This is the case given that 316(b) requirements are linked to standards established pursuant to CWA sections 301 and 306, and such requirements are only applicable to point sources through NPDES permits (see, CWA sec. 402(a)). Finally, the rule does not specify the type of permit (individual or general) to be used to implement these requirements. Such determinations remain with the Director and will be made based on applicable regulations and implementation considerations. Also see the response to 316bEFR.035.001.

Comment ID 316bEFR.202.041

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 3.01
Definition: Existing Facility

Flow Thresholds

On page 17130 the following is stated:

EPA requests comment on both the 50 MGD and 25 percent cooling water thresholds.

As described in Comment 3, the Department supports these threshold values and finds them reasonable and practical.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.202.042

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Concerns Regarding Site-Specific Alternative

On page 17140 the following is stated:

A facility may use one of the three different methods for establishing the best technology available for minimizing adverse environmental impact. Under the first method, a facility would demonstrate to the Director issuing the permit that the facility's existing design and construction technologies, operational measures, and/or restoration measures already meet the national minimum performance requirements that EPA is proposing.

Under the second method, a facility would select design and construction technology, operational measures, restoration measures or some combination thereof. The facility would then demonstrate to the Director that its selected approach would meet the performance requirements EPA is proposing.

Under the third method, a facility would calculate its cost of complying with the presumptive performance requirements and compare those costs either to the compliance costs EPA estimated in the analysis for this proposed rule or to a site-specific determination of the benefits of meeting the presumptive performance requirements. If the facility's costs are significantly greater than EPA's estimated costs or site-specific benefits, the facility would qualify for a site-specific determination of best technology available.

The Agency discusses each of these three methods for compliance and the proposed presumptive minimum performance requirements in greater detail below. EPA invites comments on all aspects of this proposed regulatory framework as well as the alternative regulatory approaches discussed later in this section.

The Department has many concerns regarding this third method. Please refer to Comments 6B, 6C, 6D, 6E, 6F, and 6G.

EPA Response

No response is required, as the referenced comments are addressed individually in separate responses.

Comment ID 316bEFR.202.043

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.02

Performance standards

Implementation of Performance Standards

On page 17142 the following is stated:

In specifying a range, EPA anticipates that facilities will select technologies or operational measures to achieve the greatest cost-effective reduction possible (within today's proposed performance range) based on conditions found at their site, and that Directors will review the facility's application to ensure that appropriate alternatives were considered. EPA also expects that some facilities may be able to meet these performance requirements by selecting and implementing a suite (i.e. more than one) of technologies and operational measures and/or, as discussed below, by undertaking restoration measures. EPA invites comment on whether the Agency should establish regulatory requirements to ensure that facilities achieve the greatest possible reduction (within the proposed ranges) that can be achieved at their site using the technologies on which the performance standards are based. EPA also invites comment on whether EPA should leave decisions about appropriate performance levels for a facility to the Director, provided that the facility will achieve performance that is no lower than the bottom of the performance ranges in today's proposal.

As discussed in Comment 6C, the Department emphatically supports a range of performance measures given the highly site-specific nature of selecting appropriate intake protection technologies. In addition, utmost flexibility should be given to facilities that choose to comply with performance standards. The Department also agrees that a suite of technologies may be feasible and appropriate in many circumstances. Given the above as well as the fact that intake protection technologies are still evolving, the Department believes that "EPA should leave decisions about appropriate performance levels for a facility to the Director, provided that the facility will achieve performance that is no lower than the bottom of the performance ranges in today's proposal."

EPA Response

EPA agrees with the commenter and believes that today's final rule maintains the desired flexibility for both the permitee and permitting authority in determining the most cost-effective means by which the rule's requirements can be met.

Comment ID 316bEFR.202.044

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.02

Performance standards

Compliance with Performance Standards

On page 17143 the following is stated:

If compliance monitoring determines that the design and construction, operating measures, or restoration measures prescribed by the permit have been properly installed and were properly operated and maintained, but were not achieving compliance with the applicable performance standards, the Director could modify permit requirements consistent with existing NPDES program regulations (e.g. 40 CFR 122.62, 122.63, and 122.41) and the provisions of this proposal. In the meantime, the facility would be considered in compliance with its permit as long as it was satisfying all permit conditions. EPA solicits comment on whether the proposed regulation should specify that proper design, installation, operation and maintenance would satisfy the terms of the permit until the permit is reissued pursuant to a revised Design and Construction Technology Plan. If EPA were to adopt this approach, EPA would specify in the regulations that the Director should require as a permit condition the proper design, installation, operation and maintenance of design and construction technologies and operational measures rather than compliance with performance standards.

As discussed in Comments 4 and 16, utmost flexibility should be given to those facilities that choose to comply with the performance standards. Given the many site-specific factors that affect biological populations from year to year (i.e. weather patterns, climate changes, fishing regulations), compliance with performance standards can fluctuate greatly. As stated in Comment 6C, these factors help to justify the appropriateness of specifying performance standards as a range of values as opposed to discrete point source values. In sum, the Department agrees that permittees should be considered to be in compliance with their permit so long as design and construction, operating measures or restoration measures prescribed by the permit have been achieved.

EPA Response

EPA believes that today's final rule maintains the desired flexibility for both the permittee and permitting authority. The Technology Installation and Operation Plan (TIOP) allows a facility to select a suite of design and construction technologies, operational measures, and/or restoration measures and request that the implementation of the TIOP be considered the means of determining compliance with today's rule. This option is available to the permittee with the approval of the Director for the first two permit cycles.

EPA has deferred to the Director the determination of the proper method by which compliance with the rule is to be measured. EPA believes the Director is best suited to address the variable situations that may arise on a site-specific basis, such as those discussed by the commenter.

Comment ID 316bEFR.202.045

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03
Option 3--Site-specific determination

Site-Specific Determination

On page 17143 the following is stated:

How could a Phase II Existing Qualify for a Site-Specific Determination of Best Technology Available for Minimizing Adverse Environmental Impact?

…To be eligible to pursue this approach, the facility must first demonstrate to the Director either: (1) that its costs of compliance with the applicable performance standards specified in §125.94 (b) would be significantly greater than the costs considered by the Administrator in establishing such performance standards; or (2) that the facility's costs would be significantly greater than the benefits of complying with the performance standards at the facility's site. A discussion of applying the cost test us provided in section VI.A.2 of this proposed rule. A discussion of applying the test in which costs are compared to benefits is provided in Section VI.A.8.

Please refer to Comment 6F concerning item (1) in this cite and Comments 5 and 6G concerning the use of the term "wholly disproportionate".

EPA Response

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

EPA agrees that the burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say "you [the facility] must demonstrate to the Director" when stating a requirement.

Comment ID 316bEFR.202.046

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Use of Lower Cost Threshold in Rule

On page 17146 the following is stated:

EPA believes it is appropriate to set a lower cost threshold in this rule to avoid economically impracticable impacts on energy prices, production costs, and energy production that could occur if large numbers of Phase II existing facilities incurred costs that are more than significantly greater that but not wholly disproportionate to the costs in EPA's record. EPA invites comment on whether a "significantly greater" cost test is appropriate for evaluating requests for alternative requirements by Phase II existing facilities.

Similarly, on page 17146 the following is stated:

EPA invites comment on whether the standards proposed today might allow for backsliding by facilities that have technologies or operational measures in place that are more effective than in today's proposal. EPA invites comment on approaches EPA might adopt to ensure that backsliding from more effective technologies does not occur.

The Department vehemently opposes this weaker cost test as contained in the proposed regulation as discussed previously in Comment 5. The Department also agrees that inclusion of this weaker cost test would almost certainly result in backsliding from current policies and practice and is therefore in violation of 40 CFR 122.44(l).

The Department and other regulatory agencies have been waiting for regulations regarding Section 316(b) for over twenty-five years. Inclusion of the site-specific alternative as well as the inclusion of the "significantly greater" cost test as opposed to the "wholly disproportionate" cost test (as described in current case law) is a sore disappointment to regulatory agencies. Intake protection technologies have evolved tremendously since enactment of the Clean Water Act in 1972. As a result, the Department does not agree that inclusion of the stronger "wholly disproportionate" cost test would necessarily result in a negative economic impact on energy prices, production costs, and energy production. In fact, a strong Section 316(b) regulation would help in advancing the science of intake protection technologies and in creating new research and jobs.

EPA Response

EPA basis for the site-specific provisions of the final rule are discussed in the preamble to the final rule, including but not limited to section VII. Regarding backsliding, this rule does not alter the existing backsliding regulations. See response to 316bEFR.021.013.

Comment ID 316bEFR.202.047

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 2.04.04

Use cost-benefit tests

Beyond opposing a weaker cost-benefit analysis, it is the Department's position that a formal cost-benefit analysis is not permitted pursuant to the Section 316(b) as it has been interpreted for the past three decades. This issue was long ago analyzed by the EPA Administrator:

Unlike Sections 301 and 304, Section 316(b) determines what the benefits to be achieved are and directs the Agency to require use of "best technology available" to achieve them. There is nothing in Section 316(b) indicating that a cost/benefit analysis should be done, whereas with regard to "best practicable control technology currently available" and "best available technology economically achievable" Congress added express qualifiers to the law indicating a requirement for cost/benefit analysis. Indeed, but for one bit of legislative history, there would be no indication that Congress intended costs to be considered under Section 316(b) at all. I find, therefore, that insofar as the RA's decision may have implied the requirement of a cost/benefit analysis under Section 316(b), it was incorrect.

However, the RA may have meant only that some consideration ought to be given to costs in determining the degree of minimization to be required. I agree that this is so--otherwise the effect would be to require cooling towers at every plant that could afford to install them, regardless of whether or not any significant degree of entrainment or entrapment was anticipated. I do not believe that it is reasonable to interpret Section 316(b) as requiring use of technology whose cost is wholly disproportionate to the environmental benefit to be gained.

IMO Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2) National Pollutant Discharge Elimination System Permit, 1977 WL 22370 (E.P.A.), 1 E.A.D. 337 (1977).

Since the Seabrook ruling, the wholly disproportionate test has been consistently limited in scope and function due to its marginal statutory basis. It must be stressed, however, that this test is a limited one, for the Administrator in the same decision rejected the notion that a full cost/benefit analysis is required under Section 316(b). In re Central Hudson Gas and Electric Corporation, et al. Opinion No. 63 July 29, 1977, 1977 WL 28250 *8 (E.P.A.G.C.). Considering the marginal statutory authority for considering costs in a 316(b) determination and the rejection of a full cost/benefit analysis in the 30 year history of applying this statute, it is the Department's position that EPA lacks statutory authority to promulgate the third regulatory option under the current rule because it distorts the prior limited and informal "wholly disproportionate test" into a formal cost/benefit analysis which will now be the crux of the rule.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.202.048

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 11.03

RFC: Appropriate spatial scale for restoration

Spatial Scale of Restoration Measures

On page 17146 the following is stated:

EPA specifically invites comment on whether restoration measures should be allowed only as a supplement to technologies or operational measures. EPA also seeks comment on the most appropriate spatial scale under which restoration efforts should be allowed - should restoration measures be limited to the waterbody at which a facility's intakes are sited, or should they be implemented on a broader scale, such as at the watershed or State boundary level.

As described in Comment 7, all technological options must be carefully considered first, and mitigation should not be required as a substitute for technology. However, in the event that fish protection technologies are not currently available to meet the performance standards at 125.94(b), the Department supports mitigation measures to minimize impingement/entrainment losses.

With regard to the spatial scale under which restoration efforts should be allowed, the Department suggests that the spatial scale be defined at the watershed level. Although it is true that it would be easier for regulatory agencies to monitor and control restored lands within that regulatory agency's boundary, aquatic life do not necessarily respect state boundary lines. As a result, it should not be a requirement that restored lands must stay within state boundary lines. In addition, there may be a parcel of ecologically productive or potentially ecologically productive land within the watershed in a different state. It would be unfortunate if there was indeed a requirement for lands chosen for restoration to stay within the same state. Using a broader spatial scale of a watershed will also help to ensure that ecologically productive lands within that watershed can be considered for restoration.

EPA Response

For a discussion of the consideration of technologies before choosing restoration measures, see EPA's responses to comments 316bEFR.033.005 and 316bEFR.202.029.

For a discussion of the appropriate scale on which to conduct restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.202.049

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 11.06
RFC: Performance/effectiveness of restoration

Measure of Success of Restoration Measures

On page 17147 the following is stated:

EPA seeks comment on how it may measure the success or failure of restoration activities given the high degree of uncertainty associated with many areas of this developing science and that many of these activities do not produce measurable results for many months or years after they are implemented. For these reasons, EPA requests comment on whether to require that a facility using restoration measures restore more fish and shellfish than the number subjected to impingement mortality or entertainment. EPA believes that restoring or mitigating above the level that reflects best technology available for minimizing adverse environmental impact (e.g. restocking higher numbers of fish than those impinged or entrained by facility intakes or restoring aquatic system acreages at ratios greater than one-to-one) would help build a margin of safety, particularly when the uncertainties associated with a particular restoration activity are known to be high.

The Department agrees that there is uncertainty associated with producing a certain number of fish by way of wetlands restoration. Therefore, instead of requiring a permittee to produce a particular number of fish, permittees should be required to restore a discrete number of wetlands. The amount of wetlands to be restored should be based on the amount of losses due to impingement and entrainment. Conservative assumptions should be used to account for uncertainties in developing this value of land acreage.

One alternative in establishing the number of acres to be restored would be to consider the amount of plant growth necessary to sustain the biomass lost by the facility's intake operations. Specifically, wetlands production can be estimated by the aggregated food chain model. This can be related directly to the estimated biomass lost by the facility's intake operations. This loss can be used to estimate the wetlands restoration acreage required to adequately minimize the effects of the intake losses by increasing the population of those species. The food chain model estimates the production of fish biomass per acre based on the biological conversion for wetland plant productivity through the food chain to the fish species at issue. Primary productivity per acre of wetland per year and food chain transfer conversion factors can be derived from published, peer-reviewed scientific literature and can be employed in this calculation using information specific to the watershed, where available. Conservative assumptions should be incorporated into these calculations.

The plan for restoration should be established in a Management Plan which should have regulatory oversight. Definitive goals for vegetative and hydrological success criteria could be established in any such Plan with periodic deadlines to assess the successes and/or failures of the restoration.

The Department agrees that the benefits of restoration projects can take months or even many years to realize. However, this should not be a deterrent. If these lands are deeded for conservation in perpetuity, the benefits of ecological production from these lands will be realized for many, many years.

As discussed in Comment 7, the Department prefers the restoration and/or preservation of wetlands to fish stocking as fish stocking does not remedy the problem of continued losses of fish habitat.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA agrees that some restoration measures, such as habitat restoration, may have strong ancillary benefits and encourages permit applicants and permitting authorities to consider the net benefits of a restoration measure. For a discussion of the ancillary benefits from restoration measures, see EPA's response to comment 316bEFR.032.011.

Any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.202.050

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 11.07.01

RFC: Consideration of additional env. Benefits

Other Environmental Benefits of Restoration Projects

On page 17148 the following is stated:

Habitat restoration measures may provide important benefits beyond direct effects on fish and shellfish numbers, such as flood control, habitat for other wildlife species, pollution reduction, and recreation. EPA requests comment on whether and how additional environmental benefits should also be considered in determining appropriate fish and shellfish rates for restoration projects.

Because the goal of habitat restoration measures required under Section 316(b) would be to minimize the losses due to impingement and entrainment from an intake structure, the focus and rationale for any required habitat restoration should be strictly fish production. The Department agrees that there are numerous other benefits to restoration measures for other species, including people. However, these benefits are ancillary and including them as a basis for habitat restoration would complicate the issue and not serve the original purpose to increase fish populations.

EPA Response

Any restoration measure must meet all the requirements described in the final rule.

For a discussion of the ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.202.051

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

Conservation of Existing Habitats

On page 17148 the following is stated:

In some cases, conservation of existing, functional habitats - particularly conservation of habitats that are vulnerable to human encroachment and other anthropogenic impacts - may be desirable as part of a facility's restoration effort. In the case of conservation, the functionality of the habitat would not be compromised, therefore eliminating much of the uncertainty associated with measuring the success of other restoration efforts such as habitat enhancement or creation. However, because conserved habitat is already contributing to the relative productivity and diversity of an aquatic system, conservation measures would not necessarily ensure a net benefit to the waterbody or watershed of concern. EPA seeks comment on whether habitat conservation would be an appropriate component of a facility's restoration efforts.

The loss of wetlands has become a critical environmental issue. Conservation of existing, functional habitats would be desirable as part of a facility's restoration efforts considering the continued threat of development to wetlands and adjacent upland buffers. However, the Department agrees that conservation of already productive wetlands may not increase fish populations as much as restoration of former or degraded wetlands. As such, conservation of existing wetlands should count towards a facility's required number of acreage; however, it should count as a lesser value. For example, three acres of wetlands that are conserved can be considered equivalent to one acre of wetlands that is restored. Therefore, if a facility is required to restore 1000 acres of wetlands, the conservation of 3000 acres of existing wetlands could be considered to be in compliance with this requirement. Other combinations that could be used to meet the 1000 acre requirement in this example would be the restoration of 500 acres of former wetlands coupled with the conservation of 1500 acres of existing wetlands.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.202.052

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 12.02
RFC: Monitoring frequencies

Minimum Elements of Impingement Mortality and Entrainment Characterization Study

On page 17148 the following is stated:

What are the Minimum Elements of Impingement Mortality and Entrainment Characterization Study?

EPA invites comment on whether it should set specific, minimum monitoring frequencies and/or whether it should specify requirements for ensuring appropriate consideration of uncertainty in the impingement mortality and entrainment estimates.

Similarly, on page 17149 the following is stated:

EPA invites comment on including minimum sampling frequencies and durations as follows: for at least two years following the initial permit issuance, impingement samples must be collected at least once per month over a 24 hour period and entertainment samples must be collected at least biweekly over a 24 hour period during the primary period of reproduction, larval recruitment and peak abundance. These samples would need to be collected when the cooling water intake structure is in operation.

Given that many sites do not conduct ongoing impingement and entrainment monitoring, inclusion of a minimum impingement and entrainment sampling frequency for representative important species would be helpful. In fact, any facility that has chosen to comply with 125.94(c) should be required to conduct impingement and entrainment monitoring for representative important species for the life of the permit at a minimum frequency of once per month for impingement and once per month for entrainment. If the facility has agreed to comply with the performance standards at 125.94(b), then it would be more appropriate to tailor impingement and entrainment monitoring to the intake protection technologies chosen for that site. For example, if upgraded traveling screens with fish buckets is the chosen technology (where the focus of such technology is impingement), than increased impingement monitoring for representative important species to monitor the efficacy of upgraded screens would be appropriate. On the contrary, if wedgewire screens are the chosen technology (where the focus of such technology is entrainment), than increased entrainment monitoring for representative important species to monitor the efficacy of wedgewire screens would be appropriate.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.202.053

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 10.02
Benefit Estimation Methodology

Quantification of Benefits

On page 17149 the following is stated:

EPA believes that a rigorous environmental and economic analysis should be performed when a facility seeks a site-specific determination of best technology available due to significantly greater cost as compared to the benefits of compliance with the applicable performance standards. EPA invites comment on which of these methodologies, or any other, is the most appropriate for determining a fair estimate of the benefits that would occur should the Phase II existing facility implement technology to comply with the applicable performance standards. In addition, EPA invites comment on whether narrative benefits assessments should supplement these methodologies to properly account for those benefits which cannot be quantified and monetized.

The Department agrees that a rigorous economic analysis should be required for any facility that seeks a site-specific determination of BTA. Again, the burden to provide and justify this analysis should clearly belong to the facility. The Department has reviewed the three options for a benefits assessment (i.e. (1) Quantified and Monetized Baseline Impingement and Entrainment Losses; (2) Random Utility Model; (3) Contingent Valuation Approach).

The Department recommends use of (1) Quantified and Monetized Baseline Impingement and Entrainment Losses coupled with (2) Random Utility Model to provide an estimate of benefits. With respect to the use of supplementing these estimates with narrative benefit assessments, the Department is not sure how narrative values would be of use in the analysis. It would be preferable to quantify benefits to the best extent practicable instead of using narrative benefits. If narrative benefits are not given a value, then it is assumed that their value would be assumed to be zero in the analysis.

EPA Response

EPA agrees that accurate valuation of benefits is critical for any facility that seeks a site-specific determination of BTA. EPA further agrees that it is appropriate to use quantified and monetized baseline impingement and entrainment losses and use the Random Utility Model approach to estimating recreational fishing benefits in estimating site-specific benefits of BTA. EPA also agrees that it would "be preferable to quantify benefits to the best extent practicable." The Agency, however, disagrees that if a value cannot be assigned for some ecological benefits then their value would be assumed to be zero in the analysis. Ignoring ecological values that are difficult to value could result in serious misallocation of resources. The Agency notes that the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN #6-1931) recommend using narrative benefit assessment when estimation of quantified and monetized benefits is not feasible.

Comment ID 316bEFR.202.054

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Conservation of Entrainment Mortality and Survival

On page 17150 the following is stated:

EPA requests comment on whether it is appropriate to allow consideration of entertainment mortality and survival in benefit estimates, and if so, should EPA set minimum data quality objectives and standards for a study of entertainment mortality and survival used to support a site-specific determination of best technology available for minimizing adverse environmental impact. EPA may decide to specify such data quality objectives and standards either in the final rule language or through guidance.

The Department has determined that it is appropriate to allow consideration of entrainment mortality and survival in benefit estimates. However, site-specific factors are quite variable which may make it difficult for EPA to set minimum data quality objectives and standards for a study of entrainment mortality and survival.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.202.055

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 13.0

More Stringent Requirements

More Stringent Requirements than Performance Standards

On page 17150 the following is stated:

Proposed 125.94 (e) provides that the Director could establish more stringent requirements relating to the location, design, construction, or capacity of a cooling water intake structure at a Phase II existing facility than those that would be required based on the proposed performance standards in the rule (125.94 (b)), or based on the proposed site-specific determination of best technology allowed under the rule (125.94 (c)), where compliance with the proposed requirements of 125.94(b) or (c) would not meet the requirements of applicable tribal, state or other federal law.

Although the Department has determined that the performance standards cited in 125.94(b) are stringent and protective in most circumstances, inclusion of 125.94(e) is also helpful, particularly if intake protection technologies continue to evolve in the future.

EPA Response

Today's rule recognizes a State's authority to adopt more stringent requirements.

Comment ID 316bEFR.202.056

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 6.02

Impacts of multiple intake structures on watersheds

Stress of Multiple Intakes

On page 17151 the following is stated:

EPA is also concerned about the potential stress from multiple intakes because demonstration studies are typically conducted on an individual facility basis and do not consider the effects of multiple intakes on local aquatic organisms.

The effects of multiple intakes are a serious environmental concern. It is important that regulatory agencies are aware of other intakes within the watershed that could be impacting the same species as discussed in Comment 2.

EPA Response

EPA agrees with this comment. Please see the response to comment 316bEFR.099.004.

Comment ID 316bEFR.202.057

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 13.0

More Stringent Requirements

Assessing Benefits of Impaired Waterbodies

On page 17151 the following is stated:

EPA also notes that States have designated many waterbodies for the propagation of fish and shellfish that are not attaining such uses due to pollution, and that, in these waters, aquatic communities may be significantly stressed or under-populated. EPA also believes that in some waterbodies, heavy fishing pressures have greatly altered and reduced aquatic communities. EPA anticipates that studies valuing the monetized benefits of reducing impingement and entrainment may not identify significant site-specific benefits in such areas and, should one or more permit applicants request site-specific determinations of less-costly best technology available for minimizing adverse environmental impact, a State may not have authority to deny such requests. EPA requests comment on whether recovery of aquatic communities in such waterbodies might be delayed by use of the significantly greater cost-to-benefit test proposed today. EPA request comment on an regulatory alternative that would explicitly allow the Director to require more stringent technologies or measures where not doing so would delay recovery of an aquatic species or community that fish and wildlife agencies are taking active measures to restore, such as imposing significant harvesting restrictions.

The Department agrees that studies valuing the monetized benefits of reducing impingement and entrainment may not identify significant site-specific benefits in areas subjected to heavy fishing pressures or other negative impacts. In fact, an important part of the benefits equation includes societal benefits which are difficult to quantify as a monetary value since societal benefits are based on intrinsic values. On the other hand, it is much easier to quantify another part of the benefits equation namely the value of fish lost for species which have a market value. It is easy to establish a benefit value for these fish as known market prices are available.

With respect to impaired waterbodies as described in this excerpt of the preamble, the Department is concerned that the use of site-specific assessments for impaired waterbodies will result in intake protection technologies not being deemed cost-effective. This will be due in part to the fact that benefits will be severely understated as fish may not be available in great numbers at the time of the cost/benefit analysis. In addition, societal benefits of having an increase in fish in the waterbody will be difficult to quantify. Therefore, benefits are sure to be understated for such a waterbody. In addition, as stated in this excerpt, the cause of the impairment could be a result of many factors such as fishing pressures, water pollution etc.; however, losses from the cooling water intake structure(s) may very well have contributed to this impairment. It seems inappropriate that an analysis for a cooling water intake structure on an impaired waterbody is likely to result in understated benefits which could in turn result in no technologies being cost-effective and therefore being implemented. This lack of action will only continue to contribute towards the impairment.

Based on the above, it is extremely important that impaired waterbodies are given special treatment in the rule. In sum, the Department is in support of an regulatory alternative that would explicitly allow the Director to require more stringent technologies or measures for waterbodies in which fish and wildlife agencies are taking active measures to restore.

EPA Response

Please see response to comment 316bEFR.002.016.

Comment ID 316bEFR.202.058

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 14.01
RFC: 5% threshold and supporting documents

Discussion of 5% Threshold in Freshwater Rivers

On page 17151 the following is stated:

10. Discussion of the 5% Flow Threshold in Freshwater Rivers

…EPA believes that it is unacceptable to impact more than 5% of the organisms within the area of an intake structure. Hence, if the facility withdraws more than 5% of the mean annual flow of a freshwater river or stream, the facility would be required to reduce entrainment by 60-90 %…

EPA also requests comment on the following alternative withdrawal thresholds for triggering the requirement for entertainment controls: (1) 5% of the mean flow measured during the spawning season, (to be determined by the average of flows during the spawning season, but remaining applicable to non-spawning time periods); (2) 10% or 15% of the mean annual or spawning season flow; (3) 25% of the 7Q10; and (4) a species-specific flow threshold that would use minimum flow requirements of a representative species to determine allowable withdrawals from the waterbody.

The Department supports the 5% flow threshold for freshwater rivers as it finds it reasonable. Items (2) and (3) are too lenient whereas item (4) is far too site-specific. Item (4) would result in debate with permittees, review time for regulatory agencies; and delays in implementing intake protection technologies.

EPA Response

EPA notes the comment and has retained the provision in today's final rule.

Comment ID 316bEFR.202.059

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 15.01
RFC: State or Tribal alts. achieve comparable perf.

Requirements at a Watershed Level

On page 17151 the following is stated:

In 125.90, today's proposal includes an alternative where an authorized State or Tribe may choose to demonstrate to the Administrator that it has adopted alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions in impingement mortality and entrainment that would otherwise by achieved under 125.94. If a State or Tribe can successfully make this demonstration, the Administrator is to approve the State or Tribe's alternative regulatory requirements.

EPA is proposing that such alternative requirements achieve comparable performance at the watershed level, rather than at larger geographic scales or at the individual facility-level, to allow States and Tribes greater flexibility and, potentially, greater efficiency in efforts to prevent or compensate for impingement mortality and entrainment losses, while still coordinating those effects within defined ecological boundaries where the increased impacts are directly offset by controls or restoration efforts…

As discussed in Comment 2 and Comment 28, it is important to keep a real-world perspective in applying impingement and entrainment. However, imposing requirements at the watershed level sounds far too complex and would likely result in delays in implementation of intake protection technologies. There are far too many site-specific factors in establishing impingement and entrainment controls for each facility, never mind on a watershed basis. For example, completely different species and life stages could reside at two facilities within the same watershed. In sum, the Department is opposed to alternative requirements on a watershed level instead of the individual facility level.

EPA Response

Please see response to comment 316bEFR.099.020.

Comment ID 316bEFR.202.060

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Site-Specific Approach Provides an Important Safety Valve

On pages 17152 and 17153 the following is stated:

The Agency anticipates that the inclusion of a site-specific cost to benefit test will continue to be of concern to local regulatory entities and the regulated community in light of the associated burden on permit writers…

However, EPA believes it important to have a site-specific option in the rule to cover cases of exceptionally high costs and/or minimal benefits…EPA anticipates that many, if not most, facilities will choose to comply with the presumptive standards, but believes that for those facilities with exceptionally high costs or exceptionally low benefits, the site-specific provisions provide an important "safety valve".

EPA invites comment on whether the Agency should establish minimum standards for a Comprehensive Cost Evaluation Study and on whether such standards should be established by regulation or as guidance only. EPA also invites comment on the above discussion of the burden that reviewing site-specific cost studies poses for permitting authorities and on its belief that site-specific provisions to address cases of unusually high costs or unusually low benefits are necessary.

As stated previously, the Department is concerned that the inclusion of a site-specific cost/ benefit test will result in a huge burden on the permitting authority.

The Department strongly disagrees with EPA's contention that "many, if not most facilities will choose to comply with the presumptive standards". In fact, the Department questions why any facility would choose to comply with the performance standards when they have the option to comply with the site-specific option. The performance standards are very stringent, and while the Department supports such standards, compliance with such will pose a technological struggle for some years to come. These standards are particularly stringent with respect to entrainment as there are few proven entrainment technologies that can easily be retrofitted to an existing facility. Addressing the issue of compliance schedules would help bridge this gap regarding performance standards. If EPA must include a site-specific option, than the Department suggests that it be made clear that the burden is on the applicant to demonstrate the appropriateness of this option.

The Department agrees that minimum standards for a cost evaluation study would be helpful, although it is suggested that these standards be established as guidance, not regulation.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

For information on the timing of attaining the performance standards, e.g., through a TIOP, please refer to the preamble to the final rule.

Comment ID 316bEFR.202.061

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.08
Burden on permitting agencies (general)

Burden to Resource Agencies

On page 17153 the following is stated:

…To reissue a permit to the Salem Nuclear Generating Station, the New Jersey Department of Environmental Protection recently reviewed and reconsidered a 36-volume permit application supported by 137 volumes of technical and reference materials. The facility filed its application in 1994; NJDEP made its decision in 2001.…

EPA is correct in stating that the original filing contained 137 volumes of technical and reference materials (additional reference materials were later filed). The voluminous nature of the permit application for this facility is a good example of the burden associated with a site-specific Section 316(b) decision. If the site-specific alternative included as 125.94(c) is indeed included in final regulation, then voluminous permit applications are likely for other facilities that apply to be covered under the site-specific alternative. Again, this concern supports the improvements to the site-specific alternative as described previously in Comment 6.

EPA Response

EPA included a site-specific determination of BTA in today's final rule with four other compliance alternatives to provide maximum flexibility for the facility and speed permitting where possible. Please see response to comment 316bEFR.019.014 for additional discussion.

Comment ID 316bEFR.202.062

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 4.01

Source data used by EPA

The Department would also like to comment on a mistake in this particular cite. The 36 volume permit application referenced above was filed in March 1999, not 1994. The June 2001 final NJPDES permit decision was in response to the March 1999 filing. This 2001 permit decision renewed the previous permit decision, which was issued in 1994.

EPA Response

EPA appreciates the clarification. Regardless of the specifics of the citation, EPA agrees with the New Jersey Department of Environmental Protection that the voluminous nature of the permit application for Salem is a good example of the burden associated with a site-specific determination of best technology available.

Comment ID 316bEFR.202.063

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 16.01
RFC: Regulating limited capacity facilities

Capacity Utilization

On page 17153 the following is stated with respect to capacity utilization:

In § 125.94(b)(2), the Agency proposes standards for reducing impingement mortality but not entrainment when a facility operates less then 15 percent of the available operating time over the course of several years. Fifteen percent capacity utilization corresponds to facility operation for roughly 55 days in a year (that is, less then two months). The Agency refers to this differentiation between facilities based on their operating time as a capacity utilization cut-off. The Agency's record demonstrates that facilities operating at capacity utilization factors of less then 15 percent are generally facilities of significant age, including the oldest facilities within the scope of the rule.

Similarly, on page 17154 the following is stated:

...EPA invites comment on its proposed approach to regulating Phase II existing facilities with limited capacity utilization. EPA specifically invites comment on the above alternate thresholds for using capacity utilization to establish performance standard that address impingement mortality but not entrainment....

Please refer to Comment 6C regarding concerns about capacity utilization.

EPA Response

See response to comment 316b.efr.202.022.

Comment ID 316bEFR.202.064

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 4.01.03
Information provided to EPA by stakeholders

Consumption of Water

On page 17157 the following is stated:

The Nuclear Regulatory Commission estimates that a steam-electric plant utilizing a once-through cooling system would consume approximately 40 percent less water than a comparably sized plant equipped with recirculating wet cooling towers because a wet cooling tower uses a small amount of water many times and evaporates most of this water to provide its cooling (which can sometimes be seen as a white vapor plume).

Perhaps an error was made here. A once-through cooling system consumes more water than a comparably sized plant equipped with recirculating wet cooling towers.

EPA Response

EPA believes the statement to be correct. In this context, the term "consume" means to entirely remove from the surface waterbody. The comparison done by the NRC illustrates that a once-through system returns all of the water taken in, less some evaporative losses in the heated discharge. Alternatively, a cooling tower removes or consumptively uses a proportionately higher volume of water during the evaporative cooling process in the cooling tower, despite taking in a significantly smaller volume of water as compared to a once-through cooling system. Please refer to DCN 3-3074 in the Phase I docket (W-00-03) for the full document.

Comment ID 316bEFR.202.065

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Site-Specific Based Options

On page 17159, the following is stated under item C. entitled "Site-Specific Based Options Under Consideration":

EPA also invites comment on site-specific approaches for determining the best technology available for minimizing adverse environmental impact at existing facilities. In general, a site-specific option is a formal process for determining the best technology available for minimizing adverse environmental impact at particular facilities that focuses on the site-specific interactions between cooling water intakes and the affected environment and the costs of implementing controls. This approach would be based on the view that the location of each power plant and the associated intake structure design, construction, and capacity are unique, and that the optimal combination of measures to reflect best technology available for minimizing adverse environmental impact must be determined on a case-by-case basis.

As stated previously, the Department is opposed to 125.94(c)(1) of the proposed regulation language. As can be expected, the Department is also imposed to the Site-Specific Alternative Sample Rule Language included here as it is a less stringent variation of the option proposed in 125.94(c)1. The Department has many specific concerns regarding the sample regulation language for this option as noted below in Comments 37 - 40.

EPA Response

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

No further response is required, as the issues raised in this comment are addressed in individual responses.

Comment ID 316bEFR.202.066

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 17.06.01
Sample site-specific rule (p.17159-61)

Site-Specific Alternative Sample Rule - Burden of Proof

On page 17160 the following is stated:

(a)(1) Except as provided in paragraph (1)(2) of this section, an owner or operator of an existing facility covered by this subpart must conduct a baseline biological survey and provide any other information specified in § 125.97 that the Director concludes is necessary for determining the magnitude of any adverse environmental impact occurring at the facility.

The Department interprets this language to mean that the burden of proof is on the permitting agency for the Site Specific Alternative Sample Rule language. This will be extremely resource intensive for the permitting agency and, as a result, will result in less (if any) protection overall. Again, the Department is concerned that no facility will ever agree that they are causing an "adverse environmental impact". If they contend that they are not causing an "adverse environmental impact" then they will not be agreeable to implementing intake protection technologies.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA agrees that the burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say "you [the facility] must demonstrate to the Director" when stating a requirement.

Comment ID 316bEFR.202.067

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 17.06.01
Sample site-specific rule (p.17159-61)

Site-Specific Alternative Sample Rule - Criteria for Determination of Adverse Environmental Impact

On page 17160 the following is included as sample rule language for the Site Specific Alternative:

(c) In determining the best technology available for minimizing adverse environmental impact at an existing facility, the Director shall:

(1) Minimize impingement mortality for fish and shellfish;
(2) Minimize entrainment mortality for entrainable life stages of fish and shellfish;
(3) Take into account non-aquatic environmental impacts, including energy requirements, and impacts on local air quality or water resources; and
(4) Not require any technologies for location, design, construction or capacity or operational and/or restoration measures the costs of which would be significantly greater than the estimated benefits of such technology or measures.

These criteria, as contained in the Site-Specific Alternative Sample Rule language, are extremely subjective, broad and vague. But perhaps a bigger concern is the fact that the burden of proof is on the permitting agency. Given that this language is requiring definition of intake protection technology measures at the site, it is more appropriate and reasonable to require the facility to provide information regarding these criteria. The facility will have far more familiarity with their site, biological considerations, biological studies etc. than the permitting agency.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA agrees that the burden of proof lies with the permittee. This is reflected in the choice of words used in the rule language and in the preamble. For example, the rule may say "you [the facility] must demonstrate to the Director" when stating a requirement.

Comment ID 316bEFR.202.068

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 17.06.01
Sample site-specific rule (p.17159-61)

Site-Specific Alternative Sample Rule - Restoration Measures

On page 17160 the following is stated as sample rule language for the Site-Specific Alternative:

125.95 As an owner or operator of an existing facility, may I undertake restoration measures to mitigate adverse environmental impact?

(a) An owner or operator of an existing facility may undertake restoration measures (such as habitat improvement and fish stocking) that will mitigate adverse environmental impact from the facility's cooling water intake structure.

(b) In determining whether adverse environmental impact is minimized, the Director must take into account any voluntary restoration measures.

As discussed in Comment 7, restoration measures should only be considered after all technological alternatives have been considered. The decision to allow restoration measures should be up to the permitting agency as discussed later in Comment 53.

With respect to this sample language, the Department has many concerns regarding such. The tone of this language can be interpreted to mean that a facility can voluntarily choose to undertake restoration measures without any oversight from the permitting authority. The permitting authority would then be required to take into consideration any restoration measures that the permittee incorporated without having any say in the appropriateness of such measures. In sum, the Department strongly opposes this language.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to the preamble to the final rule.

Comment ID 316bEFR.202.069

Subject Matter Code 17.06.01

Sample site-specific rule (p.17159-61)

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Site-Specific Alternative Sample Rule - Monitoring

On page 17161 the following is stated:

125.98 As an owner or operator of an existing facility, must I perform monitoring?

(b) The Director may require modifications of the monitoring program proposed by the owner or operator based on, but not limited to, consideration of the following factors:

(1) Whether or not the facility has been determined to cause adverse environmental impacts under 125.100...

This language is very disconcerting. According to such, the Director can modify and/or eliminate a monitoring program if it determines that the facility does not cause an averse environmental impact. As stated previously it is unlikely that any facility would not object to a finding that it is causing an adverse environmental impact. As a result, facilities will expect to be alleviated from any monitoring obligation. The permitting authority will then have no basis for requiring any intake protection technologies and will actually not even be given the opportunity to understand the magnitude of any impingement and entrainment effects since no data could be collected. In sum, this language is a recipe for the permittee to “do nothing”.

EPA Response

EPA did not adopt the sample site-specific rule language in the proposed rule. While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.202.070

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 17.07

Option: Site-specific based 1977 Draft Guidance

EPA's 1977 Section 316(b) Draft Guidance

On page 17161 the following is stated regarding "Site-Specific Alternative Based on EPA's 1977 Draft Guidance:

The 1977 Section 316(b) Draft Guidance states, "The environmental-intake interactions in question are highly site-specific and the decision as to best technology available for intake design, location, construction, and capacity must be made on a case-by-case basis." Section 316(b) Draft Guidance, U.S. EPA, 1977, p.4).

Similarly, on page 17161 the following is stated:

Although the Draft Guidance describes the information to be developed, key factors to be considered, and a process for supporting section 316(b) determinations, it does not establish national standards for best technologies available to minimize adverse environmental impact. Rather, the guidance leaves the decision on the appropriate location, design, capacity, and construction of each facility to the permitting authority. Under this framework, the Director determines whether appropriate studies have been performed and whether a given facility has minimized adverse environmental impact.

Intake protection technologies have evolved tremendously since 1977. As such, the direction in these excerpts is clearly outdated where current times call for national performance standards as those contained in 125.94(b). The inclusion of national performance standards will help to ensure that facilities are given a goal and site-specific factors can be considered in deciding how to get to that goal. As stated numerous times throughout this document, the Department is strongly opposed to a site-specific alternative as written.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.202.071

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 17.09

Option: PSEG site-specific alternative

PSEG Approach for Determination of Adverse Environmental Impact

On page 17162 the following is stated:

Under PSEG's recommended approach, permitting authorities would have the authority to continue to place emphasis on the factors they believe are most relevant to a given situation. For example, when long-term data are available that meet appropriate data quality standards, and when analyses using appropriate techniques such as models that already have been developed to allow population-level analysis of the potential for adverse environmental impact, permit writers would focus on those adverse environmental impact factors related to population-level impacts.

As stated in Comment 1, the Department believes it most appropriate to define adverse environmental impact as “any impingement or entrainment”. This is in direct contrast to a population level impact approach. Populations level impacts are very difficult to quantify given the many confounding factors that affect populations. Instead this effort should be focused on the magnitude of the impingement and entrainment effects caused by the facility and technological measures that can be implemented to minimize that impact. In sum, the Department does not agree with PSEG’s recommended approach.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA has chosen not to define the term "adverse environmental impact" in the final rule. Please refer to section VIII of the preamble to the final rule for more information.

Comment ID 316bEFR.202.072

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Options for Definition of Adverse Environmental Impact

In an effort to promote discussion concerning a definition of Adverse Environmental Impact, the following options are described on pages 17162 and 17163:

(1) EPA's 1977 Definition of Adverse Environmental Impact and Examples of its Current Use

In EPA's 1977 Draft Guidance, adverse environmental impact is defines as follows:

Adverse environmental impact means the adverse aquatic environmental impact that occurs whenever there will be entrainment or impingement damage as a result of the operation of a specific cooling water intake structure. The critical question is the magnitude of any adverse impact which should be estimated both in terms of short term and long term impact with respect to (1) absolute damage (number of fish impinged or percentage of larvae entrained on a monthly or yearly basis); (2) percentage damage (percentage of fish or larvae in existing populations which will be impinged or entrained, respectively); (3) absolute and percentage damage to any endangered species; (4) absolute and percentage damage to any critical aquatic organism; (5) absolute and percentage damage to commercially valuable and/or sport species yield; and (6) whether the impact would endanger (jeopardize) the protection and propagation of a balanced population of shellfish and fish in and on the body of water from which the cooling water is withdrawn (long term impact).

Over the past 25 years, permitting agencies have interpreted this definition in a variety of ways. Some agencies consider the absolute number of organisms subjected to impingement and entrainment by facility cooling water intakes. Permitting authorities that evaluate adverse environmental impact by enumerating losses of numbers of fish individuals find this approach removes much of the uncertainty associated with evaluating effects to species at higher organizational levels such as populations, communities, or ecosystems. Other permitting authorities have focused on evaluating effects on populations in determining whether an adverse environmental impact is occurring.

(2) An Alternative Definition

EPA solicits comment on an alternative definition of "adverse environmental impact" as follows:

Adverse environmental impact means one or more of the following: entrainment and impingement of significant numbers of a critical aquatic organisms or percentages of aquatic populations; adverse impacts to threatened, endangered or other protected species, or their designated critical habitat; significant losses to populations, including reductions of indigenous species populations, commercial fishery stocks, and recreational fisheries; and stresses to overall communities or ecosystems as evidenced by reductions in diversity or other changes in system structure of function.

(3) Discussion of UWAG Recommendation for Determining Adverse Environmental Impact

UWAG offers the following definition:

Adverse environmental impact is a reduction in one or more representative indicator species (RIS) that (1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and (2) is attributable to operation of the cooling water intake structure.

The Department strongly opposes all three of these definitions. Inclusion of any of these definitions presents a danger in that facilities will contend that they “are not causing an adverse environmental impact” and therefore should not be required to implement intake protection technologies. As discussed in Comment 5, adverse environmental impact should be defined as “any impingement or entrainment effects” and, as a second choice adverse environmental impact should be left undefined in final rule.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.202.073

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

UWAG Locational Criteria

In a discussion of the UWAG approach, the following critereon is included as one of several factors under the heading Physical Criteria on page 17163:

Locational Criterion: An existing cooling water intake structure would be considered not to create a risk of adverse environmental impact if it withdraws water from a zone of a water body that does not support aquatic life due to anoxia or other reasons, such as lack of habitat, or water quality conditions.

According to UWAG's description, this is one of several protective decision criteria that should be considered in trying to eliminate the risk of adverse environmental impact. Specifically, a waterbody that does not support aquatic life would be considered to not create a risk of adverse environmental impact. However, this decision criteria begs the question "is the lack of aquatic life due in part to the cooling water intake structure"? Given this potential cause, it seems inappropriate that a lack of aquatic life in a waterbody would be considered a criteria for adverse environmental impact.

EPA Response

EPA agrees with this commenter. The lack of aquatic life in a waterbody should not automatically exempt a cooling water intake structure from provisions of any part of the Clean Water Act. The operation of the cooling water intake structure, or the facility in general, may be the reason for the lack of aquatic life. The reason for the lack of aquatic life should be investigated before any decisions are made.

Comment ID 316bEFR.202.074

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01.01
UWAG definition of "adverse environmental impact"

UWAG Biological Criteria

In a discussion of the UWAG approach, the following critereon is included as one of several factors under the heading Biological Criteria on page 17163:

Percent Population Loss Criterion: On freshwater rivers, lakes (other than the Great Lakes), and reservoirs, a facility would be considered not to create a risk of adverse environmental impact if the cooling water intake structure causes the combines loss, for entrainment and impingement, of (1) no more than 1% of the population of any harvested RIS and (2) no more then 5% if the population of any non-harvested RIS, with fractional losses summed over life stages for the entire lake, reservoir, or river reach included in the evaluation.

As discussed in Comment 1, a population measure of a given fish species, let alone many fish species, could result in a debate for years. The results of biological population studies and modeling can be very subjective because it is difficult to identify, measure, and attribute the impact of each of the many variables affecting populations of each of the impacted species. Given this potential for unending debate, the Department has determined that this critereon is infeasible and unpractical.

EPA Response

EPA agrees with this commenter. It is extremely difficult to identify, measure, and attribute the impact of each of the many factors affecting populations of each of the impacted species. Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.202.075

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Questions for Definition of Adverse Environmental Impact

To summarize the discussion on the determination of adverse environmental impact, the following summary is included on page 17164:

(4) Questions for Comment on the Determination of Adverse Environmental Impact

(a) EPA invites public comment on all aspects of the foregoing approaches to defining adverse environmental impact and for making the preliminary determination on adverse environmental impact, and on which approach should be included if the Agency adopts a site-specific approach for the final rule.

(b) Should the final rule adopt the 1977 Draft Guidance approach to defining adverse environmental impact as any entrainment or impingement damage caused by a cooling water intake structure?

© Should the final rule state that any impingement and entrainment is an adverse environmental impact and focus site-specific assessment on whether that impact is minimized by technologies already in place or potential changes in technology? Alternatively, should the final rule define adverse environmental impact in terms of population-level or community-level effects?

(d) Should EPA adopt an approach that makes more explicit use of threshold determinations of whether adverse environmental impact is occurring. If so, should EPA adopt any or all of the conservative decision criteria suggested by UWAG in a final rule?

(e) Should the structured risk assessment decision process that UWAG recommends for determining adverse environmental impact be adopted?

The Department has determined that the first part of option (c) is the only feasible alternative in order to allow permitting agencies the authority to require technological solutions to minimize impingement and entrainment effects. The Department strongly supports the inclusion of a statement that "any impingement and entrainment is an adverse environmental impact" so that the focus of the site-specific assessment can be a determination as to whether or not that impact is minimized by technologies already in place or if it can be addressed by potential changes in technology.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.202.076

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 18.02
RFC: Use of previous demonstration studies

Use of Previous Section 316(b) Determinations and Section 316(b) Demonstration Studies

On page 17164 the following is stated with respect to the use of previous Section 316(b) demonstration studies:

Under PSEG's approach, if a cooling water intake structure at an existing facility has previously been determined to employ best technology available based upon a diligent review of a section 316(b) demonstration that was conducted in conformance with the 1977 EPA Guidance, then the existing would continue to be determined to employ best technology available for the next permit cycle.

Similarly, on page 17165 the following is stated with respect to the use of previous demonstration studies:

EPA invites public comment on whether a final rule should permit the use of a previous section 316(b) demonstration for determining whether there is adverse environmental impact and the best technology available for minimizing adverse environmental impact. If such a provision is included in the final rule, what criteria or conditions should be included to ensure that the previously conducted demonstration is an adequate basis for section 316(b) decisions?

Although the Department is not opposed to the consideration of a previously conducted section 316(b) demonstration in rendering a decision on best technology available, this is a completely different issue than consideration of a section 316(b) determination as discussed in the first excerpt of this comment. In fact, the Department questions why this excerpt has been included under the heading “PSEG Recommendation for Using Previous Demonstration Studies” since the content of the excerpt concerns a section 316(b) determination not demonstration. Any Section 316(b) determination up until promulgation of final rule for Phase II existing facilities would have been rendered without rules and guidance. Instead permitting agencies had to rely on the plain language of the Clean Water Act and relevant case law since draft EPA guidance documents were never finalized. Once rules are promulgated, permitting authorities will be required to use them in guiding any future Section 316(b) determinations. In sum, the Department does not necessarily find it appropriate to simply “roll over” a prior Section 316(b) determination. However, the factors and site-specific information included in that determination should certainly be considered in any future Section 316(b) determination as they may still be relevant.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today’s final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.202.077

Subject Matter Code 18.03.03

UWAG approach for determining site-specific BTA

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

UWAG Recommendation for Rejecting Technologies

Under the UWAG recommendation for a process on page 17165 the following is stated:

Facilities then would calculate the net benefits for each technology and rank them by cost-effectiveness. Those with marginal costs greater than marginal benefits would be rejected. The technology with the greatest net benefit would be the "best" technology for the site.

Although the Department agrees with the general approach of ranking technologies by their cost-effectiveness, the Department disagrees that “those with marginal costs greater than marginal benefits” should be rejected. This would mean that any technology for which the costs are greater than the benefits would be dismissed (i.e. $1 or greater of costs as compared to $1 of benefits). This directly contrasts the wholly disproportionate standard articulated in case law. Again, the Department can not help but to assume that it is unlikely that any technologies would be deemed cost-effective and therefore implemented if this direction is incorporated into final rule. This is particularly magnified by the fact that benefits are often understated due to the difficult nature of quantifying such.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

Comment ID 316bEFR.202.078

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Wholly Disproportionate Versus Significantly Greater Cost Test

With respect to a process for determining the best technology available for minimizing adverse environmental impact and the role of costs and benefits, the following is stated on page 17166:

EPA invites comment on whether the long-standing "wholly disproportionate" cost-to-benefit test is an appropriate measure of costs and benefits in determining best technology available for minimizing adverse environmental impact. EPA also invites comment on the use of the "significantly-greater" cost to benefit test in today's sample site-specific rule.

Please refer to Comment 19 regarding concerns about this excerpt.

EPA Response

No substantive comment. No response necessary.

Comment ID 316bEFR.202.079

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Burden Associated with Site-Specific Determination

On page 17167 the following is stated:

The site-specific decision-making process requires each regulated facility to develop, submit, and refine studies that characterize or estimate potential adverse environmental impact. Although some approaches allow facilities to use existing studies in renewal applications, States must still conduct evaluations to ascertain the continued validity of these studies and assess existing conditions in the water body. Such studies can be resource intensive and require the support of a multidisciplinary team. A Director's determinations as to whether the appropriate studies have been performed and whether a given facility has minimized adverse environmental impact have often been subject to challenges that can take significant periods of time to resolve and can impose significant resource demands on permitting agencies, the public, and the permit applicant.

...Because of workload concerns, some States have requested that EPA adopt regulations that set clear requirements specifying standards of performance, monitoring and compliance.

The Department wholeheartedly supports the promulgation of regulations that set clear requirements with respect to performance standards as discussed in Comment 6C.

The Department agrees with EPA in its recognition of the burdens associated with the above excerpt for the site-specific decision making process. As discussed in Comment 6 as well as elsewhere through this document, the Department opposes the site-specific option unless significant improvements are made.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

The commenter cross-references several of its own comments. Please refer to the responses to these comments for detailed responses to the issues raised.

Comment ID 316bEFR.202.080

Subject Matter Code 11.1

RFC: Discretionary restoration approach

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Restoration Approaches

Regarding the issue of restoration approaches being considered, the following language is included on page 17169:

In the existing facilities rule, EPA is proposing to allow restoration as one means of satisfying the compliance requirements for any one of the three alternatives in 125.94(a). The demonstration a facility would make to show that the restoration measures provide comparable performance to design and construct technologies and/or operational measures would be similar to the demonstration that a facility would make under Track II in the new facility rule.

This language continues in itemizing options regarding restoration which are as follows:

(1) Discretionary Restoration Approaches
(2) Mandatory Restoration Approach
(3) Restoration Banking

The Department supports the use of restoration as part of implementing Section 316(b); however, as discussed in Comment 7, restoration should not be a substitute for technology. Nonetheless, the Department supports "Discretionary Restoration Approaches" over "Mandatory Restoration Approaches". Based on the descriptions of each in the preamble, the Department has determined that "Discretionary Restoration Approaches" are more likely to ensure that the permitting authority has control as to whether or not this option is considered and is only considered after all feasible technological options have been exhausted.

EPA Response

For a discussion of the extent to which restoration measures are voluntary in the final rule, see EPA's response to comment 316bEFR.060.022.

For a discussion of the requirement to consider design and construction technologies and operational measures before deciding to implement restoration measures, see EPA's responses to comments 316bEFR.033.005 and 316bEFR.202.029.

For a discussion of the role of the permitting authority in determining the appropriate level of performance to meet the requirements of the final rule, see EPA's response to comments 316bEFR.060.026 and 316bEFR.212.001.

Comment ID 316bEFR.202.081

Subject Matter Code 11.12

RFC: Restoration banking

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Regarding Restoration Banking, while the Department agrees that this option may reduce the burden on the permit applicant and cuold potentially result in more wetlands being restored, the Department is concerned that proper regulatory oversight is maintained with this option. The Department is not entirely satisfied that this concern has been addressed, based on the preamble language, and therefore does not support the concept of restoration banking.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.202.082

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Restoration Trading

On page 17170 the following is stated:

EPA seeks comment on whether a section 316(b) trading program would generally afford greater watershed protection by increasing the number of facilities meeting the performance standard and whether consideration of credit purchases should be mandatory prior to the Director setting alternative requirements.

The Department does not agree with this option. Section 316(b) is already complex and this option would only add to that complexity as it introduces interrelationships. In addition, trading presents many unique challenges for permitting agencies as recognized by EPA. The Department has determined that the end result of this option would be less protection overall since some facilities will implement measures while other facilities will not. Instead, all facilities should implement any feasible technologies where restoration can account for any gaps.

Although the Department's first choice is to not include a restoration trading options for existing or new facilities, its second choice would be to allow voluntary adoption of trading.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule. Please see response to comment 316bEFR.018.029 regarding trading restoration.

Comment ID 316bEFR.202.083

Subject Matter Code 21.01

Submittal of required information

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Time Frame for Information Collection Proposal

On page 17175 the following is stated:

EPA requests comment on whether it should specify a particular time frame for submitting the information collection proposal, or alternatively, whether it should remove the requirement for approval by the Director.

The Department suggests that a definitive time frame be established for submission of the information collection proposal. The Department suggests that this information be submitted with the renewal application for a NPDES permit.

EPA Response

EPA has clarified timing requirements. See the preamble to today's final rule. Please see response to comment 316bEFR.034.066 for details.

Comment ID 316bEFR.202.084

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Impingement Mortality and Entrainment Characterization Study

As stated on page 17175, it is explained that the proposed regulations would require the permittee to submit the results of an Impingement Mortality and Entrainment Characterization Study. One of the components of this characterization is:

(3) documentation of the current impingement mortality and entrainment of all life stages of fish and shellfish at the facility and an estimate of impingement mortality and entrainment under the calculation baseline.

The Department agrees with the three components described that will comprise this study so long as one distinction is made with respect to item (3) cited above. It should be clarified that current impingement mortality and entrainment should be for "representative important species" as opposed to all life stages of fish and shellfish. This distinction mirrors this same concern expressed in Comment 6C.

EPA Response

Please see EPA's response to comment 316bEFR.202.031.

Comment ID 316bEFR.202.085

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Design and Construction Technology Plan

On page 17176 the following is stated to describe the Design and Construction Technology Plan:

If you choose to use existing and/or proposed design and construction technologies or operational measures in whole or in part to meet the requirements of 125.94, proposed 125.95(b)(4) would require that you develop and submit a Design and Construction Technology Plan with your application that demonstrates that your facility has selected and would implement the design and construction technologies necessary to reduce impingement mortality and/or entrainment to the levels required. The Agency recognizes that selection of the specific technology or group of technologies for your site would depend on individual facility and waterbody conditions.

The Department supports the requirement to submit a Design and Construction Technology Plan. Submission of these plans will be used to support performance standards. In addition to the Department's position that compliance with performance standards should be encouraged, the Department is confident that submission of these plans will advance the knowledge and science of intake protection technologies. Specifically, upon review of these plans, permitting authorities will better understand the efficacy and applicability of the intake protection technologies that are the subject of the plans.

EPA Response

EPA appreciates the support of the New Jersey Department of Environmental Protection.

Comment ID 316bEFR.202.086

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Component of the Design and Construction Technology Plan

On page 17176 the following is stated:

(3) calculations of the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved by the technologies and operational measures you have selected based on the Impingement Mortality and Entrainment Characterization Study in 125.95(b)(3);

The Department supports this component of a Design and Construction Technology Plan so long as one distinction is made. Instead of calculations of the reductions in impingement mortality and entrainment of "all" life stages of fish and shellfish, calculations should be provided for only representative important species.

EPA Response

Please see EPA's response to comment 316bEFR.202.031.

Comment ID 316bEFR.202.087

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA's Cost Estimates

On page 17181 the following is stated with respect to the costs evaluated as part of the Economic Analysis:

Section VIII.A.1 below presents the analysis of national costs associated with the proposed section 316(b) Phase II Rule. Section VIII.A.2. presents a discussion of their impact analysis of the proposed rules at the market level and for facilities subject to this rule.

1. Costs

EPA estimates that facilities subject to this proposed rule will incur annualized post-tax compliance costs of approximately 178 million. These costs include one-time technology costs of complying with the rule, annual operating and maintenance costs, and permitting costs (including initial permit costs, annual monitoring costs, and repermitting costs)....

As discussed in Comment 6F, it is inappropriate to allow a facility to be eligible for the site-specific option based on its determination that a facility's costs would be significantly greater than those considered by the Administrator in establishing the performance standards. The Department is unclear as to whether a facility is expected to compare its costs with those determined by the Administrator that are articulated in this section. If this is the case, then this comparison is simply not appropriate. The cost data included in this section is not detailed enough and many many assumptions were made. In addition, the Department notes that the scenario included in the proposed rule did not contain accurate cost data as parts of the analysis could not be completed. As stated by EPA on page 17181:

Because of limited time after final definition of the rule as proposed herein, EPA was unable to rerun the IPM model with an analytical option that completely matches the proposed rule's specifications.

Again, the Department suggests that this criteria as contained in 125.94(c)(1) be deleted as stated in Comment 6F.

EPA Response

EPA has discussed the basis for the site-specific provisions of the rule, as well as how it can be implemented, in the preamble to the final rule. (See section VII and IX). In addition, the rule itself includes criteria that address the cost tests. See, 125.94(a)(5)(i).

Comment ID 316bEFR.202.088

Author Name Bradley M. Campbell
Organization NJ Dept of Environmental Protection

Subject Matter Code 10.01.03
Data Issues

Underestimates of Benefits

On page 17192 the following is stated regarding the concern that EPA's estimates of impingement and entrainment losses and benefits are probably underestimates:

EPA's estimates of fish losses due to impingement and entrainment, and of the benefits of the proposed regulations, are subject to considerable uncertainties. As a result, the Agency's benefits estimates could be either over- or under-estimated. However, because of the many factors omitted from the analysis (typically because of data limitations) and the manner in which several key uncertainties were addressed, EPA believes that its analysis is likely to lead to a potentially significant underestimate of baseline losses and, therefore lead to understated estimates of regulatory benefits.

Several of the key factors that are likely to lead EPA's analysis to underestimate benefits include:

-EPA's analysis is based on facility-provided biological monitoring data. These facility-furnished data typically focus on a subset of the fish species impacted by impingement and entrainment, resulting in an underestimate of the total magnitude of losses.

-Industry biological studies often lack a consistent methodology for monitoring impingement and entrainment. Thus, there are often substantial uncertainties and potential biases in the impingement and entrainment estimates. Comparison of results between studies is therefore very difficult and sometimes impossible, even among facilities that impinge and entrain the same species.

-The facility-derived biological monitoring data often pertain to conditions existing many years ago (e.g. the available biological monitoring often was conducted by the facilities 20 or more years ago, before activities under the Clean Water Act had improved aquatic conditions). In those locations where water quality was relatively degraded at the time of monitoring relative to current conditions, the numbers and diversity of fish are likely to have been depressed during the monitoring period, resulting in low impingement and entrainment. In most of the nation's waters, current water quality and fishery levels have improved, so that current impingement and entrainment losses are likely to be greater than available estimates for depressed populations.

The Department agrees that difficulties in quantification of all these factors leads to underestimates of benefits. The Department would also like to specifically note the fact that impingement and entrainment data collected at a time when water quality was comparatively worse than current conditions will result in underestimated benefits as part of the cost/benefit analysis for intake protection technologies. In other words, if a cost/benefit analysis is performed for certain intake protection technologies using outdated impingement and entrainment data, any benefits to reduced impingement and entrainment effects will be underestimated as there are less fish available to be "protected" by the use of the intake protection technologies. Therefore, the use of outdated impingement and entrainment data could directly result in underestimated benefits and hence the rejection of an appropriate intake protection technology. This concern further supports the inclusion of minimum impingement and entrainment monitoring requirements as discussed in Comment 24.

EPA Response

EPA agrees with the commenter that facility-furnished data typically focus on a subset of the fish species impacted by impingement and entrainment, resulting in an underestimate of the total magnitude of losses.

EPA also agrees that industry biological studies often lack a consistent methodology for monitoring impingement and entrainment, resulting in substantial uncertainties and potential biases in the impingement and entrainment estimates. EPA agrees that this makes comparison of results between studies very difficult and sometimes impossible, even among facilities that impinge and entrain the same species.

EPA agrees with the commenter that in those locations where water quality was relatively degraded at the time of monitoring relative to current conditions, the numbers and diversity of fish are likely to have been depressed during the monitoring period, resulting in low impingement and entrainment. As a result, old data may underestimate current I&E rates in places were fish abundances, and therefore I&E rates, have increased.

EPA also agrees that if a cost/benefit analysis is performed for certain intake protection technologies using outdated impingement and entrainment data, any benefits to reduce impingement and entrainment effects will be underestimated as there are less fish available to be “protected” by the use of the intake protection technologies. Therefore, the use of outdated impingement and entrainment data could directly result in underestimated benefits and hence the rejection of an appropriate intake protection technology. For this reason, monitoring of current I&E is required as part of the determination of this rule.

Use of Data in Delaware Case Study

On page 17193 the following is stated:

EPA also examined the estimated economic value of the losses from impingement and entrainment. The estimated cumulative impact of impingement and entrainment at the 12 cooling water intake structures located in the Delaware case study area was based on data available for the Salem facility and than extrapolated to the other facilities on the basis of flow.

Given the varying levels of salinity, variation in species and life stages at different locations, different intake structure configurations, as well as many other site-specific factors, the Department questions whether extrapolation of Salem's data is scientifically appropriate and accurate in establishing impingement and entrainment effects for other Delaware Estuary dischargers. EPA's justification for this assumption should be further clarified.

The Department would also like to further comment on the appropriateness of the use of Salem's biological data. From a national perspective, Salem is unique in that it has extensive historical impingement and entrainment data, ongoing impingement and entrainment data collection (with minimum frequencies defined in its 1994 and 2001 New Jersey Pollutant Discharge Elimination System permits), a comprehensive loss analysis; several Section 316(b) demonstrations; and technological studies regarding alternate intake protection technologies. As was illustrated in the table entitled "Estimated Distribution of Number of Facilities Having Conducted an Environmental Technology Study by Industry Group", which was distributed by EPA at the May 23, 2001 EPA "Technical Experts Panel for Section 316(b)", only 61.5% of traditional utilities have any discrete or on-going impingement and entrainment data sets; Section 316(b) demonstrations; or technological studies.

Despite the fact that Salem's data is more comprehensive than most facilities, there was still some concern regarding the accuracy of the point estimates of impingement and entrainment data, particularly with respect to entrainment. In the June 14, 2000 report prepared by the Department's consultant, ESSA Technologies Ltd., to provide its findings on certain components of Salem's March 1999 application, the following is stated:

In order to complete the analysis of the loss of fish due to entrainment and impingement at the station, the investigators made a careful and substantial effort to fill gaps in the data and to adjust for known biases. Significant data engineering for entrainment losses had to occur before analyses could proceed. They should be commended for their efforts.

Significant, however, was the extensive interpolation and extrapolation of entrainment data required to complete the historical sampling period. There was also a high degree of process error (bias) in the sampling methodology with which the investigators have had to cope. We believe that the variance in the entrainment data warrant an uncertainty analysis to accompany the single-averaged point estimate approach taken in the analyses.

Again, the Department requests that EPA further justify the appropriateness of extrapolating Salem's data to other facilities.

EPA Response

EPA agrees with the commenter that there are site-specific conditions that influence I&E rates for individual facilities. However, it was not EPA's intent to develop precise I&E estimates for individual facilities for its 316b Phase 2 benefits analysis. Rather, the goal was to develop an estimate of the magnitude of I&E for the over 550 facilities nationwide that are in scope of the rule. Because I&E data are not available for most of these facilities, EPA, by necessity, had to extrapolate I&E rates from facilities with data to facilities without data. EPA took great care in this procedure to extrapolate among similar facilities within the same ecological region.

For the final analysis of I&E for the mid-Atlantic region, EPA extrapolated I&E from 6 facilities in different parts of the region Calvert Cliffs, Indian River, Chalk Point, Morgantown, Indian Point, and Salem) to capture a range of conditions within the region. For a discussion of EPA's extrapolation procedure for its final analysis, please see Chapter A5 of the Regional Analysis Document (DCN #6-0003) and EPA's response to Comment 316bEFR.041.041. EPA's analysis of the mid-Atlantic region is presented in Part D of the Regional Analysis Document.

Comment ID 316bEFR.202.090

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Use of Individual Loss Data Versus Population Effects Data

As stated numerous times through this document, the Department defines losses at the individual level. As a result of this policy, it is the Department's position that the best starting point to understanding any facility's effects on a receiving waterbody is to refer to impingement and entrainment data sets. These numbers reflect the direct effects at the intake structure due to impingement and entrainment. An assessment of these effects is integral to defining alternatives to minimize these losses. Impingement and entrainment data sets feed directly into the overall impingement and entrainment losses. Specifically, these impingement and entrainment data sets are extrapolated to be representative of actual operating flow conditions and are then used in choosing appropriate intake protection technologies and their associated cost/benefit ratios.

To further illustrate the importance of defining adverse environmental impact at the individual level, the Department would again like to use the example of the Salem facility in describing the many ways losses can be defined in addition to impingement and entrainment losses. Despite the fact that the Department defines losses at the individual level and because of a lack of regulations from EPA in determining whether an adverse environmental refers to losses at the individual level versus a population level, PSEG provided loss estimates in its 1999 application for the Salem facility in the following ways:

-Impingement and entrainment losses - expressed in losses (number of fish) and densities (number/million m3)

-Conditional Mortality Rates (CMR's) – CMR values provide a conservative estimate of the percentage reduction in the Delaware portion of the young-of-the year populations due to Salem's operations without taking into account compensation or the portion of the population that resides outside the study area within the Delaware River.

-Base Case Losses - impingement and entrainment losses were calculated for a consistent set of operating conditions and losses were converted to age 1
equivalent recruits. The alternate intake protection technologies were defined in terms of base case losses.

-Production Foregone - estimates the total reduction in future growth (measured in units of biomass) attributable to organisms killed as a result of impingement and entrainment at the station. This analysis was included for the forage fish bay anchovy and for non-RIS forage species and this analysis fed into the cost/benefit assessment.

-Spawning Stock Biomass per Recruit (SSBPR) – this model considers the reproductive capacities of organisms entrained and impinged by estimating the fractional change in reproductive capacity of a given species as a result of plant operations.

-Equilibrium Spawner Recruit Analysis (ESRA) – this model is used to understand long-term (equilibrium) impacts by calculating the population consequences of base-case conditional mortality rates for entrainment and impingement.

As illustrated by this example, a lack of definition for adverse environmental impact will result in facility's providing complex data analyses where the building block for any such analyses is impingement and entrainment data. The review of these analyses is extremely time-consuming and resource intensive for the permitting agency. In addition the question of the actual losses due to the facility becomes extremely complex and can lead to great debate, which is an unproductive use of effort. Again, it is the Department's position that the focus should be on the direct effects of the facility, namely individual impingement and entrainment losses, and ways in which to minimize those losses with intake protection technologies.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.202.091

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 22.01

Executive Orders (except EO 13211)

Federalism Implications

On pages 17214 to 17216, EPA set forth its understanding of the requirements of Executive Order 13132 regarding federalism and the steps taken by EPA in furtherance of same. On page 17215 the following is stated:

Under section 6 of Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments or EPA consults with STATE and local officials early in the process of developing the proposed regulation.

It is the Department's position that Federal government has not complied with the substance or the spirit of Executive Order 13132. The Department disagrees with EPA's assertions that this rule (1) has no federalism implications, (2) does not impose substantial direct compliance costs on state regulating agencies and (3) is required by statute. To the contrary, this regulation does implicate federalism policies because it affects the policymaking discretion of the States. Moreover, the expansion of the site-specific alternative from an exception, to be granted at the discretion of the permitting authority, to a freely available third regulatory option eliminates all of the gains in administrative simplicity which were anticipated to be reaped from the relatively simple performance standards, and thus, imposes an enormous additional administrative burden on the States with a commensurate increase in direct implementatione costs. Finally, the imposition of formal cost/benefit analysis as a central focus of the regulation is not required by Section 316(b) of the Clean Water Act. Beyond being not "required" by statute, it is the Department's position that the cost/benefit analysis imposed by the "site-specific" alternative is not authorized by 316(b) as discussed in Comment 6F above.

EPA Response

EPA has followed Executive Order 13132 regarding federalism and concluded that this rule does not have federalism implications.

Comment ID 316bEFR.202.092

Author Name Bradley M. Campbell

Organization NJ Dept of Environmental Protection

Subject Matter Code 22.0

Administrative Requirements

Notwithstanding its claim that the federalism issues protected by OE 13132 are not implicated in this rulemaking, EPA asserts that it has provided sufficient opportunity for review and comment by State and local agencies to satisfy the requirements of OE 13132. However, the significantly less stringent changes made to this regulation subsequent to the December 28, 2001 submission of the EPA draft to the Office of Management and Budget were not subject to any comment or input from State or local agencies. OE 13132 appoints the Office of Management and Budget as the gatekeeper of agency responsiveness to OE 13132. It makes a mockery of the substance and intent of the OE 13132 to allow the gatekeeper to ignore the mandates of the executive order and require changes, which violate federalism policies.

EPA Response

EPA has followed Executive Order 13132 regarding federalism and concluded that this rule does not have federalism implications.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Timothy J. Method

On Behalf Of:

Indiana Dept of Environmental

Author ID Number:

316bEFR.203

Comment ID 316bEFR.203.001

Author Name Timothy J. Method

Organization Indiana Dept of Environmental

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

IDEM supports an approach to implementing section 316(b) of the Clean Water Act that is reasonable, cost effective and results in the minimization of any potential adverse environmental impacts from large power plants' cooling water intakes.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

Comment ID 316bEFR.203.002

Subject Matter Code 1.01

Comment period

Author Name Timothy J. Method

Organization Indiana Dept of Environmental

IDEM also invites EPA to further engage states in discussions of implementation so that it can better reflect the realities faced by them.

EPA Response

EPA believes it has considered the concerns of States in today's final rule. Please see EPA's response to comment 316bEFR. 023.001.

Comment ID 316bEFR.203.003

Author Name Timothy J. Method

Organization Indiana Dept of Environmental

Subject Matter Code 21.08

Burden on permitting agencies (general)

IDEM is concerned with the additional burden a site-specific approach described in the proposed rule could have to our existing NPDES permit program. It is apparent that significant resources will be required to effectively implement the proposed regulation. Most states are currently working hard to process NPDES renewal applications in a timely way and to effectively implement other provisions of the NPDES program. Also, most states face significant budget constraints. It is not apparent that U.S. EPA has considered the costs and burden of implementing the proposed regulation on existing state NPDES programs.

IDEM is aware that some site-specific review may be needed while permitting existing facilities. However, EPA must not require implementation of cooling water intake regulations in a vacuum without considering other requirements, timing and needs of the NPDES program. The establishment of a regulatory framework that presupposes a level of available resources without proper consideration of the ability to effectively implement its provisions will not be successful.

EPA Response

EPA did greatly consider the costs and burden of implementing today's final rule and has provided maximum flexibility for both facilities and Directors through the four compliance alternatives in 125.94(b) and the site-specific determination of BTA. Please see response to comment 316bEFR.034.005 for a discussion of the efficiencies added to the final rule.

EPA is also sensitive to the resource limitations of some States. Because of the multiple compliance alternatives and the availability of the Technology Installation and Operation Plan as discussed at 125.94(e), EPA believes that most facilities will not seek compliance via a site-specific determination of BTA. Only a handful of facilities are expected to pursue the site-specific determination of BTA.

EPA has outlined possible timing requirements in the preamble to today's final rule. Please see response to comment 316bEFR.034.066 for a discussion on timing of application studies.

Comment ID 316bEFR.203.004

Author Name Timothy J. Method

Organization Indiana Dept of Environmental

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

IDEM supports an approach that gives the permit writer a clear option for requiring technologies that are proven in their efficacy under particular conditions EPA could provide technical guidance on technologies available and their efficacy under certain conditions and provide permit writers with clear criteria for considering these different technologies given the conditions at the facility.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule, which includes a compliance alternative for preapproved technologies. EPA notes that facilities using approved design and construction technologies (such as a wedge-wire screen in certain freshwater river environments) may demonstrate compliance with the rule under § 125.94(a)(4) or may request that the Director approve additional technologies under § 125.99(b).

With respect to the choice of intake technologies for a particular facility or type of facility in the final rule, there are several resources permit writers may consult for information. First, EPA has provided a database with numerous studies that illustrates the effectiveness of various intake technologies (see DCN 5-4420 in OW-2002-0049, the docket for the Phase II NODA). Second, the final rule also includes provisions for verification monitoring (see § 125.95), allowing the Director to monitor the effectiveness of a selected technology. Lastly, as stated in the Phase II Information Collection Request for the final rule (DCN 6-0001 in OW-2002-0049, the docket for today's final rule), EPA assumed that some facilities would conduct pilot studies to evaluate the potential effectiveness of intake technologies. The results of such a study may help guide the selection of the most effective intake technology.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas McGarity

On Behalf Of:

Center for Progressive Regulation

Author ID Number:

316bEFR.204

Comment ID 316bEFR.204.001

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 2.04.04

Use cost-benefit tests

Our basic concern with EPA's current proposal is this: EPA's proposal threatens to turn a technology-based regime into a cost-benefit regime, without any support for this transformation in the statutory language, structure, or history.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.204.002

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 22.0

Administrative Requirements

Further, the motivation for this sea change in statutory interpretation appears to have come from an agency, the Office of Information and Regulatory Affairs (OIRA), within the Office of Management and Budget (OMB), which is not charged with implementing and interpreting the Clean Water Act and which is, it appears, engaged in a pattern of holding closed-door meetings with industry representatives on pending rules, followed by "recommendations" to EPA to weaken the rules under consideration. OIRA's influence on this and other rulemakings, and in particular its closed-door sessions with private parties, have caused misinterpretations of the Clean Water Act and, more generally, violate both the spirit and the letter of the Administrative Procedure Act.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.204.003

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 2.04.04

Use cost-benefit tests

Statutory interpretation: EPA's reliance on formal cost-benefit analysis, including the agency's proposed differentiation of standards according to the quality of the receiving waters affected, is a misinterpretation of the Clean Water Act. Changes to EPA's proposal made after review by OIRA suggest that EPA's new reliance on formal cost-benefit analysis in setting technology-based standards under the Clean Water Act is a result of OIRA's influence. It thus appears that EPA is ceding its interpretive authority under the Clean Water Act to OIRA, which violates Congress's intent that EPA be responsible for implementation of the Clean Water Act.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.204.004

Subject Matter Code 22.0

Administrative Requirements

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Administrative process. While OIRA was reviewing EPA's initial proposal for CWIS's, and insisting on numerous and extensive changes in EPA's proposal that greatly relaxed the requirements of EPA's initial proposal, top OIRA officials met with numerous representatives of the energy businesses affected by this proceeding. Yet neither EPA nor OIRA has made available all of the documents that passed between EPA and OIRA concerning EPA's proposal. Moreover, EPA's preamble does not explain whether and how EPA's initial proposal was changed as a consequence of OIRA review and/or OIRA's contacts with industry representatives. As things stand now, the existing public record invites the unfortunate conclusion that the changes made to EPA's proposal between the time when EPA submitted the proposal for OIRA review and when the agency offered a significantly changed proposal for public comment were influenced by ex parte contacts between high-level OIRA officials and industry representatives, contacts undocumented and unexplained in EPA's preamble.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.204.005

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 22.0

Administrative Requirements

We believe that these errors of statutory interpretation and the appearance (and perhaps reality) of secret industry influence on EPA's proposal will make this rulemaking proceeding exceedingly vulnerable to judicial invalidation. We also believe, as scholars of environmental law and the administrative process, that the substance and process of this rulemaking reflect an exceedingly problematic turn of events both for environmental regulation and, more generally, for open and impartial administrative proceedings. See Sidney A. Shapiro, Two Cheers for HBO: The Problem of the Nonpublic Record, 54 Admin. L. Rev. 853 (2002). We strongly urge EPA to respond to the comments below by changing the proposal in the ways we suggest and by making public the documents and any other records that shed light on the reasons why the rule was changed so substantially at OIRA's behest.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.204.006

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 2.04.04

Use cost-benefit tests

EPA's proposal transforms technology-based regulation into cost-benefit regulation, with no support in the statute for doing so.

Section 316(b) is not a cost-benefit provision. It does not even mention economic costs, in contrast to other technology-based provisions of the Clean Water Act, which explicitly allow EPA to consider costs. See, e.g., 33 U.S.C. §§ 1314(b)(1)(B), 1314(b)(2)(B), 1314(b)(3), 1316(b)(1)(B). The contrast between the explicit mention of costs in other statutory provisions and the absence of such language in section 316(b) is striking evidence that cost-benefit analysis is not permitted under section 316(b). See Whitman v. American Trucking Associates, 531 U.S. 457, 468 (2001) (faced with similar interpretive question under Clean Air Act, Justice Scalia rejected the argument that costs should be considered, remarking on the importance of the issue and observing that Congress does not "hide elephants in mouseholes"). Moreover, even the consideration of costs that has been undertaken under other provisions of the statute is not as rigid and hyper-quantified as the cost-benefit balancing EPA proposes to undertake here. For example, EPA's longstanding practice under other provisions of the Clean Water Act has not, in contrast to the approach undertaken here, featured relaxation of regulatory requirements based on a comparison of monetized costs to monetized benefits.

In lacking any reference to consideration of costs, section 316(b) contrasts strikingly not only with other provisions of the Clean Water Act, but with provisions of other statutes that do contemplate formal cost-benefit analysis. The Safe Drinking Water Act, for example, specifically directs EPA to undertake cost-benefit analysis and to consider willingness-to-pay in undertaking that analysis. See 42 U.S.C. § 300g-1(b)(3)(C)(iii). No such language appears in section 316(b). It is more than a little awkward, therefore, that EPA cites to the Safe Drinking Water Act as a possible source for the cost-benefit standard under the Clean Water Act – as if they were somehow the same statute! See National Pollutant Discharge Elimination System—Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 67 Fed. Reg. 17122, 17166 (April 9, 2002). They are not.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.204.007

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 21.08

Burden on permitting agencies (general)

Moreover, EPA itself recognizes the significant administrative burdens that will be imposed on state and federal permitting agencies as a result of individualized cost-benefit assessments for CWIS regulation. Indeed, these burdens were one reason why EPA did not choose site-specific cost-benefit as a lead option in its original proposal. See OMB Review Draft for the Proposed Section 316(b) Rule for Large Cooling Water Intake Structures at Existing Power Generating Facilities, USEPA Docket W-00-32, DCN# 4-4005, at 93 (December 28, 2001). At the behest of OIRA, however, EPA elevated site-specific cost-benefit analysis to a lead option. EPA should explain the basis for this change of heart. Mere reference to OIRA's desires, of course, will not be an adequate statement of EPA's basis and purpose for this rule, as OIRA is not the agency charged with implementing and interpreting the Clean Water Act. Motor Vehicle Manufacturers Assoc. v. State Farm Mutual Automobile Ins. Co., 463 U.S. 29, 56 (1983) (an "agency must examine the relevant data and articulate a ‘rational connection between the facts found and the choice made'").

EPA Response

Please refer to the final rule preamble for an explanation of EPA's decision to include a site-specific option.

Comment ID 316bEFR.204.008

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 8.0

Waterbody Type

EPA also errs, as part of its new emphasis on cost-benefit balancing, in proposing to vary regulatory requirements according to the nature and quality of the water bodies affected by individual CWISs. Section 316(b) requires that effluent standards demand the "best technology available for minimizing adverse environmental impact." Once a technology is identified as available and as the best for minimizing adverse environmental impact, EPA should not relax regulations under section 316(b) based on the nature of the water bodies affected. Such an approach runs counter to EPA's longstanding approach to the technology-based requirements of the Clean Water Act. See, e.g., Weyerhaeuser v. Costle, 590 F.2d 1011, 1035 (D.C. Cir. 1978) (rejecting site-specific variances from best available technology standards). EPA's new approach also runs counter to the history and purpose of the Act itself, which was significantly amended in 1972 precisely because the previous water-quality-based approach had been, in Senate Muskie's words, "inadequate in every vital respect." A Legislative History of the Water Pollution Control Act of 1972, vol. 2, at 1253 (1973). Finally, and perhaps most tellingly, EPA's focus on site-specific water quality under section 316(b) is undermined by the subsection immediately preceding section 316(b) – section 316(a) – which provides explicitly for the kind of site-specific analysis EPA has endorsed here. The lack of such site-specific emphasis in section 316(a) evinces congressional intent that section 316(a) not turn on site-specific determinations.

EPA Response

EPA disagrees with this analysis. EPA sees no relevance to the commenter's reference to 316(a), which relates to thermal discharges. In any case, section 316(b) specifically directs EPA to consider waterbody characteristics and environmental effects when choosing a BTA. Nowhere does 316(b) specify that EPA must adopt a single national categorical standard or technology.

Comment ID 316bEFR.204.009

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 3.01

Definition: Existing Facility

In another reflection of its misunderstanding of section 316(b), EPA proposes very different requirements for existing facilities than it has required for new facilities in its Phase I rules. Section 316(b) does not, however, distinguish between new and existing facilities; its requirements apply equally to all facilities. Other sections of the Clean Water Act, in contrast, draw a clear distinction between new and existing facilities. Compare, e,g., 33 U.S.C. § 1311 (referring to existing sources) with 33 U.S.C. § 1316 (referring to new sources). The lack of such a distinction in section 316(b) is telling evidence that the same requirements should apply to both kinds of facilities. EPA thus errs in drawing such a large distinction between new and existing facilities for purposes of this proposed rule.

To be sure, section 316(b) does refer to provisions of the Clean Water Act (sections 301 and 306) that distinguish between new and existing facilities. However, nothing in section 316(b) says that the requirements of section 316(b) are the same as those under sections 301 and 306. Moreover, if this were the case, then EPA's use of site-specific, formal cost-benefit analysis, and its emphasis on the condition of the affected waters in setting regulatory requirements, would be even more suspect, as these regulatory approaches have not historically been adopted under sections 301 and 306.

EPA Response

As the comment notes, section 316(b) requires that "...standards established pursuant to..." sections 301 and 306 of the CWA must require that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Given the wording of section 316(b), as well as its reference to both existing and new facility standards, the Agency believes it is well within its authority to make reasonable distinctions in determining both best technologies for existing versus new facilities, as well as to make reasonable distinctions in determining which technologies are available to existing versus new facilities. Such distinctions are based on documented differences between the two categories of facilities with regard to their respective ability to address issues such as intake location, intake design, the availability of space for specific technologies, secondary environmental effects (e.g., plumes, fogging, icing, etc.), operational delays associated with retrofitting, energy impacts, costs, and cost-effectiveness.

Comment ID 316bEFR.204.010

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

EPA makes a half-hearted attempt to justify its distinction between new and existing facilities, arguing that more flexibility is needed for existing sources and that energy impacts would be unacceptable if the same requirements were to apply to both kinds of sources. 67 Fed. Reg. at 17140-41, 17146. The best evidence against these claims are EPA's own words, in the original proposal it sent to OIRA for review in December 2001. There, EPA found that 59 existing sources, at least, could be subject to much more stringent standards than it now proposes imposing, despite the supposedly reduced flexibility of such existing facilities. See OMB Review Draft for the Proposed Section 316(b) Rule for Large Cooling Water Intake Structures at Existing Power Generating Facilities, USEPA Docket W-00-32, DCN# 4-4005, at 77-78 (December 28, 2001). In the current proposal, which followed OIRA's review and OIRA's closed-door meetings with industry representatives, EPA has softened the requirements for these facilities. However, EPA does not elaborate upon its reasons for having done so. Even under its own, mistaken view of the proper interpretation of the Clean Water Act – according to which cost-benefit analysis is the criterion for regulatory choice – EPA does not adequately explain why the costs of requiring closed-cycle cooling at any or even all facilities covered by this proceeding are not worth the benefits. EPA vaguely suggests that the costs are "unacceptable." The agency also recognizes, however, that the benefits of closed-cycle cooling would reach at least almost $1.5 billion, 67 Fed. Reg. at 17168, without even accounting for the numerous and multifarious unquantified benefits conferred by regulation of CWISs. See 67 Fed. Reg. at 17190-93. EPA cannot simply declare that the costs are unacceptable; it must explain why it believes them to be so.

EPA Response

The costs of converting to recirculating wet cooling towers for a portion of or the entirety of the existing facilities within the scope of the rule are unacceptable, in the Agency's view (see the preamble to the final rule). Additionally, EPA based its decision on the uncertainty relating to the engineering feasibility, the potential for extended connection outages, and the lack of historical engineering precedent for cooling tower retrofit projects (with only one known case at a power plant of the size of the typical facility within the scope of the rule). The Agency can and did consider a wide range of factors into its determination that the societal "costs" of mandated cooling tower retrofit are "unacceptable," especially when compared to the relatively inexpensive and beneficial societal impacts of the preferred final rule requirements. See section VII.E of the preamble to the final rule.

One fact influencing this conclusion came to the Agency, literally, on the eleventh hour prior to proposal. This fact, was the real-life construction downtime data from the Palisades Nuclear plant cooling tower conversion, which the Agency requested from the facility far in advance of the proposal, only to receive it on the day before the proposal was signed. Prior to this point, the Agency had in hand data from two small power plant conversions that indicated connection outages could be quite short. However, the 10 month outage at Palisades was so far in excess of the Agency's previous estimates (1 month net outages at all plants retrofitting to closed-cycle) that this served to reinforce the Agency's findings of the costs of retrofitting being high to unacceptable. Hence, the Agency did not have the opportunity to include this important piece of evidence in its proposal submission to OIRA nor did it have opportunity to fully flesh this fact out in the analyses supporting the proposed rule and retrofitting cooling towers. Therefore, the Agency re-analyzed some proposal regulatory options for the Notice of Data Availability (68 FR 13525).

Comment ID 316bEFR.204.011

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 2.04.04

Use cost-benefit tests

We strongly support Congress' choice of technology-based standards to implement the Clean Water Act. Although this approach has been criticized by those who favor a cost-benefit approach, the academic literature has long recognized the important advantages of this approach to environmental protection as compared to the cost-benefit approach that OIRA has attempted to smuggle into EPA's decisionmaking. See, e.g., Sidney A. Shapiro & Thomas O. McGarity: The Rationale for Technology-Based Regulation, 1991 Duke L.J. 729; Thomas O. McGarity, Media-Quality, Technology, and Cost-Benefit Balancing Strategies for Health and Environmental Regulation, 46 Law & Comp. Probs. 159 (Summer 1983).

EPA's transformation of technology-based regulation into cost-benefit regulation, along with its inadequate explanation of its regulatory choices under the new cost-benefit regime, is made all the more troubling, as we next explain, by the obvious and undue influence of OIRA, and perhaps even industry representatives, in leading to EPA's regulatory change of heart.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.204.012

Author Name Thomas McGarity

Organization Center for Progressive Regulation

Subject Matter Code 22.0

Administrative Requirements

EPA and OIRA should make available any and all documents pertaining to OIRA's review of EPA's initial proposal for this rule, and EPA should explain why it changed its proposal so significantly at OIRA's behest. EPA should also explain whether and how private industry representatives with whom OIRA officials met during OIRA's review of this rule affected OIRA's and/or EPA's perspective on this rule.

Even a cursory comparison of EPA's original proposal, sent to OIRA in December 2001, and the proposal EPA published in April, reveals that OIRA insisted on numerous and extensive changes in EPA's proposal. EPA should explain why it made these changes. EPA's December 2001 proposal was made by the expert agency, charged with implementing and interpreting the relevant statute, after plenary agency review. Changes made at the behest of OIRA at this point should be explained in the administrative record. This is particularly so in this case, where OIRA met with numerous industry representatives while undertaking its review of this rule.

While EPA's initial proposal was under review at OIRA, high-level OIRA officials met with representatives from the following industry groups: TXU, Cinergy, PSEG, Progress Energy, Edison Electric Institute, TECO Energy Inc., Constellation Energy Group, Allegheny Energy, Minnesota Power, and Mirant Corporation. See "Meeting Record Regarding: Meeting with the Administrator of OIRA to Discuss 316(b) Existing Facilities Rule," available at http://www.whitehouse.gov/omb/oira/2040/meetings/87.html. All of these are businesses in the energy sector. (We have used the abbreviated designations used by OIRA on its web site; we think it most likely that "TXU" is TXU Energy, "PSEG" is Public Service Enterprise Group, and "EEI" is Edison Electric Institute.)

Several weeks after this meeting, OIRA concluded its review of EPA's proposal. OIRA's review ultimately produced substantial changes in EPA's proposed rule. EPA itself has documented the changes that occurred at OMB's behest. See Section 316(b) Phase II Proposed Rule Summary of Major Changes During Interagency Review, USEPA W-00-32 DCN 4-4019, (May 23, 2002) (documenting that over thirty major changes, i.e. the vast majority, were made "at the suggestion or recommendation" of OIRA). EPA has not stated, however, whether any information, opinions, or documents that might have been supplied by the energy industry representatives who enjoyed an ex parte meeting with OIRA officials led to the changes in EPA's proposal. Yet EPA officials were present at the meeting with industry representatives. (See meeting record, available at http://www.whitehouse.gov/omb/oira/2040/meetings/87.html (listing EPA employees Stephanie Dangle, Geoff Grubbs, David Gravallese, and Tom Gibson as attendees).) EPA thus should explain what influence, if any, its ex parte contacts with industry representatives had on its current proposal.

In addition, EPA should make public any documents that passed between EPA and OIRA during this review. OIRA so far has refused to make public all such documents, citing a Reagan-era policy on nondisclosure of OIRA-review-related documents. See Letter from Donald R. Arbuckle, Deputy Administrator, OIRA, to Reed Super, Senior Attorney, Riverkeeper (June 20, 2002)). EPA should also make public any written or oral communications that passed between private groups and individuals and EPA or OIRA during OIRA's review. See Shapiro, supra, at 855 ("The legitimacy of rulemaking relies on public knowledge of private contacts with agency and White House officials even if any agency can successfully defend its rule against legal attacks on the basis on publicly available information.")

Without this disclosure, OIRA's early and intense involvement in EPA rulemaking would allow OIRA to undo the procedural strictures of the Administrative Procedure Act: a "private" notice and comment period, open to select members of affected groups, would precede the "public" notice and comment period contemplated by the APA. The D.C. Circuit has warned of such secrecy "frustrating" the APA, since the final rule would not be "based (in part or whole) on any information or data which has not been placed in the docket...." Sierra Club v. Costle, 657 F.2d 298, 403 (D.C. Cir. 1981), quoting Administrative Procedure Act, 42 U.S.C. §7607(d)(6)(C). The court also expressed the same concern in United Steelworkers of America v. Marshall, 647 F.2d 1189 (D.C.Cir.1980) (partially rev'd on unrelated grounds, United Steelworkers of America v. Dole, 1990 WL 488981 (D.C. Cir. 1990)), requiring disclosure of any ex parte communications "that may have influenced the agency decisionmaking." 647 F.2d at 1237-38. Surely these principles cannot be circumvented by the simple expedient of having private industry representatives meet in OIRA's offices rather than in EPA's.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Dr. Daniel Talhelm

On Behalf Of:

Consumers Energy Co.

Author ID Number:

316bEFR.205

Comment ID 316bEFR.205.001

Author Name Dr. Daniel Talhelm
Organization Consumers Energy Co.

Subject Matter Code 10.02.02
Commercial Fishing Benefits

Producer Surplus of Commercial Landings:

Producer surplus in concept is "the difference between the market price a producer can obtain for a good or service and the actual cost of producing that unit of the commodity" (p. A9-2, footnote 1). Chapter A9 concludes that producer surplus is 40% to 70% of commercially landed fish values (p. A9-5). This may be true in fisheries for which fishing effort is near optimal levels, i.e., those for which long run marginal fishing costs (for the industry) approximate long run marginal fishery revenue. However, producer surplus is likely much smaller in overcapitalized fisheries, for which fishing costs (and usually fishing effort) exceed optimal levels. For instance, in his estimates of the demand and supply of all U.S. lake whitefish landings, Ghanbari (1977) estimated that the ratio of producer surplus to landed value was .29. This is lower than those of EPA's other citations. Further, using data from Pattinson and Talhelm (1978) on costs reported by whitefish fishing firms in Michigan's Green Bay, Ghanbari also estimated that producer surplus for whitefish fishing in those Michigan waters was only 3% of current revenue. Finally, using a surplus production analysis of Michigan's Green Bay whitefish fishery, Ghanbari estimated that at optimal effort (much lower than the then-current effort), producer surplus would be 40% to 66% of total revenue. Husin (1984) found similar results. In his surplus production analysis, using Pattinson and Talhelm (1978) cost data, he estimated that producer surplus for all of Michigan's 1982 whitefish fishery was 15%, but could have increased to 45% at optimal effort. (See further discussion in Talhelm 1988). These studies show that overcapitalization was common in Michigan's Great Lakes fisheries at the time, reducing producer surplus levels considerably below optimal levels. They also imply that the ratio of producer surplus to revenue may vary considerably over time. Michigan's fisheries have changed drastically since 1982, and recent levels of producer surplus apparently have not been estimated. Judging by reports in the fisheries literature and in the news media of stock depletion in many Great Lakes and saltwater commercial fish stocks, excess effort is common. In such cases, producer surplus will commonly be lower than EPA's estimated 40% to 70% of landed value, and could be as low as zero. An upper estimate of 40% would be more realistic for Great Lakes fisheries. EPA's related rule of thumb, a .22 ratio between producer surplus and total economic surplus for commercial landings, is similarly flawed, though there apparently are no alternative empirical estimates of this ratio for Great Lakes commercial fisheries.

EPA Response

For the cost-benefit analysis of the EPA assumed that producer surplus in the commercial fishing sector ranges from 0% to 40%. The 22% rule of thumb was not used.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.205.002

Author Name Dr. Daniel Talhelm
Organization Consumers Energy Co.

Subject Matter Code 10.02.04
Valuing Forage Species (incl non-use and non-landed)

Existence and other Nonuse Values:

In the economic literature, the term "existence" has been used in several contexts, ranging from the literal existence or not of a species or habitat (or the risk of extinction), to the possible loss of "integrity" of an ecosystem. I&E losses rarely threaten the existence or integrity of a species or habitat; they generally only impact a very small percentage of highly viable populations. Yet the proposed EPA rules assign existence values to these species (as part of non-use values). The relationship between the value of the risk of extinction and the value of a trivial population reduction has not been adequately addressed in the economics literature. Clearly, the pure survival value of organisms and unique ecosystems can be large and socially important. People felt violated when they heard that Prince William Sound's ecological integrity was threatened by a large oil spill, and when they heard that Lake Erie was "dying." People might also feel violated, but to a much lesser degree, when they hear about I&E losses where species/ecosystem integrity is not threatened, but it is not clear whether this is even a form of existence value. Further, people may feel similarly violated by fish removals by sport and commercial fisheries, but society generally considers both practices acceptable. One can validly argue that marginal losses of non-threatened species have zero impact on existence values. One can also argue that option value (another nonuse value) is also zero because all impacts are easily reversible in a relatively short time frame. Therefore, EPA's assumption that existence and other non-use values are 50% of recreational values (p. A9-10) is quite arbitrary, as EPA acknowledges, and EPA has cited no scientific basis for any loss of non-use values in non-threatening removals such as via I&E. Appropriately, EPA has agreed to "revisit the body of research on this topic…" New research is particularly needed to determine whether existence values and other nonuse values are impacted at all by marginal removals of non-threatened species.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

For further discussion of the topic of conditions under which nonuse values may or may not apply, and the issues associated with applying stated preference techniques to estimate such values more reliably, please see response to comment 316bEFR.306.105.

Comment ID 316bEFR.205.003

Author Name Dr. Daniel Talhelm
Organization Consumers Energy Co.

Subject Matter Code 10.01
Ecological Evaluation Methodology

Negative Values of Nuisance Species:

Some fish and other aquatic organisms can have negative economic values. Several exotic species in the Great Lakes are considered to have negative values, including the sea lamprey, the round goby, the Eurasian ruffe, the spiny water flea and the zebra mussel. For instance, the Great Lakes Fishery Commission spends millions of dollars annually to reduce sea lamprey populations in U.S. Great Lakes waters. Any I&E reduction in sea lamprey would be welcomed and encouraged. The potential benefits of reducing the negative impacts of nuisance species should be explicitly considered in the EPA rules, but there is no evidence that they have been considered.

EPA Response

EPA is not aware of any I&E studies that have documented I&E of large numbers of “nuisance” species. EPA has not estimated benefit values for problem species.

Comment ID 316bEFR.205.004

Author Name Dr. Daniel Talhelm
Organization Consumers Energy Co.

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Replacement Costs:

Chapter A11's second sentence states that "the HRC [habitat-based replacement cost] method can be used to value a broad range of ecological and human service losses associated with I&E of aquatic species…." Chapter A11 later repeatedly states that HRC estimates the "values" of services lost due to I&E. These statements are incorrect under conventional uses of the term "value" in economics. HRC is actually an estimate of the cost of one of several methods of avoiding the loss of services (e.g., sport fishing) by replacing lost organisms or their equivalents, not the value of the services that would be lost if the removed organisms were not replaced. Chapter A11 apparently acknowledges that on page A11-3, stating that HRC is "a proxy for the value of resources lost to I&E" [emphasis added], but goes on to incorrectly state that HRC estimates the values of the services lost. HRC could be greater than or less than the actual value of the lost services because HRC depends in part on the market value of coastal property and the cost of modifying the property to produce the desirable organisms. It is illogical to assume that such costs have any relationship to the value of sport fishing, commercial fishing, or other services that might otherwise be lost to I&E.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.205.005

Subject Matter Code 10.03.07.01

J.R. Whiting

Author Name Dr. Daniel Talhelm

Organization Consumers Energy Co.

Case Study: Consumers Energy Company's J.R. Whiting Power Plant

EPA's case study applying the benefits transfer methods in Chapter A9 to the Consumers Energy Company's J.R. Whiting power plant (Chapter H4) has several erroneous assumptions and apparent miscalculations, nearly all of which exaggerate the estimated economic losses attributable to the plant's I&E. EPA's estimated total I&E values in this case study are roughly 3 times higher than those that EPA would have derived if it had applied the methods outlined in Chapter A9 but used more appropriate data and assumptions. Issues include:

-misallocating species between recreational and commercial fisheries (Table H4-1),

-arbitrarily assigning some of the highest recreational values per fish to species least preferred by anglers (Tables H4-5 and -6), and

-apparently miscalculating (overestimating) average commercial prices for Lake Erie fish (Tables H4-7 and –8).

Misallocating Species: Table H4-1 purportedly allocates the impacts of the Whiting facility on non-forage species between recreational and commercial fisheries in proportion to "the landings in each fishery" (p. H4-1). A footnote to the table explains that "accurate recreational landings data for Lake Erie have not yet been located, so EPA applied a 50/50 split for species both commercially and recreationally harvested." Michigan, Ohio, Pennsylvania and New York all regularly estimate Lake Erie sport catch by species. EPA's Chapter H1 even cites Michigan's estimates of sport catch for Lake Erie. Similar data are also available from the Lake Erie Committee of the Great Lakes Fishery Commission (GLFC). Apparently, EPA did not contact the state resource agencies or the GLFC regarding this information. Even if "accurate" estimates were not available from those sources, approximations are available from the respective professional fisheries biologists in those states that are considerably more accurate than EPA's arbitrary 50/50 split. Several allocations in H4-1 clearly are inaccurate:

-White perch: Lake Erie anglers commonly catch white perch when available, though they are generally sought only by a small segment of anglers. The NMFS website cited on p. A9-4 as EPA's source of commercial fisheries prices lists the commercial catch of white perch in the 1990s as 120,000 to 1,021,000 pounds per year, so it is clearly both a commercial and recreational fish. If angler catch data were unavailable a 50/50 allocation would be more appropriate than EPA's 100% recreational. The Great Lakes white perch commercial harvest has generally exceeded the Great Lakes white bass catch, so it is unclear why EPA allocated white bass 50/50 and white perch 100% to recreational harvest.

-Yellow perch: Yellow perch are highly sought after by Lake Erie anglers, but also are a popular food fish. Data from the same NMFS website show that large numbers of perch (500,000 to over 1,000,000 pounds) have been harvested annually and sold commercially from Lake Erie's U.S. waters (though none from Michigan) during EPA's baseline period (the 1990's decade). A 50/50 allocation would be reasonable if sport catch data were unavailable, but EPA unaccountably assigned all perch to the recreational fishery.

Recreational Values for Fish Species: EPA assigned some of the highest recreational values per fish to species least preferred by anglers (Tables H4-5 and -6). White bass, channel catfish and perhaps walleye are over-valued relative to the others. Recreational valuation studies generally study the more popular species. Those found in Lake Erie are yellow perch, smallmouth bass, walleye and bluegills, crappie and sunfish, though smallmouth and bluegills are not valued in this case study. Of the four species, walleye are valued disproportionately higher. However, walleye are the most sought after species by anglers with expensive boats and equipment—an indicator of high recreational value—so perhaps a higher value is justified. Relatively few benefits transfer data are available for the other species. EPA apparently arbitrarily picked values for them, because no other explanation is available.

The difficulty with benefits transfer procedures is that unscientific judgments must often be made because the available studies may not evaluate the species needing to be valued, or the study values may be based on entirely different conditions, such as different fishing conditions, different size fish, or different availability of substitute kinds of angling. EPA cites only four studies as references for benefits transfer (Table H4-4). Further, the national studies by Charbonneau and Hay (1978), and the Idaho study of Sorg, et al. (1985) likely represent conditions quite different from those of Lake Erie. Finally, the upper value listed for Boyle, et al. (1998), exceeds the supposedly broader range of values listed for the same study in Table A9-2, with no explanation from EPA. Unscientific judgments such as these by EPA cannot be conclusively refuted. However, common knowledge of the relative popularity of various Lake Erie species and the wide availability of several species and fishing modes along the Lake Erie shoreline suggests the following:

-White bass are popular only with limited segments of the angling population though they are readily available in season. Thus they probably have lower values than indicated in the tables. Judging by the typical fishing modes observed, anglers apparently spend relatively little per fish caught to fish for white bass — which is an indicator of a lower economic value. A more accurate range of values would probably be $1.00 to $3.37 per fish.

-While channel catfish are considered a game species (as well as a commercial species), they should probably be valued less than smallmouth bass ($1.58 to $5.32 in Table I4-5) as the latter is a more preferred species, judging by expenditures as indicated by angling mode. Channel catfish are roughly comparable to crappie in terms of apparent angler preference, so its lower value should probably be around $1.50, rather than EPA's $2.64.

-Walleye values probably are appropriately the highest on these lists, but nevertheless may be too high because there are probably more substitute kinds of angling available in the Lake Erie area than in the two areas used for the benefits transfer estimates cited in Table H4-4 (Idaho for Sorg, et al., 1985, and nationally for Charbonneau and Hay, 1978). This would suggest slightly lower values, perhaps $4.00 to $7.00.

Table 1. Comparison of commercial fish values.

Species Values estimated by Re-source

	Econometrics using EPA stated methods	EPA values from Tables H4-7 and H4-8
Brown bullhead	$0.246	$0.33
Carp	$0.104	$0.16
Channel catfish	$0.442	$0.76
Freshwater drum	$0.119	$0.21
Gizzard shad	$0.041	$0.15
Suckers	$0.067	$0.17
White bass	$0.978	$0.98

Commercial Fishery Prices: EPA states that "a ten year average (1990-1999) of the market values [from NMFS data on its website] were used to even out inter-annual fluctuations, and where a facility's surrounding watershed boundaries were included in multiple states, an average of the states' market values were used. All values are stated in 2000 dollars" (p. A9-5). Surely in the case of the Whiting facility, the appropriate watershed is the U.S. waters of Lake Erie, implying the use of catch and harvest values for Lake Erie fisheries from the Great Lakes data published on the NMFS website for the 1990-1999 period. For purposes of this review, H4-7 and H4-8 were recalculated using the catch and harvest values for Lake Erie fisheries for the 1990-1999 period listed in the Great Lakes data published on the NMFS website. All landed values were first converted to 2000 dollars using the U.S. Consumer Price Index, 1982-84 = 100 series. Table 1 lists the results and compares them to EPA values from Tables H4-7 and H4-8. All EPA values are higher than those calculated using the procedures stated by EPA, except the white bass value was about the same.

Recalculating Total Valuation of J.R. Whiting's I&E: EPA's Table H4-13 summarizes its estimates of the values attributable to I&E at Whiting. However, our examination of the application of the valuation methodologies has shown that many of these estimates are erroneous. We approximate the correct values using procedures described in EPA's Chapter A9. For expository purposes these approximations follow Chapter A9's guidelines even though we have earlier shown that some of those are flawed.

1. Though at least two EPA allocations between sport and commercial harvest are inappropriate, to simplify the remainder of this critique we have not estimated the impacts of more appropriate catch allocations on total I&E valuation. Changing the harvest assump-tions would alter many of the subsequent calculations, thus adding to their complexity, but would not help explain the validity of this point.

2. Commercial: Using the landed values from NMFS data (Table 1, above), the losses in Tables H4-7 and H4-8 are $38,456 and $5,164, respectively, implying total commercial fisheries losses of $78,516 to $137,403, or about one-third the $254,340 and $445,095 es-timated by EPA (right-hand column of Table H4-13).

3. Recreational: Reducing the values of channel catfish and white bass to more appropriate levels (to $1.5 to $5.02 and $1.00 to $3.37 per fish, respectively) lowers the estimated recreational values substantially, to about $8,031 to $23,586.

4. Forage: EPA estimates retained without comment.

5. Nonuse values are still assumed to be 50% of the (now lower) recreational values, following

Chapter A9's guidelines for expository purposes despite their flaws.

6. Aggregate: The aggregate total values attributable to I&E, using procedures described in EPA's Chapter A9 but with more appropriate data (except harvest allocations), are about $90,000 to $200,000 (Table 2). EPA case study estimates are about 3 times higher.

These findings should also be appropriately reflected in the conclusions presented in Chapter I6: Benefits Analysis for the J.R. Whiting Facility, and Chapter I7: Conclusions.

[see hard copy for table]

EPA Response

In the first portion of his comments, Dr. Talhelm summarizes EPA's methods to estimate fishery benefits for the proposed Phase II rule. Dr. Talhelm's main comments are summarized in the six points that conclude the comments. EPA responds to each of these in turn below.

1) At proposal EPA did not identify a data source that would provide recreational landings data that would be adequate to calculate useful % commercial and % recreational values. Thus, EPA relied on the expert opinion of several local fisheries biologists to determine these commercial/recreational values.
For the final rule, EPA collected recreational harvest information from state agencies in the Great Lakes region. While these data provided valuable input into the recreational benefits analysis, it was not sufficiently detailed to determine % commercial and % recreational values. However, based on comments from Dr. Talhelm and other commenters, EPA did review the commercial landings data and made two changes. Because there is a documented Great Lakes commercial harvest of white perch and yellow perch, EPA agrees that a 100% recreational assumption is inappropriate. For the analysis for the final rule a 50% commercial and 50% recreational assumption was made for both species.

2) Based on comments by Dr. Talhelm and others, EPA reviewed and modified many of the methods used to estimate commercial fishing benefits and losses. For details on EPA's response to comments on the commercial fishing methods please refer to the response to comment 316bEFR.005.029. See also the Regional Study Document prepared for the final rule, Chapter A10: Methods for Estimating Commercial Fishing Benefits.

3) EPA also reviewed and modified the methods used to estimate recreational fishing benefits and losses. In its analysis for the final rule, EPA no longer uses a benefits transfer approach to estimate recreational losses and benefits. Rather, EPA has developed a random utility model (RUM) to estimate benefits for each region. For further detail on the new methods please refer to the Regional Analysis Document (DCN # 6-0003, Chapter A11: Estimating Benefits with a Random Utility Model (RUM) and Chapter G4 of the Great Lakes RUM model.

4) In its analysis for the final rule, EPA did not use hatchery replacement costs to estimate non-use benefits.

5) In its analysis for the final rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits.

6) This comment is noted, but it does not provide specifics requiring a response from EPA.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed Super

On Behalf Of:

Riverkeeper

Author ID Number:

316bEFR.206

Comment ID 316bEFR.206.001

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.01
Overview of I & E effects on organisms

COOLING WATER INTAKE STRUCTURES AND THEIR ENORMOUS IMPACTS ON FISH AND AQUATIC LIFE.

Every year, electric generating facilities kill the overwhelming majority of organisms in the more than 70 trillion gallons they withdraw from U.S. waters for cooling. This staggering mortality – trillions of fish, shellfish, plankton and other species, including some that are endangered or threatened – has harmed aquatic, coastal and marine ecosystems for decades, and has contributed to the collapse of some fisheries.

This excessive mortality occurs both despite and as result of the facilities' attempts to filter extraneous materials including fish from the cooling water stream. Aquatic organisms too small to be screened out are drawn through the cooling system and are killed by "entrainment." <FN 3> Larger organisms become trapped on intake screens and are killed or injured by "impingement." <FN 4>

Data on fish mortality from cooling water intake structures (abbreviated as "CWIS") are far from comprehensive and most likely understate impacts. Nevertheless, generators and government agencies, including EPA, have documented massive fish kills by power plants for decades in the U.S. and Europe. As just a few examples of this waste:

-The Brayton Point Station in Somerset, Massachusetts on Mt. Hope Bay in the northeastern reach of Narragansett Bay killed between 7 million and 164.5 million menhaden and river herring each day in the summer of 1971 by entrainment;

-the Millstone Point Nuclear Power Station on Niantic Bay in Waterford Connecticut killed 36 million menhaden and blueback herring during a sixteen day period in 1972 by entrainment; and

-the Connecticut Yankee Plant on the Connecticut River in Haddam Neck, Connecticut killed 179 million fish larvae were per year from 1969-70. <FN 5>

The same EPA document also reported enormous impingement death tolls at power plants, such as:

-The Surry Power Station on the James River, Virginia destroyed 6 million river herring by impingement from October-December, 1972;

-the Millstone Point Plant's intake screens on Niantic Bay killed more than 2 million fish during the late summer and early fall of 1971;

-the Indian Point Electric Generating Station on Haverstraw Bay on the Hudson River in Buchanan, New York killed 1.3 million white perch and striped bass during one 9-1/2 week period from 1969-1970, with a predicted impingement death toll of 6.5 million fish per year; and

-the P.H. Robinson Plant in Galveston Bay, Texas impinged 7,191,785 menhaden, anchovy and croaker in one year from 1969-70. <FN 6>

In the preamble to the Phase II Proposal, EPA provided further examples of devastating impacts associated with impingement and entrainment at individual steam electric generating facilities:

-The Brunswick nuclear plant on the Cape Fear estuarine system in North Carolina, has entrained as much as 3-4 billion individual fish and shellfish at early life stages annually. Studies there have predicted an associated 15-35 percent reduction in populations, which may be altered beyond recovery; <FN 7>

-On Florida's Gulf Coast, the Crystal River power plant seriously reduces forage species and recreational and commercial landings (e.g., 23 tons per year); <FN 8>

-On Lake Michigan, the D.C. Cook nuclear plant killed one million fish during a three-week study period. <FN 9>

-On New York's Hudson River, entrainment at five power plants (Indian Point, Bowline, Roseton, Lovett and Danskammer) predicted year-class reductions of up to 79 percent, depending on fish species. The generators' 2000 analysis of three of these plants completed in predicted year-class reductions of up to 20 percent for striped bass, 25 percent for bay anchovy, and 43 percent for Atlantic tomcod, even without assuming 100 percent entrainment mortality. These losses could seriously deplete any reserve or compensatory capacity needed to survive unfavorable environmental conditions. <FN 10>

-The Brayton Point facility in Somerset, Massachusetts withdraws 1.3 billions gallons per day from Mt. Hope Bay and has apparently caused an 87 percent reduction in finfish abundance since a 50 percent increase in its cooling water withdrawal in 1985. <FN 11>

-At the San Onofre Nuclear Generating Station on the Southern California coast, in a normal (non-El Niño) year, 121 tons of midwater fish are entrained, causing a 34-70 percent decline in Pacific Ocean fish populations within 3 kilometers; <FN 12>

-The Pittsburg and Contra Costa Plants in the San Francisco Bay Delta in northern California can impinge and entrain more than 300,000 endangered and threatened species per year, including Delta smelt, Sacramento splittail, Chinook salmon, steelhead trout. <FN 13>

-More than 1,300 endangered sea turtles entered enclosed cooling water intake structure canals at the St. Lucie plant in Florida, resulting in mortality over a 9-year period. <FN 14>

The massive toll on U.S. ecosystems and fisheries has aggrieved commercial and recreational fishermen and other citizens who value these natural resources. Environmental advocates around the country have devoted substantial time and energy monitoring and fighting these impacts in the thirty years since Congress enacted the Clean Water Act.

For example, on New York's Hudson River, environmental groups and fishermen's organizations, including Riverkeeper, Inc., the Hudson River Fishermen's Association, (Riverkeeper's predecessor), the Natural Resources Defense Council, and Scenic Hudson, Inc., have been fighting for more than 30 years to reduce the massive entrainment and impingement at the River's six large once-through plants. Decades of fish kills from these facilities, including reductions in some year classes up to an estimated 79 percent, has sapped the recovery of one of the most valuable estuaries on the eastern seaboard, once a word-class fishery.

Similarly, the Brayton Point Power Station in Somerset, Massachusetts has obliterated the fisheries of Mount Hope Bay, which forms the northeast arm of Narragansett Bay. Mount Hope Bay, a federally designated essential fish habitat and a critical spawning and nursery area for many marine species, had a long history as a productive fishing ground for flounder, lobster, and shellfish. The Bay's legendary fishing productivity crashed in the mid-1980's, after the power plant increase in cooling water withdrawals approximately 45 percent. Environmental organizations, such as Save the Bay and its Narragansett Baykeeper and the Conservation Law Foundation, and Rhode Island public agencies including the state Attorney General and Department of Environmental Management, have fought for years to force the plant to reduce its water withdrawals to restore the ecological health of Mount Hope Bay.

The Salem Nuclear Generating Station, in Salem County, New Jersey approximately 30 miles southwest of Philadelphia, withdraws over than 3 billion gallons per day, more cooling water than any facility in the country, from Delaware Bay. A study commissioned by the New Jersey Department of Environmental Protection estimated that the Salem cooling water intake annually kills 375,000 white perch, 281,746 herrings (alewife & blueback), 305,000 spot, 61,100 Atlantic croaker, and 3,239 striped bass, 842,000,000 bay anchovy and 1,120,000 weakfish – four times as many bay anchovy and weakfish each year than are commercially caught in the Delaware Estuary. <FN 15> The Delaware Riverkeeper Network and the American Littoral Society have been fighting for years to cause Salem to reduce its massive death toll.

Similarly large aquatic mortality tolls have occur at numerous other locations around the country, including but not limited to the Big Bend plant in Tampa, Florida, the Duke Energy Plants in Morro Bay and Moss Landing, California, the Portero Plant in San Francisco Bay, many plants on the Great Lakes, and a great many others where environmental advocates continue to devote substantial time and energy to monitoring and fighting these impacts.

EPA also has placed in the docket for the Phase II Proposal a large collection other studies of fish mortality by entrainment and impingement at cooling water intake structures. <FN 16> In all, EPA currently has a database of impingement and entrainment data from more than 100 different facilities, ranging from the relatively small Palisades Plant in Michigan, which takes in 19.7 million gallons per day (mgd), to the nation's largest user of cooling water, the Salem Nuclear Plant in New Jersey which withdraws more than 3 billion gallons per day. <FN 17> EPA acknowledges that even the massive reported death tolls fail to account for the full extent of mortality to aquatic organisms:

Studies like those described … may provide only a partial picture of the severity of environmental impact associated with cooling water intake structures. ….[T]he methodologies for evaluating adverse environmental impact used in the 1970s and 1980s, when most section 316(b) evaluations were performed, were often inconsistent and incomplete… <FN 18>

Footnotes

3 Entrainment occurs when relatively small fish and shellfish organisms, eggs, and larvae are drawn through the cooling water intake structure into the plant's cooling system, pass through its heat exchanger, and are discharged out of the facility.

As entrained organisms pass through the cooling system they are subject to mechanical, thermal, and toxic stress including physical impacts in the pumps and condenser tubing, pressure changes caused by diversion of the cooling water into the plant or by the hydraulic effects of the condensers, sheer stress, thermal shock in the condenser and discharge tunnel, and chemical toxemia induced by antifouling agents such as chlorine. Few, if any, entrained organisms survive. 67 Fed. Reg. at 17136; see also U.S. EPA, Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b), P.L. 92-500, p. 1 (1977) (hereinafter “1977 EPA Guidance Manual”).

4 Impingement occurs when fish and other aquatic organisms become trapped on screening devices or other barriers installed at the entrance of the intake structure to prevent debris from entering the facility's cooling system. Impingement is caused by the force of water passing through the intake structure and can result in starvation and exhaustion (when organisms are trapped against an intake screen), asphyxiation (when organisms are forced against an intake screen or other barrier at the entrance to the cooling water intake structure by velocity forces that prevent proper gill movement or when organisms are removed from the water for prolonged periods of time), and descaling (when organisms are removed from an intake screen by a wash system). 67 Fed. Reg. at 17136; see also 1977 EPA Guidance Manual, p. 1.

5 U.S. EPA, Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact (April, 1976) (hereinafter, “1976 EPA Development Document”), at p. 9, Table I-3 ; see also Clark & Brownwell, Electric Power Plants in the Coastal Zone: Environmental Issues (American Littoral Society Special Publication No. 7, 1973), at p. V-8, Table V-B.

6 1976 EPA Development Document, p. 7, Table I-2.

7 67 Fed. Reg. at 17138.

8 Id.

9 Id.

10 Id., citing John Boreman and Phillip Goodyear, Estimates of Entrainment Mortality for Striped Bass and Other Fish Species Inhabiting the Hudson River Estuary, American Fisheries Society Monograph 4:152-160, 1988.

11 Id., citing Gibson, Mark R., Comparison of Trends in the Finfish Assemblage of Mt. Hope Bay and Narragansett Bay in Relation to Operations at the New England Power Brayton Point Station, R.I. Div. Fish and Wildlife (1996).

12 67 Fed. Reg. at 17139, citing S. Swarbrick and R.F. Ambrose (1988).

13 Id. (numbers of fish expressed as age 1 equivalents).

14 65 Fed. Reg. at 49072.

15 Versar, Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station, § VI-4 (Jan. 1989) (Revised Final Report) (reported on an "equivalent adult" basis). 30 million pounds of bay anchovy and weakfish are lost each year due to entrainment and impingement at Salem compared to 6.8 million pounds of yearly commercial landings between 1975-1980.

16 See US EPA, 316(b) Docket. These include studies of particular water types (Inland Waters; Estuaries; and Coastal Waters), studies of particular regions or states (Michigan; Southwest U.S.; New York State), studies of particular waters (Lake Erie; Kanawha River; Great Lakes; Western Great Lakes; Lake Michigan; New River; Wabash River; Ohio River; Chesapeake Bay; Hudson River), and studies of particular power plants (Clifty Creek Station; Tanners Creek Power Plant; Bowline Point; Zion Nuclear Generating Station; Cardinal Plant; Kyger Creek Station; Gallatin Steam Plant), among others.

17 US EPA, Facilities for Which EPA Has Impingement and Entrainment Data (undated 3-page table).

18 67 Fed. Reg. 17139.

EPA Response

EPA thanks the commenter for the submission. Please see section IV of the preamble to today's final rule for EPA's discussion regarding environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.206.002

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Author Name Reed Super

Organization Riverkeeper

CLOSED-CYCLE COOLING IS AN AVAILABLE TECHNOLOGY WHICH WOULD DRASTICALLY REDUCE FISH KILLS DUE TO ONCE THROUGH COOLING

The enormous aquatic mortality caused by power plants intakes is almost entirely unnecessary. Readily available, affordable and common technology can eliminate more than 90% of the impact for those facilities using "once through cooling," which requires extremely large quantities of water because it does not recirculate any. The water simply transfers the waste heat to the receiving waterbody by its flow. "Closed-cycle" cooling, in contrast, substantially recirculates cooling water because it uses a cooling tower transfer heat to the atmosphere by evaporation and convection.

As a result closed-cycle cooling systems use dramatically less water than once-though cooling systems, and thereby impinge and entrain a fraction of the aquatic organisms. The precise volume of water withdrawn by closed cycle systems depends on the size of the plant, type of electricity generation technology, and the source water salinity. On fresh water, closed-cycle systems generally reduce water usage by about 95% over once through cooling. That is, a plant which would extract 1 billion gallons per day (1000 mgd) of water if cooled by a once-through system, will require only about 5% of that amount or 50 mgd if cooled by an evaporative cooling tower instead. <FN 19>

Footnotes

19 Where State water quality standards limit chloride to a maximum increase of 10 percent over background and therefore require a 1.1 cycle of concentration (as opposed to 2.0) , closed-cycle cooling may reduce intake volume by a still significant 70%, rather than 95% or more. EPA Phase II Technical Development Document ("Phase II TDD") at p. 4-1.

EPA Response

See response to comment 316b.EFR.404.034.

Comment ID 316bEFR.206.003

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 19.0

Dry Cooling

“Dry” closed-cycle (also known as air-cooled) systems are also available to reduce impacts even further. Dry-cooling uses radiator-type coils to transfer heat to air by convection. These systems recirculate virtually all their water. As a result, plants that use dry cooling have no visible plume or thermal discharge to waterways, and have much smaller water requirements. Hybrid cooling systems use both wet sections and dry sections in order to abate evaporation plumes present caused by wet cooling towers.

EPA Response

See response to comment 316b.EFR.404.003.

Comment ID 316bEFR.206.004

Subject Matter Code 17.03.01

Ex. facilities converted to closed-cycle

Author Name Reed Super

Organization Riverkeeper

Both the wet and dry closed-cycle cooling has been standard power plant technology for decades. As EPA reported last year, 100% of the utility and nonutility combined-cycle plants built in the last 20 years have a closed-cycle recirculating cooling system and 88% of the coal-fired facilities built in the last 10 years have closed-cycle cooling. 66 Fed. Reg. at 28855-28856 (May 25, 2001). Existing facilities of various sizes and fuel types, including the 821 MW Palisades Nuclear Plant in Michigan; the 490 MW coal-fired Canadys Steam Plant in South Carolina, the 346 MW Jefferies Coal Plant also in South Carolina, and Unit 7 of the 751 MW gas-fired Pittsburg Power Plant in Contra Costa County, California, have retrofit closed-cycle cooling over the last 30 years. <FN 20>

Footnotes

20 67 Fed. Reg. 17155; Phase II TDD, pp. 4-1 to 4-6.

EPA Response

See response to comment 316b.EFR.404.004.

Comment ID 316bEFR.206.005

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.03

Purpose of Rule (General, incl. bckgrd., history)

CWA SECTION 316(B) REQUIRES BEST TECHNOLOGY AVAILABLE

Section 316(b) of the 1972 Federal Water Pollution Control Act amendments ("Clean Water Act," "CWA" or the "Act") <FN 21> provides:

Cooling water intake structures

Any standard established pursuant to [Section 301 or Section 306 of the Act] and applicable to a point source must require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. <FN 22>

Congress enacted the requirement in response to a number of well-profiled fish kills at power plants in the early 1970s. <FN 23> In fact, during debate over the Clean Water Act, Senator Buckley cited with approval two newspaper articles reporting a decision of the Atomic Energy Commission (AEC) to require Consolidated Edison to install closed cycle cooling at Indian Point. <FN 24> The articles noted that the plants withdrew massive amounts of water from the Hudson River, entraining thousands of organisms per minute, and that the AEC had ordered Con Ed to stop removing such large volumes of water from the River and to install cooling towers in order to abate these massive fish kills. <FN 25>

Footnotes

21 33 U.S.C. §§ 1251-1387.

22 33 U.S.C. § 1326(b).

23 See supra p. 2-4. See also Clark and Brownell, Electric Power Plants in the Coastal Zone: Environmental Issues (1973), p. V-8, tbl. V-B. See also New York Times Abstracts, August 16, 1972, p. 41, col. 1 ("massive fish kill in Apr at Millstone Point nuclear power complex").

24 Senate Com. on Pub. Works. A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Session, at 196-197 (1973.) See also In the Matter of: Carolina Power & Light Company (Brunswick Steam Electric Plant), USEPA, Decision of the General Counsel, EPA GCO 41 (June 1, 1976) at fn. 10.

25 Id.

EPA Response

Please see the preamble to today's final rule and other documents in this record for an explanation of why EPA did not select the closed-cycle cooling for all facilities option.

Comment ID 316bEFR.206.006

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 17.03.03
Benefits of reduced intake capacity

Technology years ago advanced to the point where impacts on waters of the U.S. from cooling water intake structures at existing power plants can be drastically reduced, as was both anticipated and required by the Clean Water Act. <FN 32> Aquatic and other environmental impacts from closed-cycle cooled stations are negligible. By reducing cooling water intake volume and fish kills by more than an order of magnitude, closed-cycle cooling clearly represents the best capacity technology available for minimizing adverse environmental impact, and the key component of the BTA determination. EPA has no discretion to disregard such an effective and proven technology in determining BTA.

Footnotes

32 33 U.S.C. § 1251(a)(1) (goal to eliminate discharges into waters of the United States by 1985).

EPA Response

See the preamble to the final rule.

Comment ID 316bEFR.206.007

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.03
Purpose of Rule (General, incl. bckgrd., history)

HISTORY OF CWIS REGULATION

EPA has established effluent limitations under CWA Section 301 for existing sources in each of the industry categories which are major users of cooling water. <FN 33> However, none of these standards address cooling water intake structures. Unlike other sources of degradation to aquatic ecosystems controlled under the 1972 Clean Water Act amendments (such as discharges of pollutants), cooling water intake structures have uniquely avoided nationally uniform limitations. Instead, regulation of cooling water intake structures has long been relegated to ad hoc determination by individual permit writers exercising best professional judgment.

In 1976, EPA chose to promulgate a single regulation under Clean Water Act section 316(b), codified at 40 C.F.R. Part 402 <FN 34> and applicable to all categories of point sources, rather than include a section 316(b) provision within all individual effluent limitations guidelines and new source performance standards under sections 301 and 306.

The operative section of the 1976 regulation, provided in full:

The information contained in the Development Document <FN 35> shall be considered in determining whether the location, design, construction and capacity of a cooling water intake structure of a point source subject to standards established under section 301 or 306 reflect the best technology available for minimizing adverse environmental impact. <FN 36>

In 1977, the United States Court of Appeals for the Fourth Circuit remanded the regulation back to EPA because EPA had violated the Administrative Procedure Act by failing to either publish the Development Document in the Federal Register or properly incorporate it by reference. <FN 37> As a result, the court did not address the validity of the regulation on substantive grounds. EPA subsequently withdrew the regulation, <FN 38> and although it reserved space in the Code of Federal Regulations, had not promulgated or proposed a new cooling water intake structure regulation until its December 18, 2001 publication of the Phase I new facility rule. The present proposal is EPA's first proposed rule for new facilities since the 1976 regulation was set aside and then withdrawn in 1979.

In the absence of federal regulations, section 316(b) determinations have typically involved individualized ecological assessment and determination of best technology available for each proposed or renewed cooling water intake structure. This lack of categorical standards has resulted in uneven and conflicting regulation as well as enormous, unnecessary aquatic mortality, which runs contrary to the goals of the Clean Water Act and the direct mandate of section 316(b). The individualized assessments have typically relied on narrow and inaccurately applied population models, and have ignored other impacts on ecosystem health.

For 30 years, industry has used the threat of litigation and a variety of dubious interpretations of section 316(b) to avoid the imposition of BTA. A favorite strategy of industry is to threaten state permitting agencies with litigation in order to obtain a compromise settlement for limited mitigation or data gathering and study, rather than installing best technology. Even with extensive data collection, there has been continued disagreement among industry, permitting agencies, and environmental groups over ecological impacts.

The multiplicity of these individual determinations and the combination of ecological and mathematical/statistical expertise necessary to determine the complex population dynamics for individual species has granted industry a critical strategic advantage because of superior resources in these proceedings. This advantage is a key component in industry's strategy to avoid national technology based regulations. Industry's most common analytical tools in these individualized technical determinations are density-dependent models of fisheries populations. Cooling water users have for decades used arguments based on density-dependence to justify the destruction of large numbers of fish and crustaceans via impingement and entrainment at their CWISs. In many critical cases, mathematical models of density dependent compensation these models have been misapplied. As just one example, industry has misapplied commonly-used Ricker curves, originally developed for salmonid fisheries with intense competition for spawning space, is misapplied to the entrainment of other species which lack such intense competition. <FN 39> More fundamentally, typical compensation analysis relies on an ecologically baseless concept of "surplus production" which dismisses the ecological value of the tens of millions of fish which are a critical base of the food chain whether or not they grow to adulthood – even though their predators may be populated at far below their historic values.

On January 19, 1993, Riverkeeper, Inc. <FN 40> and a coalition of individuals and environmental organizations sued EPA in the United States District Court for the Southern District of New York, to obtain an order directing EPA to promulgate new cooling water intake regulations. Riverkeeper, Inc., et al v. Whitman, U.S.D.C., S.D.N.Y., Case No. 93 Civ 0314 (AGS). <FN 41> In 1995, plaintiffs and EPA agreed to a consent decree which among other things set forth a timetable by which EPA would take final action on regulations to implement Section 316(b). <FN 42> Under the consent decree entered by the court in 1995, EPA was required to propose regulations implementing Section 316(b) for all facilities no later than July 2, 1999, and to take final action with respect to the regulations no later than August 13, 2001.

EPA subsequently moved to amend the Consent Decree, claiming it was unable to meet the deadlines. <FN 43> Although the court found that EPA's "explanations for its previous delays do not justify modification of the Consent Decree," it extended the proposal deadline, on the ground that "the public interest does require that the Decree be modified to enable EPA to produce a sound Regulation." <FN 44> Pursuant to an amended consent decree entered by the Court in October 2000, EPA is now required to promulgate 316(b) regulations in three phases according to the following schedule:

Phase I (new facilities)
-final rule due 11-9-01

Phase II (existing large power plants)
-draft rule due 2-28-02
-final rule due 8-23-03

Phase III (existing small power plants and other facilities)

-draft rule due 6-15-03
-final rule due 12-15-04

As required by the amended consent decree, EPA Administrator Christine Whitman signed the final Phase I regulation for new facilities on November 9, 2001 and the Federal Register published it on December 18, 2001. <FN 45> Both industry and environmental stakeholders, including Riverkeeper and other signatories to this comment have challenged the Phase I regulation on various grounds in distinct but consolidated cases, Riverkeeper, et al; Utility Water Act Group, et al, v. USEPA, U.S. Court of Appeals for the Second Circuit, Case No. 02-4005(L).

Footnotes

33 See, e.g., Steam and Electric Power Generating: 40 C.F.R. Part 423; Pulp, Paper and Paperboard: 40 C.F.R. Part 430, as amended 42 Fed. Reg. 13198 (January 6, 1977); Petroleum Refining: 40 C.F.R. Part 419.

34 Former 40 C.F.R. §§ 402.10-402.12 (1976).

35 USEPA, Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact, 1976.

36 Former 40 C.F.R. § 402.12 (1976). The remainder of the regulations contained a statement of scope and certain definitions. Former 40 C.F.R. §§ 402.10, 402.11(1976). See VEPCO, 566 F.2d at 448.

37 Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977).

38 See 44 Fed. Reg. 32956 (June 7, 1979).

39 See e.g. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permit Renewal for Bowline Point 1 & 2, Indian Point 2 & 3 and Roseton 1 & 2 Steam Generating Stations, December 1999, Appendix VI-4-B, relying on Ricker models to estimate the impact of entrainment on Atlantic tomcod young.

40 At that time, Riverkeeper was known as Hudson Riverkeeper Fund, Inc.

41 The plaintiffs in the lawsuit are Riverkeeper, Inc., Alex Matthiessen, a/k/a The Hudson Riverkeeper; Maya K. van Rossum, a/k/a The Delaware Riverkeeper; Terrance E. Backer, a/k/a, The Soundkeeper; John Torgan, a/k/a the Narragansett Baykeeper; Joseph E. Payne, a/k/a The Casco BayKeeper; Jonathan Kaplan, a/k/a The San Francisco Baykeeper; Sue Joerger, a/k/a The Puget Soundkeeper, Steven E. Fleischli, a/k/a the Santa Monica BayKeeper, Andrew Willner, a/k/a The New York/New Jersey Baykeeper, The Long Island Soundkeeper Fund, Inc., the New York Coastal Fishermen's Association, Inc. and the American Littoral Society, Inc. The case was previously captioned as Cronin v Browner.

42 Fifty-six individual power companies and three power industry associations sought to intervene in the lawsuit. Judge Allen G. Schwartz denied the utilities' motion to intervene, finding that they had failed to meet the standards for either mandatory or permissive intervention under Federal Rules of Civil Procedure 24(a)(2) and 24(b). Cronin v. Browner, 898 F.Supp. at 1056-1057.

43 Cronin v. Browner, 90 F.Supp.2d 364, 368 (S.D.N.Y. 2000).

44 Id. at 372.

45 66 Fed. Reg. 65256.

EPA Response

No response necessary.

Comment ID 316bEFR.206.008

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 22.0
Administrative Requirements

THE PROPOSED PHASE II REGULATION.

On December 28, 2001, after years of research by its Office of Science and Technology, EPA submitted its draft proposal to the White House's Office of Management and Budget (OMB) for interagency review. EPA's original draft regulation would have required closed-cycle cooling for 59 of the largest plants on tidal rivers, estuaries and oceans. This compromise proposal fell far short of a closed-cycle requirement on all major power plants, but it would have at least minimized the impact on the most ecologically productive waterbodies.

However, antiregulatory ideologues in OMB's Office of Information and Regulatory Affairs (OIRA) forced EPA to abandon its carefully chosen option and remove any closed-cycle requirements. The agencies relied on cost-benefit analyses which systematically belittle the value of aquatic ecosystems. Even using this drastic underestimate, the calculated benefits of the EPA original proposal would have exceeded costs to retrofit the most destructive facilities by an ample 3 to 2 margin. Nevertheless, in direct contravention to the Congressional "best technology available" mandate in the Clean Water Act, OIRA rejected any use of cooling towers and compelled the least cost alternative. OIRA's action also violated Executive Order (E.O. 12866), which prohibits regulatory economic analyses from dictating a result contrary to statutory requirements.

EPA formally proposed the Phase II Proposal on February 28, 2002 and published it in the Federal Register on April 9, 2002 pursuant to the amended consent decree in Riverkeeper v. Whitman. The Phase II Proposal sets unreasonably low standards and then provides applicants the opportunity to avoid meeting those standards.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.009

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

Specifically, EPA's proposal fails to require closed-cycle cooling (which reduces fish kills by approximately 95%) as "best technology" for any of the 550 large power plants in the country, but instead sets a performance standard based loosely on the protection offered by a variety of cheaper, less effective, less reliable mechanisms. This weak mandate would allow existing plants to kill 20 to 1000 times more fish per megawatt than new plants, and continue to decimate aquatic life in U.S. waterways indefinitely.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.206.010

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.07.04

RFC: Appropriateness of and tests for variance

The proposal also allows power companies to avoid the weak technology standard by pleading special economic circumstances, or arguing that the local ecosystem does not merit protection. Specifically, the variance test for permit-writers to apply is two-fold: whether a facility' costs (a) are significantly greater than EPA's estimated costs; (the "economic variance") or (b) are significantly greater than the monetized benefits (the "ecological variance").

EPA Response

See response to 316bEFR.033.004.

Comment ID 316bEFR.206.011

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Reed Super

Organization Riverkeeper

Alternatively, the companies may attempt to replace the fish they kill. Such restoration measures are vague, unproven, likely to fail, and are rarely if ever intended to replace the number or variety of aquatic and marine animals killed by the water withdrawals.

EPA Response

EPA agrees that there are uncertainties associated with the design, assessment, performance, and implementation of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

For a discussion of the role of restoration in the final rule, see EPA's response to comment 316bEFR.056.033 and the preamble to the final rule.

Comment ID 316bEFR.206.012

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Instead of setting a protective, technology based standard, the rule would adopt and codify many of the site-specific arguments which permittees typically use to avoid closed-cycle cooling requirements. Since even environmentally sympathetic regulators lack the resources needed to rebut, or in most cases fully evaluate, these arguments, the rule will allow applicants to continue to obstruct and delay needed technology upgrades.

EPA Response

Please refer to the response to comment 316bEFR.206.027 for information about the regulatory approach for the final rule.

EPA also disagrees that today's final rule is less stringent than the previous implementation of 316(b). Please refer to the response to comment 316bEFR.202.003.

Comment ID 316bEFR.206.013

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.04
Use cost-benefit tests

EPA's failure to require sufficiently protective technology is based in large part on relatively minor cost variations between the cooling system technologies, and wholly incomplete benefits estimates. Significantly, the proposal was based on a completely new, and unauthorized approach to the costs of cooling intake technologies. EPA has always contended "that there should be some reasonable relationship between the cost of cooling water intake structure control and the environmental benefits associated with its use." <FN 46> Based on a statement by one Congressman in the 1972 legislative history, EPA has long interpreted BTA to mean "best technology available commercially at an economically practicable cost." In so doing, EPA claimed to be implementing "congressional concern that the application of best technology available should not impose an impractical and unbearable burden." <FN 47> EPA has traditionally measured economic practicability by applying the "wholly disproportionate test" to compare the benefits of cooling water intake technology against marginal cost to the ratepayer, i.e., the incremental electricity cost. Under EPA's traditional wholly disproportionate cost test, a cooling water intake structure technology would not be deemed to reflect BTA if the incremental costs of requiring the use of that technology are wholly disproportionate to the environmental benefits to be gained through its use.

Footnotes

46 65 Fed. Reg. 49094

47 Id.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.014

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

In its Phase I rule for new facilities published December 18, 2001, EPA established the first minimum national standards for cooling water intake structures. The rule includes two new cost tests. First, EPA examined the proposed national standards to determine whether they are "economically practicable." The test used was to compare annualized post-tax compliance costs with revenues on facility, firm and national (industry) levels. Second, EPA established a test for permit-writers to use when determining whether to grant a variance from the minimum national standards. This test utilizes a wholly disproportionate test, but compares the individual facility's compliance costs to the compliance costs estimated by EPA in the rule. If a facility's costs will be wholly out of proportion to the EPA costs, the permit-writer can include weaker standards. <FN 48>

In the Phase II proposal for existing facilities, EPA changed its cost test approach once again. As in Phase I, EPA used the cost/revenue test to determine whether the proposed option is economically practicable on a facility and firm level. But EPA's proposed option was selected (and the cooling tower options were rejected) using a rigid cost-benefit decision-making criterion. Under this criterion, also known as "maximize net benefits," EPA even rejected a regulatory alternative where the total benefits exceeded the total costs by a 3:2 margin. Furthermore, because of EPA's ecological variance – which allows an individual facility to demonstrate that the costs of installing technology at its site will outweigh benefits – permit writers will be required to engage in the same kind of wholly inappropriate cost/benefit analysis on a local level.

Footnotes

48 40 CFR § 125.94(c) [proposed].

EPA Response

The commenter's summary of cost analyses for the Phase I final rule for new facilities is generally accurate. In setting national standards, EPA also considered the ratio of initial compliance costs to the construction cost of a new plant.

Regarding the Phase II rule, EPA notes that the cost-to-revenue ratio is not the main measure used to assess economic practicability. It is only one of several measures used. See EPA's response to Comment ID 316bEFR.005.021 for discussion on EPA's use of cost-to-revenue test to determine economic practicability.

EPA did not use "maximize net benefit" in the final rule. See EPA's response to Comment ID 316EFR005.020 for additional information. EPA notes that the approach to benefit cost analysis of the final rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, US EPA (EPA 240-R-00-003).

See preamble to the final rule for a discussion of why the cooling tower options were rejected.

See preamble to the final rule for a discussion on the cost benefit test.

Comment ID 316bEFR.206.015

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.05

Implement a site-specific alternative

Finally, EPA is requesting comment on a wide array of alternative approaches to establishing BTA limitations, many of which have been suggested by the electric generating industry. These case-by-case, site-specific, multi-tiered approaches contravene the Act's mandate for uniform, national standards and would significantly prejudice the efforts of state regulators and local officials and advocates, who – facing the extensive resources of the power industry – would be required to prove the need and reasonable cost of best technology in the permit proceeding for each new power plant.

EPA Response

EPA disagrees. Today's rule in general, and the site-specific option in particular, will not impose a significant burden on states, tribes, local governments, environmental advocates, or the public. There is sufficient flexibility in the final rule that EPA expects facilities will use the site-specific compliance options infrequently.

Comment ID 316bEFR.206.016

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

THE CLEAN WATER ACT REQUIRES TECHNOLOGY-BASED AND TECHNOLOGY-FORCING STANDARDS TO RATCHET DOWN POLLUTION.

Congress enacted the Clean Water Act <FN 49> (CWA) in 1972 to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. § 1251(a). The CWA establishes a comprehensive regulatory program requiring all dischargers, including power plants, to obtain National Pollutant Discharge Elimination System (NPDES) permits for point source discharges. 33 U.S.C § 1311. The permits contain standards, which are established by EPA through a system of technology-based limitations, supplemented by water-quality related limitations, which protect specific bodies of water. <FN 50> 33 U.S.C. § 1312. The NPDES permit takes the applicable effluent limitations and other standards and turns them into the obligations borne by the individual polluting entity. NRDC v. EPA, 822 F.2d 104, 110 (D.C. Cir. 1987).

The intended effect of the Clean Water Act permit and effluent limitation process is to gradually reduce pollution and adverse environmental impact to the point of elimination. Indeed, Congress set a “national goal that the discharge of pollutants into the navigable waters be eliminated by 1985.” 33 U.S.C. § 1251(a)(1). Congress understood that compliance with the Act would have economic consequences to industry and, accordingly, adopted a phase-in compliance scheme. That scheme uses increasingly more stringent effluent limitation guidelines and NPDES permits to ratchet surface water pollution down to zero. As explained by the court in NRDC v. EPA:

[T]he [Clean Water Act’s] regulatory scheme is structured around a series of increasingly stringent technology-based standards (beginning with the implementation of the best “practicable” technology (BPT) and progressing toward implementation of pollution controls to the full extent of the best technology which would become available (BAT). New sources would, again, be subject to the most stringent technology-based standards of all, namely “new source performance standards”. … [T]he most salient characteristic of this statutory scheme, articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing.… The essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies. This policy is expressed as a statutory mandate, not simply as a goal.

NRDC v. EPA, 822 F.2d 104, 123 (D.C. Cir. 1987) (emphasis added).

Congress’s plan to eliminate surface water impairment requires that NPDES permits be made more stringent over time. Thus, it devised a three-phase implementation plan:

-For permits issued before EPA had completed the limitation guidelines, EPA was to use its “best professional judgment” (BPJ). <FN 51>

-By 1976, industries had to use the “best practicable technology” (BPT). <FN 52> Later, amendments to the Act extended the deadline for use of BPT to 1979.

-By 1981, industries had to use the “best available technology” (BAT), a much more stringent standard. <FN 53>

CWA section 316(b) requires NPDES standards for cooling water intake structures. <FN 54> Like sections 301, 304 and 306 of the Act, section 316(b) mandates a best technology standard. Congress used the locution, “best technology available” (BTA), which is unique in the Clean Water Act, but is substantially similar to the Section 301 “best available technology” (BAT) standard. On its face, it is stricter than the Section 301(b) requirement to impose the “best technology available economically achievable” (BAT) <FN 55> because its spare and direct mandate contains no explicit cost component and does it require the consideration of the other factors relevant to BAT. <FN 56> Given the practically identical language and the application of the Phase II Proposal only to existing sources, the BTA requirement is as least as stringent, and possibly more stringent, than the section 301 BAT standard.

Footnotes

49 33 U.S.C. §§ 1251-1387. The CWA is officially known as the Federal Water Pollution Control Act. It was amended in 1977 and 1987.

50 “Whenever a technology-based effluent limitation is insufficient to make a particular body of water fit for the uses for which it is needed, EPA is to devise a water-quality based limitation that will be sufficient to the task.” 33 U.S.C. § 1312(a); see also NRDC v. EPA, 822 F.2d 104, 111 (D.C. Cir. 1987).

51 “Best professional judgment” (BPJ): Where EPA has not yet promulgated national effluent standards for a particular category of point sources, the permit writer must use, on a case-by-case basis, his or her best professional judgment to impose “such conditions as the permit writer determines are necessary to carry out the provisions of the Clean Water Act.” 33 U.S.C. § 1342(a)(1)(B); NRDC v. EPA, 863 F.2d 1420, 1424 (9th Cir. 1988).

52 “Best practicable technology” (BPT): BPT represents the “average of the best existing performance by plants . . . within each industrial category.” Kennecott v. EPA, 780 F.2d 445, 448 (4th Circ.1985).

53 33 U.S.C. § 1311(b) (2) (A), (C), (D) and (F). BAT uses “the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.” Kennecott v. EPA, 780 F. 2d 445, 448 (4th Cir. 1985). For new sources, the strictest standard, “best available demonstrated control technology” (BACT) is required. 33 U.S.C. § 1316.

54 “Any standard established pursuant to [Section 301 or Section 306 of the Act] and applicable to a point source must require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” 33 U.S.C. § 1326(b).

55 CWA § 301(b)(2)(A); 33 U.S.C. § 1311(b)(2)(A).

56 “Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate.” 33 U.S.C.§ 1314(b)(2)(B)

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.017

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.0
Legal Authority and Purpose of Today's Proposal

CLOSED-CYCLE COOLING REDUCES WATER WITHDRAWALS AND FISH KILLS BY AN ORDER OF MAGNITUDE OR GREATER AND IS THEREFORE NECESSARY TO MINIMIZE IMPACT.

1. Capacity is the Critical Factor in Minimizing Adverse Environmental Impact.

CWA section 316(b) requires minimization of adverse environmental impact (AEI):

the location, design, construction, and capacity of cooling water intake structures [must] reflect the best technology available for minimizing adverse environmental impact. <FN 57>

The amount of water withdrawn by an intake is directly related to – and is the critical determinant of – the extent of adverse environmental impact. Consequently, section 316(b) requires a minimization of intake capacity.

Footnotes

57 33 U.S.C. § 1326(b) (emphasis added).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.018

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.01
Overview of I & E effects on organisms

On November, 9, 2000, Riverkeeper submitted to EPA a report prepared by Drs. Peter A. Henderson and Richard M. Seaby of Pisces Conservation, Ltd., that reviewed and evaluated the ecological basis for the proposed Phase I regulation. <FN 58> Drs. Henderson and Seaby reviewed literature and data on cooling water intakes from many power plants in freshwater, marine and estuarine water bodies in the U.S. and Great Britain, and concluded that there is a direct relationship between the volume of water pumped and the number of fish impinged and entrained. <FN 59> The following regression equations summarize the average correlation for all of the plants studied:

I = 0.023(G+340.25)1.844

E = 1.816(G+340.25)1.658

where "I" represents the number of fish impinged per year, "E" is the number of fish entrained per year, and "G" is gallons of water per second. <FN 60> The power function indicates a particularly sensitive relationship: increases in water withdrawal will result in a greater proportional increase in entrainment and impingement mortality.

As the Pisces Report explains:

It is impossible to remove any significant volume of water from a lake, reservoir, river or the ocean without also removing some of the organisms that are living within it. When water is extracted from healthy natural waters, to an over-riding degree the number of organisms killed be they fish, crustaceans or members of the plankton increases with the volume of water pumped. <FN 61>

As Drs. Henderson and Seaby explain in the Pisces Phase I Report, mathematical analysis of data from a large number of U.S. and European power plants show "no appreciable difference in overall catch rate over a wide range of habitats and geographical position." <FN 62> As such, "pumping rate is considerably more important than locality and intake configuration in determining the number of fish either entrained or impinged." <FN 63> Indeed, EPA agrees that impingement and entrainment levels are directly related to the volume of water withdrawn.

Footnotes

58 Technical Evaluation of US Environmental Protection Agency Proposed Cooling Water Intake Regulations for New Facilities, prepared by Drs. P. A. Henderson & R. M. Seaby, Pisces Conservation Ltd., November 2000 (the "Pisces Phase I Report"). Pisces is a British environmental consulting firm that has extensive experience consulting on the ecological impacts of power plants, including in particular the impacts of cooling water intakes and thermal discharges on the biota of surrounding waters. Key members of Pisces staff have worked for more than 30 years on power plant effects in many parts of the world. See Attachment A to the Pisces Report for a description of Pisces' experience in evaluating environmental impacts of power plants, including the curricula vitae of Drs. Henderson and Seaby.

59 Pisces Phase I Report, § 3.

60 Id.

61 Pisces Phase I Report, § 7 (emphasis added).

62 Pisces Phase I Report, § 5.

63 Id.

EPA Response

EPA agrees that there is a direct relationship between I&E rates and intake flow. Please see responses to Comment 316bEFR.041.037 and Comment 316bEFR.077.016.

Comment ID 316bEFR.206.019

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Closed-Cycle Cooling Minimizes Capacity and Fish Kills.

The difference in capacity between once-through cooling systems and closed-cycle cooling systems is enormous. “Once-through” cooling systems take water from a local body of water, use it to absorb heat from the facility (in the case of electric power plants, from the steam condensers), and discharge it back at an elevated temperature. In a once-through system none of the cooling water is recirculated and extremely large volumes are required.

Once-through systems generally consume on the order of hundreds of millions or billions of gallons of water per day. The Salem Generating Station in New Jersey uses more than 3.3 billion gallons of water per day. Each reactor at the Indian Point facility in New York uses more than 1.4 billion gallons per day. Once-through systems at modern combined-cycle fossil fuel plants will use somewhat less water, but the volumes for large plants of that type are still in the hundreds of millions of gallons per day (mgd).

“Closed-cycle” cooling, in contrast, involves significant or complete recirculation of cooling water. The volume of water used by either of the two primary types of closed-cycle systems is dramatically lower than for once-through cooling. In closed-cycle wet cooling systems (i.e., evaporative cooling towers), cooling water is circulated through cooling towers to transfer heat to the atmosphere by evaporation, and is then recirculated through the plant to absorb heat. In closed-cycle dry-cooling systems (a.k.a. air cooling) radiator-type coils are used to transfer heat to air passing over the coils. In dry systems, there is no water evaporation and virtually all water is recirculated. As a result, plants that use dry cooling have no visible plume and have much smaller water requirements. Plants with dry cooling systems have no thermal discharge to watersheds, only to air, and need to add additional water only occasionally for periodic system maintenance and cleaning. Where steam plume abatement is desirable, hybrid cooling systems are available that use both wet sections and dry sections.

The precise volume of water withdrawn by any of these systems depends on the size of the plant and the type of electricity generation technology. Generally, the higher the output of a power plant, the more cooling water is required. <FN 64> Most critical for BTA purposes, however, is that water requirements for the different cooling system categories vary by orders of magnitude.

The differences in both capacity and mortality between once-through cooling and closed-cycle cooling are particularly dramatic. Closed-cycle systems generally require only 2-5% as much water as once-through cooling systems. That is, a plant which would extract 1 billion gallons per day (1000 mgd) of water if cooled by a once-through system, will require only about 2-5% of that amount or 20 to 50 mgd if cooled by an evaporative cooling tower instead. Retrofitting evaporative cooling towers on a power plant that currently uses once-through cooling will therefore reduce water usage by approximately 95-98%. The reduction in water use from saline sources may in some circumstances be lower, but is still highly significant, at 70% or more, depending on the extent to which State water quality standards limit chloride increases.

Most significantly, this dramatic reduction in intake volume will directly reduce the mortality of aquatic organisms by a correspondingly large amount. Thus, power plants which currently slaughter billions of larval fish will generally destroy less than 5% (and possibly as little as 2%) of that total.

Footnotes

64 Section 3 of the Pisces Phase I Report contains regression functions to describe the relationship between power output and cooling water requirements.

EPA Response

See response to comment 316b.EFR.404.011.

Comment ID 316bEFR.206.020

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

As just one example of the massive reduction on fish deaths from converting to closed-cycle cooling, in early 2002, the Albany Steam Station on the Hudson River received approvals from New York State to repower the once-through, steam-cycle plant and convert to closed-cycle cooling. The Bethlehem Energy Center project, as it is known, will convert the existing 400 MW oil-burning facility to a 750 MW combined-cycle natural gas facility. The project will reduce Hudson River water withdrawals dramatically, by 98-99%, from the current 500 mgd to a maximum of about 8 mgd. (It will also reduce air pollution rates by 98-99%). The plant's owner, PSEG Power New York, Inc., has estimated that the reduction in intake capacity will reduce entrainment by 98-99% from the current annual totals of 420 million eggs, 460 million yolk-sac larvae, 210 million post yolk-sac larvae, and 130,000 juveniles. <FN 65>

Footnotes

65 PSEG Power New York Inc.'s Bethlehem Energy Center, SPDES Modification, DEC Number 4-0122-00044-00005, Addendum A.10, Alternative Cooling Systems Study p. 7-10, Table 7-3.

EPA Response

EPA thanks the commenter for the submission of this example.

Comment ID 316bEFR.206.021

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Retrofitting to closed-cycle cooling drastically reduces water usage and fish kills through impingement and entrainment. This ratcheting down of impacts is exactly what was contemplated by Congress when it established the NPDES permitting system and the technology-based limitation requiring best technology available.

EPA Response

See response to comment 316b.EFR.404.034 The commenter apparently alludes to Section 301(b)(2)(B), which requires EPA to establish effluent limitations that result in "reasonable further progress toward the national goal of eliminating the discharge of pollutants." While this is indeed the overarching goal of section 301, EPA also notes that such effluent limitations must be based on the best available technology economically achievable, which in turn is based on the factors in section 304(b). In other words, the amount of "ratcheting down" those effluent limitations guidelines accomplish is directly affected by what EPA judges to be BAT. The "reasonable further progress" is always defined in terms of that BAT. EPA believes the same principle holds true for 316(b) by virtue of its reference to section 301 as the similarities in terminology.

Comment ID 316bEFR.206.022

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 7.03
Available I&E technologies

All Other Technologies Are Significantly Less Effective.

While other technologies exist to reduce entrainment and impingement, none of them afford anywhere near the level effectiveness and reliability of closed-cycle cooling. Such technologies include: Ristroph screens and fish return systems; wedgewire screens; fine mesh traveling screens; barrier nets; louver screens; angled screens; velocity caps; porous dikes; behavioral barriers; variable speed pumps; and microfiltration.

As the Pisces Phase II Report, submitted with these Comments details, these technologies vary in their effectiveness, but none of them come close to achieving the effectiveness and reliability of closed-cycle cooling. Indeed, EPA acknowledges the superiority of cooling towers in reducing impingement and entrainment:

The only technology effectiveness that is certain is reductions in impingement and entrainment with cooling towers. <FN 66>

As a result, these technologies cannot be considered as BTA or as substitutes form closed-cycle cooling technology. They can, of course, be considered as supplements which when used in conjunction with closed-cycle cooling may offer additional environmental protection and further reduce impact.

Footnotes

66 67 Fed. Reg. 17192.

EPA Response

EPA did not select a regulatory scheme based on the use of closed-cycle, recirculating cooling systems at all existing facilities based on its generally high costs (due to conversions), the fact that other technologies approach the performance of this option, and other considerations. Although closed-cycle, recirculating cooling water systems serve as the basis for requirements applied to Phase I new facilities, for Phase II existing facilities, a national requirement to retrofit existing systems is not the most cost-effective approach for existing facilities. EPA estimates that the capital costs for individual high-flow plants (i.e., greater than 2 billion gallons per day) to convert to wet towers generally ranged from $130 to $200 million, with annual operating costs in the range of $4 to $20 million. For purposes of general comparison, EPA estimated that capital and installation costs for cooling towers under the Phase I rule would range from approximately $170,000 to $12.6 million, depending on flow. At proposal, EPA estimated that the total social cost of compliance for this option would be approximately $3.5 billion per year.

Moreover, EPA had serious concerns about the short term energy implications of many facilities converting to this technology within a short period of time (i.e., within ten years of promulgation of this rule), and the potential for supply disruptions that it would entail. At proposal, EPA estimated annual benefits (in $2001) for this option at $87 million per year for impingement reductions and $1.1

billion per year for entrainment reductions. Retrofitting an existing facility requires special consideration of various factors, including the adequacy of space to accommodate a cooling tower, approval and special conditions to locate such technology, potential redesign of intake, piping and cooling system components, often unique construction concerns, and secondary effects, such as formation of plumes or excessive noise. New facilities generally do not encounter costs associated with these factors.

EPA also considered several points made by commenters in rejecting this option. Some commenters asserted that, for many existing facilities, it is not spatially feasible to replace a once-through system with a closed-cycle cooling water system. Commenters asserted that this is especially true at many older metropolitan area plants that are surrounded by other facilities. They also noted that certain facilities with closed-cycle, recirculating cooling systems often need to address the impacts of cooling tower plumes, and subsequent fog and icing in metropolitan areas, and noise abatement. Commenters also asserted that the costs of retrofitting and operating such systems at facilities which do not now have them is disproportionate to the potential benefits derived, particularly given the similarity in the level of protection provided under this option (all facilities required to reduce flow commensurate with a closed-cycle, recirculating system) and the final rule. Finally, they also stated that the need for flexibility in a rule pertaining to existing facilities is critical to allow facility owners a range of options to meet the fish protection requirements. EPA does not agree that in all cases the costs of a retrofitting a closed-cycle cooling water system is disproportionate to the benefits derived. Nevertheless, EPA recognizes that these concerns can have merit for some facilities and that the validity and extent of such concerns often must be assessed on a case-by-case basis.

EPA further compared the efficacy of closed-cycle, recirculating cooling systems with that estimated for design and construction technologies. Although not identical, the ranges of impingement and entrainment reduction is similar under both options, such that the reductions estimated for the design and construction technologies, particularly when optimized, approach those estimated for closed-cycle, recirculating cooling systems. Therefore, the use of design and construction technologies as the basis for this rule is supported since they can approach towers at less cost with fewer implementation problems. EPA considered this similarity in efficacy, along with the economic practicability and availability of each type of technology, in determining that closed-cycle, recirculating cooling systems are not the required technology for all Phase II existing facilities.

Comment ID 316bEFR.206.023

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 7.03.01
Sample facilities/technologies

In particular, one technology, the microfiltration device known as Gunderboom, is an experimental technology that cannot be considered as any component of a national BTA standard, certainly not in lieu of cooling towers. The only locations where Gunderboom has been tested are on the Hudson River at the Lovett Station Unit 3 and in an in-situ experiment in Bowline Pond conducted by Riverkeeper. Analysis of the monitoring reports of Gunderboom deployment at Lovett reports indicates that even after anchoring problems were corrected, the effectiveness of the filter fabric began to decline soon after deployment, and the material was ineffective after 5 to 6 weeks of use. The failure of the Gunderboom fabric at Lovett was likely related to biofouling, which blocks water flow through the material, thereby causing water and aquatic biota to overtop, tunnel under and/or rip through the fabric. As a result, the 80% exclusion rate (or even a 60% exclusion rate) hoped for by EPA is highly speculative and cannot in practice be achieved. Such success rate has never been achieved at Lovett or anywhere else. If anything, the Lovett reports demonstrate that Gunderboom material will foul and fail within a month or two of deployment.

As the Pisces Phase II Report explains. Gunderboom has never been proven to be effective at Lovett, except for very limited periods of time:

The only microfiltration system considered is the Gunderboom and the report makes it clear that the only data available come from the observations at Lovett GS. It is concluded that 'Entrainment reductions up to 82 percent were observed for eggs and larvae and these levels have been maintained for extended month-to-month periods during 1999 through 2001.'

This statement is a clear exaggeration of the observed effectiveness of the Gunderboom at Lovett GS. Overtopping, tunneling and rips have been observed during testing. For example, in the Lovett evaluation report for 1999 it is stated that "the divers documented a substantial gap along the bottom of the boom. The gap extended along the bottom of the boom for approximately 3 m and ranged in depth from 0.5 to 0.6 m".

It is clear in Table 2 of the Lovett 2000 report (above [in Pisces report]) that there was a gradual increase in entrainment through time. Further, there was also a series of events between May and August 2000 that resulted in short-term total failures. The efficiency of the Gunderboom was assessed by comparing the level of entrainment at unit 3 (protected by a Gunderboom) to that at unit 4 (unprotected). Thus a ratio above 1 for the number of fish entrained at unit 3 to unit 4 shows that the boom was offering no protection. To achieve 82% effectiveness or better the ratio would need to be smaller than 0.18. As shown in the figure below this level of efficiency was only achieved for a short period during May 2000. It is therefore incorrect to conclude that it was achieved for extended month-to-month periods during 1999 through 2001. In fact from late July 2000 the Gunderboom was completely ineffective at reducing entrainment. <FN 67>

Because Riverkeeper suspected that the declining efficiency of Gunderboom has was related to biofouling, we commissioned original research on Gunderboom fabric with intervenor funds in the New York State Article X power plant siting proceeding for the proposed Bowline 3 facility (Case

No. 99-F-1164). <FN 68> The in situ experiment conducted in Bowline Pond by Pisces Conservation, with assistance from Carpenter Environmental Associates, demonstrated that when exposed to the Hudson River environment during the spawning season, the permeability of Gunderboom material progressively declines as a result of the growth of a biological community on the surface. <FN 69> In fact, after 29 days in the water, Gunderboom material which was subjected to an airburst cleaning system (as proposed for BEC) had only 4% of the permeability remaining, as compared to clean material. <FN 70> Fouling of the filter fabric can result in at least three biological problems: (1) fouling of the surface might reduce the area through which water can flow leading to velocity ‘hot spots’ where delicate animals may be pinned or pulled through the mesh; (2) increased flow resistance causes water to force another path across or around the barrier; and (3) establishment of a predatory community adapted to feed on any small animals drawn close to the fabric. <FN 71>

Because Gunderboom is an experimental technology, and has not been shown to be an effective substitute for closed-cycle cooling, it cannot be considered BTA.

Footnotes

67 Pisces Phase II Report at p. 42.

68 See Biofouling Studies in Bowline Pond, July 2001, P.A. Henderson. R.M. Seaby, C. Cailes, and J.R. Somes, previously submitted to EPA.

69 Id. at p. 14.

70 Id.

71 Id. at p. 1.

EPA Response

Today's rule maintains the flexibility for a facility to determine the most appropriate design and construction technologies, operational measures, and/or restoration measures suitable to its location that can best achieve requirements of today's rule.

The Gunderboom technology has demonstrated promise in reducing impingement and entrainment. EPA agrees that the technology is relatively new to the market and is still undergoing modifications and improvements but does not agree with the commenters assertion that Gunderboom should be excluded from BTA determinations. EPA has left the determination of BTA (in compliance alternatives 2 and 3) up to the Director on a site-specific basis. If the Gunderboom can be shown to reliably meet the requirements in today's rule, it should be eligible for consideration as BTA.

Comment ID 316bEFR.206.024

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 17.03.01
Ex. facilities converted to closed-cycle

CLOSED-CYCLE COOLING IS AVAILABLE AND AFFORDABLE FOR EXISTING FACILITIES, AND WILL NOT ADVERSELY AFFECT ENERGY SUPPLY, RELIABILITY OR PRICES.

1. Closed-Cycle Cooling Is Virtually Ubiquitous For Modern Power Plants, and Has Been Retrofit on Numerous Older Plants.

Closed-cycle cooling is available technology for both new and existing facilities. For new plants, it is overwhelmingly the standard technology. In conjunction with the Phase I regulation for new facilities, EPA reported that 100% of the utility and nonutility combined-cycle plants built in the last 20 years have a closed-cycle recirculating cooling system. <FN 72> For coal-fired facilities, 88% of the facilities built in the last 10 years have closed-cycle cooling. <FN 73> Likewise, for existing plants, EPA acknowledges that:

A closed-cycle recirculating cooling system is an available technology for facilities that currently have once-through cooling water systems. <FN 74>

In the 1970s, 1980s, and 1990s, facilities of various sizes and fuel types converted from once-though cooling to closed-cycle cooling. Specifically, EPA has reported the following cooling system retrofits: The Palisades Nuclear Plant in Michigan converted to closed-cycle cooling in 1974; the Canadys (coal-fired) Steam Plant in South Carolina, converted its once-through cooling system to a closed-cycle recirculating system in two steps, first Unit 3 in 1972 and then Units 1 and 2 in 1992; in 1985, the Jeffries Coal Plant also South Carolina converted from once-through cooling to recirculating cooling towers; and finally, Unit 7 of the Pittsburg Power Plant in Contra Costa County, California, has converted to closed-cycle.

In addition, many other plants have converted from once-through cooling to closed-cycle cooling, or are planning to do so, while repowering and simultaneously improving the efficiency, air pollution rates, and total capacity of their plants. For example:

Reliant Astoria Repowering Project and the Bethlehem Energy Center in New York State are evidence that firms will seek to repower older, less efficient generating facilities and that such repowerings can include cooling towers as part of the repowered facility in place of once-through cooling. Such projects will provide significant environmental benefits in terms of reduced water usage and lowered air emissions and will offer substantial economic benefits for their owners. <FN 75>

Footnotes

72 66 Fed. Reg. 28855-28856.

73 66 Fed. Reg. 28856.

74 67 Fed. Reg. 17154.

75 Synapse Phase II Report at p. 7.

EPA Response

See response to comment 316b.EFR.404.018.

Comment ID 316bEFR.206.025

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

A Retrofit Mandate Will Not Cause Energy Shortages.

A regulation requiring closed-cycle cooling for all existing facilities would not significantly affect U.S. energy supplies in the short- or long-term. Submitted with these comments is a report by Synapse Energy Economics of Boston, Massachusetts. In that its report (hereinafter, "Synapse Phase II Report"), Synapse analyzed the energy impact of an all closed-cycle cooling rule, and concludes that there would be no adverse energy reliability impact from the implementation of an all-cooling tower regulatory option. <FN 76>

Adverse energy effects of such a regulation could conceivably result from one of three causes: plants going temporarily off-line to retrofit to cooling towers; reduced energy generating efficiency (sometimes called an "energy penalty") from operating with a cooling tower; or the retirement of facilities. Synapse has carefully analyzed each of these possibilities, and none presents a significant problem.

First, Synapse calculates the percentage of national power capacity that would be off-line for retrofit at any one time. As EPA acknowledges, the new cooling towers could be built while an affected facility is operating and the attachment of the new tower to the existing cooling system would have only a one-time effect, extending a planned maintenance outage by one month. Based on EPA's estimates, Synapse notes that a national closed cycle cooling rule would cause 416 facilities, representing 33.1 percent of U.S. generating capacity, to add cooling towers. Since power plant cooling technology is dictated by 5-year NPDES permits, and since the design and construction of cooling towers can take several years, it is reasonable to assume that the facility outages required to connect these new cooling towers could and would be scheduled to occur throughout a five-year transition period. As a result, on average, only 0.5 percent of the nation's electric generating capacity would be out of service at any one time as a result of the implementation of a national closed-cycle cooling rule. <FN 77>

The same would be true on a regional basis. Only 0.75 percent of the generating capacity in the ECAR and NPCC regions, on average, would be out of service at any one time. Again, this assumes that the extra month of downtime needed to connect the new cooling towers would occur randomly throughout the year. It is far more likely, however, that the extra downtime would be preferentially scheduled to occur during the off-peak seasons when capacity reserve margins are much higher. As a result, the implementation of a national closed-cycle cooling regulation would have even less of an effect on electric system reliability than these figures would suggest. <FN 78>

Second, the energy penalties will be minor. Even assuming EPA has correctly estimated the energy penalty at 1.7 percent, this is a minor reduction considering in light of existing and predicted reserve margins, and the additional capacity expected to come on line in the near future. Moreover, EPA has significantly overstated the energy penalty, as Synapse explains in detail. <FN 79>

Third, no generating capacity will be retired as a result of the implementation of the closed-cycle cooling rule. As explained below, based on the extremely high profitability of existing nuclear and fossil fuel plants, and the relatively minor costs of retrofitting cooling towers, it is unreasonable and unrealistic to assume that any facilities will close as a result of such regulation. If anything, a cooling tower mandate might cause some retrofitting facilities to simultaneously repower from older, less efficient single-cycle generating technology to modern, more efficient combined-cycle technology. On the Hudson River, the owner of the Albany Steam Station recently received approval to repower the plant, and in so doing will reduce cooling water intake by 98-99% percent, reduce air pollution rates by a similar percentage, while nearly doubling capacity. Thus, a closed-cycle regulation may cause an increase in capacity.

Even apart from repowerings that might be caused by such a rule, there are a number of other sources of additional, new capacity which will more than compensate for any reductions in available capacity. Thus, the extremely minor capacity reduction totals discussed above overstate the effect that the implementation of a closed-cycle cooling the regulation would have on electric system reliability. A significant amount of new capacity is scheduled to come on line nationwide in the next few years. Further, there will be additional capacity available from already-scheduled repowerings of oil-, gas- and coal-fired facilities to combined-cycle plants. Synapse is aware of at least 17 coal-fired facilities have been or are planned to be repowered to use combined-cycle technology, in addition to many more repowerings from oil or gas, which EPA has reported. These repowerings could add thousands of additional megawatts of generating capacity to the national electric system and, thereby, improve system reliability while reducing water usage. Similarly, condenser upgrades improve performance in terms of fewer tube failures and lower forced outage rates. Thus, the facilities that have implemented condenser upgrades should be available for service for more of the year than they previously had been. This additional capacity can be expected to further enhance electric system reliability.

Morever, there will be additional capacity available from the implementation of power uprates at nuclear power plants. A power uprate means increasing the thermal power produced by the plant. A power uprate increases the output of the plant at a relatively low cost. The U.S. Nuclear Regulatory Commission has approved more than 60 such power uprates of between 5 and 20 percent. Requests for additional uprates are currently under review by the NRC or are planned for submission in the near future. An average increase of 10 percent in the power levels of the nation's nuclear plants would add approximately 9,000 megawatts of additional capacity to the electric system. Likewise, many nuclear power plants will be extended beyond the current 40 year terms of their Nuclear Regulatory Commission-issued operating licenses. Therefore, there may be more generating capacity available over the next 30 to 50 years than has been assumed in the EPA analyses.

Footnotes

76 Synapse Phase II Report at p. 2.

77 Synapse Phase II Report at p. 6.

78 Id.

79 Id. at 11-12.

EPA Response

See response to Comment ID 316bEFR.404.019.

Comment ID 316bEFR.206.026

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

The Cost of Closed-Cycle Cooling is Minimal to Industry, Would Not Cause Facilities to Close, and is Only Pennies per Month Per Household.

In the Phase II Synapse Report, Synapse analyzed and the costs of complying with regulatory options that require closed-cycle recirculating cooling systems and concluded that such costs would be extremely minor.

Based on EPA's own calculations, the compliance costs of an all cooling tower rule, would add cooling towers at 416 facilities, would increase the average price of generating electricity at the affected facilities by about one-tenth of one cent (known as a mill) per kilowatt hour. Since retail energy costs average about 8.5 cents per kilowatt hour, this represents only a 0.66 percent increase. <FN 80>

It is not clear that in deregulated markets the owners of affected facilities could pass these cost increases along to their customers. But even if they could, the overall price paid by consumers for the electricity they use would reflect a blend of both the price of generating electricity at affected facilities and the price of generating electricity at non-affected facilities. Consequently, the price of electricity actually paid by consumers would increase by less than the tenth of a cent per kilowatt hour. Indeed, as demonstrated by Synapse the average price increases to consumers caused by an all-cooling tower rule would be only one-twentieth of a cent (one-half mill) per kilowatt hour. As a result, an average consumer who uses 500 kilowatt hours per month would see his/her bill increase by only 28 cents per month if a closed-cycle regulation were adopted.

These extremely minor cost increases would also not cause any facilities to close. Based on its experience and previous work with power plants, Synapse believes that it is extremely unrealistic to expect that currently operating nuclear power plants will be retired as a result of the adoption of a flow reduction technology based regulatory options. This conclusion is based on (a) the improved performance and reduced O&M costs achieved at nuclear plants since the mid-1990s, (b) the fact that nuclear plants' low operating and fuel costs allow them to compete successfully in bid-based wholesale markets, and (c) the significant economic benefits that are available from relatively low cost investments in plant power uprates and operating life extensions.

For example, a recent Synapse analysis concluded that a $36 million investment in increasing the power level of the Vermont Yankee Nuclear Plant by 13 percent would result in a net present value benefit of $56 million (in 2001 dollars). A similar investment in extending the unit's operating life by twenty years would produce a net present value benefit of $253 million. With the opportunity for potential economic benefits of this magnitude, it is unlikely that any nuclear plant would be retired as result of the adoption of a closed-cycle retrofit mandate from the EPA.

Footnotes

80 Synapse Phase II Report at p. 8.

EPA Response

For a response to the comment on EPA's cost estimate for regulatory options that require closed-cycle recirculating cooling systems, please refer to comment 316bEFR.087.005 in comment category 9.0.

For a response to the comment on potential electricity price increases, please refer to comment 316bEFR.087.012 in comment category 9.02.

For a response to the comment on the potential closure of nuclear capacity as a result of a closed-cycle retrofit mandate, please refer to comment 316bEFR.087.011 in comment category 9.03.

Comment ID 316bEFR.206.027

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 7.0
Best Technology Available (BTA)

EPA should promulgate a Phase II rule that mandates a closed-cycle cooling equivalent flow limit as a component of the best technology available to minimize adverse environmental impact for all existing facilities on all waters of the U.S. The only variance that can be allowed is the fundamentally different factors (FDF) variance authorized by the Supreme Court. Restoration measures cannot be used to satisfy a technology standard.

EPA Response

EPA has not selected a regulatory approach based exclusively on closed-cycle, recirculating cooling. Please refer to section VII of the preamble to the final rule for more information.

EPA agrees that it has the authority to authorize site-specific determinations of BTA for minimizing adverse environmental impacts; EPA further agrees that such determinations under § 316(b) are analogous to FDF variances under § 301.

For information about the role of restoration, please refer to sections VII and VIII of the preamble to the final rule.

Comment ID 316bEFR.206.028

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.01
Require closed cycle cooling

Section 316(b) Requires Closed-Cycle Cooling as BTA because it is the Best Technology in Use.

As explained above, the Clean Water Act's technology-based limitations were designed to force the iterative development of more protective technologies, and to ratchet down discharges and other impairments to water quality until they could be eliminated. Congress and numerous federal courts have emphasized this "technology-forcing" character of the Act's categorical standards within the context of the section 301 BAT requirement. It is therefore well-settled law that BAT standards must require all existing facilities to match the environmental performance of the best performing, i.e., least polluting, least harmful, facility.

BAT must be "at a minimum, established with reference to the best performer in any industrial category." Conf. Rep. On S. 2770 (October 4, 1972), Legislative History of the Federal Water Pollution Control Act of 1972 at 170. "The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible. In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible." Kennecott v. EPA, 780 F.2d 445, 448 (4th Cir. 1985), citing legislative history See A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 798 (hereinafter "Leg. Hist."). See A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 798 (hereinafter "Leg. Hist.").;

"[I]t is clear that Congress did not intend by that phrase [i.e., BAT] to limit the technology to that which is widely in use. … 'It will be sufficient, for the purpose of setting the level of control under available technology, that there be one operating facility which demonstrates that the level can be achieved or that there is sufficient information and data from a relevant pilot plant.'" American Iron & Steel Inst. v. EPA, 526 F.2d 1027, 1058 (3d Cir. 1975), quoting legislative history. BAT must "utilize the latest technology to reach 'the greatest attainable level … which could be achieved. NRDC v. EPA, 863 F.2d 1420, 1431 (9th Cir. 1988). <FN 81>

The best-performer/optimally-operating-plant essence of BAT standards is illustrated by contrast with or "best practicable technology" or BPT standards. <FN 82> BPT was an intermediate technology standard which, under the CWA's three-step phase-in process, were completely replaced by the BAT standards in 1979. Under the obsolete BPT mandate, EPA set standards which represented the "average of the best existing performance by plants of various sizes, ages and unit processes within each industrial category or subcategory. This average is not based upon a broad range of plants within an industrial category or subcategory, but is based upon performance levels achieved by exemplary plants." Kennecott v. EPA, 780 F.2d 445, 448 (4th Circ. 1985) citing EPA v. Nat'l Crushed Stone Ass'n, 449 U.S. 64, 76 n. 15, 66 L. Ed. 2d 268, 101 S.Ct 295 (1980) (1980) quoting 39 Fed. Reg. 6580 (1974). "The distinction between 'best practicable' and 'best available' is intended to reflect the need to press toward increasingly higher levels of control. Kennecott v. EPA, 780 F.2d 445, 448 (4th Cir. 1985), citing legislative history.

Section 316(b)'s BTA mandate, which is at least as strict as BAT standards and clearly stricter that BPT, requires EPA to set extremely technology-forcing cooling water intake standards that reflect state-of-the-art controls. As with BAT, BTA requires EPA to look to the optimally-operating plant, i.e., the best performer, and to bring all facilities up to the "best of the best" level. EPA has done this for many years for most industrial dischargers, including new and existing power plants. <FN 83> The Clean Water Act requires the same for cooling water intakes at power plants.

Footnotes

81 See also Texas Oil & Gas Ass'n v. United States EPA, 161 F.3d 923, 928 (5th Cir. 1998) (BAT limitations to be based on the performance of "the single best-performing plant.") American Iron & Steel, 526 F.2d at 1061; National Ass'n of Metal Finishers v. EPA, 719 F.2d 624, 657, n. 51 (3d Cir. 1983); FMC Corp. v. Train, 539 F.2d 973, 983 (4th Cir. 1976); American Frozen Food Inst. v. EPA, 526 F.2d 107, 117 (D.C. Cir. 1976).

82 33 U.S.C. § 1311(b)(1)(A). EPA defines BPT as "the average of the best existing performance by plants of various sizes, ages and unit processes within each industrial category or subcategory. This average is not based upon a broad range of plants within an industrial category or subcategory, but is based upon performance levels achieved by exemplary plants." EPA v. Nat'l Crushed Stone Ass'n, 449 U.S. 64, 76 n.15, 66 L. Ed. 2d 268, 101 S. Ct. 295 (1980), quoting 39 Fed. Reg. 6580 (1974).

83 40 C.F.R. Part 423 (Steam and Electric Power Generating industry)..

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.029

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.01

Require closed cycle cooling

Because closed-cycle cooling is the best technology for minimizing adverse environmental impact, is widely available for both new and existing plants, and will not cause adverse energy impacts, it is BTA for existing facilities. EPA has no discretion to determine otherwise. Indeed, for EPA to determine that a once-through plant is the "optimally operating plant, the pilot plant which acts as a beacon to show what is possible," (Kennecott v. EPA, 780 F.2d at 448) would be arbitrary and capricious and not in accordance with law.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.030

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Author Name Reed Super

Organization Riverkeeper

COMPLIANCE COSTS ARE ONLY MARGINALLY RELEVANT TO THE DETERMINATION OF BTA.

The fact that closed-cycle cooling may cause facilities to incur higher compliance costs does not change the BTA determination. "Congress foresaw and accepted the economic hardship, including the closing of some plants, that [Clean Water Act] effluent limitations would cause." EPA v. National Crushed Stone, 449 U.S. 64, 79 (1980). As the Supreme Court explained, Congress devised the Act with the economic consequences in mind:

Prior to the passage of the [Clean Water] Act, Congress had before it a report jointly prepared by EPA, the Commerce Department, and the Council on Environmental Quality on the impact of the pollution control measures on industry. That report estimated that there would be 200 to 300 plant closings caused by the first set of pollution limitations. Comments in the Senate debate were explicit: 'There is no doubt that we will suffer some disruptions in our economy because of these efforts; many marginal plants may be forced to close.'

Id. at 80.

Section 316(b) does not explicitly provide that EPA may take compliance costs into consideration at all when establishing national standards requiring that cooling water intake structures reflect the best technology available. In contrast, other provisions of the Act that mandate the establishment of technology-based standards, such as Sections 304 and 306, require EPA to consider costs, and those provisions further specify how costs are to be considered. <FN 84> Significantly, the United States Court of Appeals for the D.C. Circuit has consistently held that, without specific statutory authorization for considering costs, "the EPA is not permitted to consider the cost of implementing those standards" under the Clean Air Act. American Trucking Associations v. US EPA, 175 F.3d 1027, 1040 (D.C. Cir. 1999); see also Lead Industries Assoc. v. EPA, 647 F.2d 1130, 1148 (D.C. Cir. 1980). This is especially true where the other provisions of the same statute direct EPA to consider costs, as certain sections of the Clean Water Act do. In such cases, courts conclude that Congress only intended EPA to consider costs where it has explicitly so provided. Lead Industries Assoc., 647 F.2d at 1148. Under this authority, which applies with equal force to the Clean Water Act, EPA is statutorily precluded from considering compliance costs in the setting of Phase II BTA standards.

Footnotes

84 EPA's interpretation lacks support because it is not based not on any judicial authority or a reading of the plain language of the Act. Instead, it rests on a single statement in the legislative history and on EPA's own preamble to the 1976 rule.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.031

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Despite the lack of explicit reference to costs in section 316(b), EPA has EPA has stated that "best technology available"' should be interpreted as "best technology available commercially at an economically practicable cost." <FN 85> EPA appears to be equating role of costs under the BTA standard with the BAT standard, which is "best available technology economically achievable." If EPA's interpretation is correct, however, then EPA's consideration of costs for BTA can be no more extensive than is permitted for BAT.

Footnotes

85 EPA's interpretation lacks support because it is not based not on any judicial authority or a reading of the plain language of the Act. Instead, it rests on a single statement in the legislative history and on EPA's own preamble to the 1976 rule.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.032

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.04

Use cost-benefit tests

Congress' goal to impose the strictest controls for existing facilities is manifested in the extent to which EPA may consider costs. In setting BAT standards, EPA may consider, among other factors, "the cost of achieving such effluent reduction," 33 U.S.C § 1314(b)(2)(B), but it cannot perform a cost-benefit analysis: "[I]f the effluent reduction is technologically feasible and economically achievable [to the industry as a whole], it must be employed." 92 Cong. Rec. S.2770 (1972)(emphasis added).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.033

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Technology is economically achievable if affordable by an industrial category as a whole. See Du Pont v. Train, 430 U.S. 112, 126-30 (1977). "In promulgating nationwide pollutant effluent limitations the EPA need not consider the hardship faced by a particular plant." Chemical Mfrs. Ass'n v. EPA, 870 F.2d at 236. Nor should it. See Du Pont, 430 U.S. at 128-30; American Iron & Steel Inst. v. EPA, 526 F.2d 1027, 1051 (3d Cir. 1975).

EPA Response

See response 087.004

Comment ID 316bEFR.206.034

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.04
Use cost-benefit tests

Several major U.S. industries, including the steel, chemical and mining industries, have filed lawsuits against the EPA's promulgation of effluent limitation guidelines, claiming that the agency had been unreasonable by failing to consider environmental compliance costs either in establishing technology guidelines or refusing to issue variances to such standards. In each instance, the EPA's steadfast refusal to give undue consideration to pollution control compliance costs was upheld by the courts.

Courts have upheld the BAT selected by EPA for a variety of industrial categories, even though EPA predicted that the BAT would cause economic displacement, including plant closures, associated job losses and other significant impacts. For instance, the Third Circuit upheld performance standards for existing sources, which are set in accordance with the procedures for BAT standards, even though "EPA estimated that compliance with the [standards] would force 14% of all indirect discharging plants to close and cause a 1.2% reduction in total industry employment." Chemical Mfrs. Ass'n, 870 F.2d at 250. As the court explained, "Congress clearly understood that achieving the CWA's goal of eliminating all discharges would cause 'some disruption in our economy,' including plant closures and job losses." Id. at 252. The Ninth Circuit has also upheld BAT that was projected to cause plant closures, observing, "Congress contemplated the closure of some marginal plants." See Association of Pacific Fisheries v. EPA, 615 F.2d 794, 818 (9th Cir. 1980); Rybacheck, 904 F.2d at 1291.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.035

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.03
Define BTA as anything less than closed cycle

Furthermore, the BAT standard should represent “a commitment [by an industrial category] of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.” See EPA v. Nat’l Crushed Stone Ass’n, 449 U.S. 64, 74 (1980). “BAT should represent a ‘commitment of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges.’” NRDC v. EPA, 863 F.2d. at 1426.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.036

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.04
Use cost-benefit tests

The role of costs in BAT can be illustrated in contrast to the now-defunct BPT standards. To determine “best practicable technology,” a cost/benefit analysis was appropriate. For such BPT standards, the Clean Water Act allowed EPA to consider, among other factors, “the total cost of application technology in relation to the effluent reduction benefits to be achieved from such application.” 33 U.S.C. § 1314(b)(1)(B). Thus, under the BPT standard, EPA considered cost as a function of effectiveness; when the cost to reduce additional effluent became disproportionate to the amount of reduction, the additional reduction was not required. Reynolds Metals Co. v. EPA, 760 F.2d 549, 554 (4th Cir.1985). As explained above, BPT was determined by averaging the best performing plants of various sizes, ages, and processes, and applying that average as the BPT standard for each industry at that time. Organic Chemicals and Plastics and Synthetic Fibers Category Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards, 52 Fed. Reg. 42522 (III)(A)(1) (to be codified at 40 C.F.R. §§ 414, 416.) This was Congress’ concession to industry to allow facilities to update and comply with approaching BAT requirements.

However, even under the less stringent BPT standard, an industrial polluter could not escape complying with the regulations based solely on inability to bear compliance costs:

Because the 1977 limitations were intended to reduce the total pollution produced by an industry, requiring compliance with BPT standards necessarily imposed additional costs on the segment of the industry with the least effective technology. If the statutory goal is to be achieved, these costs must be borne or the point source eliminated.
EPA v. National Crushed Stone, 449 U.S. 64, 78 (1980).

Thus, even under the less stringent BPT standard, costs must have a minor role and a strict cost-benefit test was not required. In Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177 (5th Cir. 1989), chemical manufacturers maintained that the cost-effectiveness of Best Practicable Technology rulemaking should be measured by a "knee-of-the-curve" test to determine the point at which costs rise steeply per pound of pollutant removed. Under such a test, they argued, the BPT rules were not cost-effective. In supporting EPA’s interpretation of cost-benefit analysis and rejecting the chemical manufacturers’ argument, the Court stated,

Congress intended Section 304(b) to give the EPA broad discretion in considering the cost of pollution abatement in relation to its benefits and to preclude the EPA from giving the cost of compliance primary importance.

Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 204 (5th Cir. 1989) (emphasis added).

Senator Muskie, the principal Senate sponsor of the Clean Water Act, described the "limited cost-benefit analysis" employed in setting BPT standards as being intended to "limit the application of technology only where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction . . . ." Remarks of Senator Muskie reprinted in Legislative History of the Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress) Ser. No. 93-1, p. 170 (1973) [emphasis added].

Following the phase-out of BPT, cost could be considered only if the total elimination of discharge is impossible and, even then, only with regard to establishing the appropriate level of reduction for the best within the industry – the BAT standard. Reynolds Metals Co. v. United States EPA, 760 F.2d 549, 553 (4th Cir. 1985); Texas Oil & Gas Ass'n v. EPA, 161 F.3d 923, 928 (5th Cir. 1998), quoting Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 226 (5th Cir. 1989). Thus, for BAT (best available technology economically achievable) under Section 301, EPA must consider costs but no full cost/benefit test is permitted.

Because the standard applicable here is akin to the higher BAT standard, compliance cost is given even less weight. In American Iron & Steel Institute v. EPA, 526 F.2d 1027 (3rd Cir. 1975), members of the steel industry sought variances from BAT standards set by the EPA, claiming the cost of compliance was prohibitive. The Court, again relying on congressional intent, explained the standard for compliance cost analysis under BAT as follows:

In making the determination of 'best available' for a category or class, the Administrator is intended to apply the same principles involved in making the determination of 'best practicable' (outlined above), except as to cost-benefit analysis . . . While cost should be a factor in the Administrator's judgment, no balancing test will be required. The Administrator will be bound by a test of reasonableness. . . the reasonableness of what is 'economically achievable' should reflect an evaluation of what needs to be done to move toward the elimination of the discharge of pollutants and what is achievable through the application of available technology - without regard to cost.

Remarks of Senator Muskie reprinted in Legislative History of the Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress) Ser. No. 93-1, p. 170 (1973) (emphasis added). Finally, EPA must fully explain its cost analysis. See Kennecott, 780 F.2d at 456.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.037

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Because the costs of closed-cycle cooling are minimal, and could readily be absorbed by the energy industry or passed on to consumers <FN 86> are marginal. In other words, closed-cycle cooling is economically achievable. That ends the cost inquiry.

Footnotes

86 As explained above, an all cooling tower rule would raise electricity prices by one-tenth of one cent per kilowatt hour, or 0.66 percent over current prices.

EPA Response

Please refer to the response to comment 316bEFR.087.004.

Comment ID 316bEFR.206.038

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.03
Define BTA as anything less than closed cycle

The Clean Water Act requires EPA to determine the best technology available for minimizing the adverse environmental impact of cooling withdrawals, and set such technology as a national standard. The Phase II Proposal does neither. The performance standards fail to reflect the best technology available – in fact they recognize and permit the worst technology by far with respect to water withdrawal capacity – and the proposed site specific option obviates the national applicability of any such standards. As Woody Allen once complained about a bad restaurant: the food's lousy and the portions are too small.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.039

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 7.02

Performance standards

The proposed BTA standard for in-scope facilities (i.e., those with intake flows of at least 50 mgd) is as follows:

-All facilities must reduce impingement 80 to 95 percent from the "calculation baseline"; <FN 87> and

-Facilities must also reduce entrainment 60 to 90 percent from the "calculation baseline," unless their capacity utilization rate is less than 15 percent, or their design intake flow is less than five percent of the mean annual flow from a fresh water river or stream, in which case they have no entrainment standard. <FN 88>

These standards, however, apply only to facilities that choose the compliance alternatives referred to as Track I and Track II. <FN 89> Permit applicants may instead seek a site-specific BTA determination under Track III. <FN 90> Furthermore, under any of the three tracks, applicants may meet the applicable performance standard with "restoration measures" in lieu of technologies, if the restoration will result in comparable increases in fish and shellfish in the watershed. <FN 91>

Footnotes

87 The calculation baseline is defined as a once-through cooling system with no impingement or entrainment controls. 67 Fed. Reg. 17141.

88 Id. There are slightly different standards for lakes and reservoirs, other than the Great Lakes. 40 CFR § 125.94(b)(4) [proposed].

89 Under Track I, an applicant may demonstrate that existing "design and construction technologies, operational measures, and/or restoration measures meet the performance standards." 40 CFR § 125.94(a)(1) [proposed]. Under Track II, an applicant may demonstrate that existing and proposed "design and construction technologies, operational measures, and/or restoration measures meet the performance standards." 40 CFR § 125.94(a)(2) [proposed].

90 40 CFR § 125.94(a)(3) and (c)(1) [proposed]. To get a site-specific BTA determination, applicants must show that either (1) their compliance costs would be "significantly greater" than those EPA considered in promulgating these regulations; or (2) their costs would be "significantly greater" than the benefits afforded.

91 40 CFR § 125.94(d) [proposed].

EPA Response

This comment characterizes the proposal and requires no response.

Comment ID 316bEFR.206.040

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Author Name Reed Super

Organization Riverkeeper

This proposed BTA "standard" is illegal, both in the approach EPA took to select it and in the result. Furthermore, the compliance options negate any semblance of a national technology standard. EPA's Phase II Proposal violates the law and is unsound environmental regulation in at least the following respects:

-The "performance standard" is set with reference to technologies less protective than the best available, in contravention of CWA section 316(b) BTA requirement and the Clean Water Act's technology-forcing mandate.

-EPA employed a cost-benefit test (the "maximize net benefits" approach) to select BTA, thereby violating the Clean Water Act and Executive Order 12866, which require minimization of environmental impacts and prohibit cost-benefit analyses.

-Restoration measures cannot be used in lieu of technologies in a Clean Water Act technology-based requirement because they are not technologies that minimize impacts and they cannot reverse the damage caused by CWISs.

-Track III, which includes both an economic and a ecological variance, is unauthorized and illegal.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.041

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA must substantially revise its Phase II regulation to require facilities to reduce their cooling water intakes capacity to a level commensurate with closed-cycle cooling, must not allow restoration measures as a compliance option, and must only allow variances consistent with statutory and Supreme Court precedent. Any other result would is a abuse of discretion and not in accordance with law.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.042

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.03
Define BTA as anything less than closed cycle

THE NATIONAL TECHNOLOGY-BASED PERFORMANCE “STANDARD” DOES NOT REFLECT BTA IN PROCESS OR PRODUCT.

1. The 60 to 90 Percent Entrainment Reduction “Standard” Is Based on Less Protective Technologies than the Best Available.

The proposal violates the Clean Water Act by basing the national BTA performance standard on technologies less effective than closed-cycle cooling, i.e. by continuing to allow once through cooling. EPA purports to require a 60 to 90 percent reduction in entrainment from the calculation baseline,” <FN 92> but the operative standard is the bottom of the range, i.e., 60 percent. This is because the proposed rule requires only technologies within or above the range, so any level of performance within the range, including 60 percent, would suffice. <FN 93>

Footnotes

92 40 CFR § 125(b)(3) [proposed]. For facilities with a capacity utilization rate of less than 15 percent, and for facilities whose design intake flow is less than five percent of the mean annual flow of a fresh water river or stream, there is no entrainment standard at all. 40 CFR § 125(b)(2) [proposed].

93 EPA set the lower end of the range (60 percent) to account for sites where the fragility of species would make them susceptible to perishing when coming in contact with the very technologies designed to protect them. The upper end of the range (90 percent) represents the maximum achieved with the technologies on which the standard is based. EPA is considering, but has not included in the Phase II Proposal, a requirement that facilities achieve the greatest reduction, within the range, that is possible at their site. 67 Fed. Reg. 17141-17142. Unless and until such requirement is included in the rule, facilities have no requirement to reduce entrainment by more than 60 percent. EPA’s anticipation that “facilities will select technologies or operational measures to achieve the greatest cost-effective reduction possible (within today’s proposed performance range),” 67 Fed. Reg at 17142, is naive. As they have for decades, generators will much more likely seek to minimize section 316(b) compliance costs as much as possible.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.043

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 17.03.03
Benefits of reduced intake capacity

EPA acknowledges that closed-cycle cooling would reduce entrainment significantly more than the 60 percent standard:

[C]losed-cycle, recirculating cooling systems (e.g. cooling towers or ponds) can reduce mortality from impingement by up to 98 percent and entrainment by up to 98 percent when compared with conventional once-through systems. <FN 94>

Furthermore, cooling towers are not only more effective, but are also more reliable (i.e., more certain in their effectiveness), as EPA has also acknowledged:

Installed technologies may not operate at the maximum efficiency assumed by EPA in its estimates of technology effectiveness. <FN 95>

The only technology effectiveness that is certain is reductions in impingement and entrainment with cooling towers. <FN 96>

Footnotes

94 67 Fed. Reg. 17142.

95 67 Fed. Reg. 17192.

96 Id.

EPA Response

See response to comment 316b.EFR.404.034.

Comment ID 316bEFR.206.044

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Author Name Reed Super

Organization Riverkeeper

Despite the clear superiority of cooling towers, EPA did not set the performance standard based on a closed-cycle recirculating cooling system. <FN 97> In light of the significant difference in effectiveness (98 percent <FN 98> compared to 60 percent), and the certainty afforded by cooling towers (fish kills are reduced in proportion to volume; other technologies are affected by a variety of poorly-understood factors), the 60 percent standard violates the Clean Water Act's best technology mandate.

The entrainment performance standard in the Phase II Proposal violates the Clean Water Act because EPA based it on technologies far more destructive than those in place at the best performing plants. In other words, the standard does not reflect BTA. Simply put, cooling towers are the best technology, while filter barriers, screens, and the like, are not. In fact, such barriers and screens do not address withdrawal capacity, the critical factor in entrainment, at all; instead they may be and should be a component of BTA in conjunction with closed-cycle cooling, as a great many U.S. power plants do. Instead, the Phase II proposal would continue to allow once through cooling – the worst technology with respect to capacity – at all in scope facilities.

Footnotes

97 67 Fed. Reg. 17142. EPA based the entrainment standard on aquatic filter barrier systems, fine mesh wedgewire screens, fine mesh traveling screens with fish return systems, seasonal flow restrictions, variable speed pumps and other operational measures. EPA admits that full-scale performance data are not available for entrainment reduction. Id. While a closed-cycle cooling tower would meet the performance standard (see 40 CFR § 125(b)(1) [proposed] and 67 Fed. Reg.17142), it is not required.

98 Even the lower bound of cooling tower effectiveness, 70 percent in saline waters where State regulations limit recirculation, is still significantly better than 60 percent. And as Pisces notes, the saline waters where cooling towers reduce withdrawals less also limit the effectiveness of the alternate technologies EPA relies on. Pisces Phase II Report at pp. 39-45

EPA Response

See response to comment 316b.EFR.404.034.

Comment ID 316bEFR.206.045

Subject Matter Code 2.04.04

Use cost-benefit tests

Author Name Reed Super

Organization Riverkeeper

EPA and OIRA's Cost-Benefit Analysis Is Fundamentally-Flawed and Such Analysis May Not Legally Be Used as the Decision Criteria for BTA Determinations.

EPA Phase II Proposal relies heavily on cost-benefit analysis. After attempting to estimate the total benefits and compliance costs of the proposed alternatives, EPA chose the option predicted to have the greatest net benefit. In essence EPA replaced the Clean Water Act's BTA mandate with a cost-benefit decision-making criterion. Such use of cost-benefit analysis is not authorized by law; in fact, it is prohibited for BTA determinations. In determining BTA standards, EPA is required to give compliance costs no more than a minor role and may not use a cost-benefit analysis to mandate technologies less than the best available.

Furthermore, EPA's benefits analysis is deeply flawed in principle and in its lack of completeness. It significantly undervalues the environmental benefits of preventing fish kills. Indeed, it is impossible to represent environmental conservation in solely monetary terms.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.046

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Cost-Benefit Analyses Are Inappropriate for Environmental Harms and Benefits.

Cost-benefit analysis for environmental regulations is deeply flawed and invariably produces biased and misleading results. Unlike compliance costs, which can be readily estimated, the environmental benefits – preventing the needless diminution of aquatic and marine fauna, and all the ecosystem effects – cannot and should not be monetized. Any attempt at monetizing environmental benefits will necessarily suffer from several systemic problems. <FN 99>

First, it is not possible to realistically value the benefit of healthy marine and aquatic faunal populations. Ecosystems are immensely complex systems. There is insufficient data to fully understand these systems and identify the benefits they provide, let alone to quantify them. It is an absurd conceit to attempt to accurately estimate the value of ecological integrity given the geologic time frame for the contribution and longevity of functioning ecosystems. Instead, if something cannot be quantified, cost-benefit practitioners ignore it and therefore assume it is equal to zero, as EPA has repeatedly done in the proposed rule.

Similarly, some environmental benefits such as support for human life and civilization, as well as goals such as happiness, security and aesthetic pleasure are impossible to monetize. Failing to account for such assets leads to absurd results. Cost-benefit analyses have been used to argue that cigarette smoking should be subsidized because shorted lives would decrease national health care costs for an aging population, and that standards for preventing exposure to lead by children are too high. <FN 100>

Third, by discounting long-term benefits, cost-benefit analyses trivialize the future and make environmental restoration seem cost-ineffective. But the very nature of environmental protection is to invest now to protect resources for coming generations as well as the present. But by discounting future benefits, cost-benefit analyses make any project that does not have an immediate payoff worthless. For example, some benefits of planting a tree will not come for many years until the tree had grown enough to provide fruit, shade, habitat, aesthetic pleasure, etc. But discounting those benefits may make them so small in present dollars that it never seems cost-effective to plant a tree, when it is obvious that such is not true.

Fourth, basing regulations on cost-benefit ignores transfers of costs and therefore misallocates social resources. Comparing total costs to total benefits without regarding who pays the costs and who gets the benefits allows the power industry to continue transfer its costs on the rest of society and the environment. One result of killing fish is that fisheries become stressed, and commercial fishers are put out of work. Cost-benefit analysis does not take this into account.

Finally, the cost-benefit analysis ignores the determination, reflected in repeated Clean Water Act mandates including section 316(b), that degradation of aquatic and marine ecosystems is unnatural and unnecessary for our survival and prosperity. Instead, it presumes the massive aquatic mortality caused by power plants as the baseline, and requires a demonstration of effectiveness simply to avoid unnecessary destruction and restore a more natural ecological function. The burden should be on power plants to prove why they should be allowed to appropriate wildlife from that system for their own purposes.

Thus, cost-benefit analysis of environmental degradation is fundamentally flawed conceptually. But even assuming arguendo that such analysis could be useful, EPA's estimate for the Phase II Proposal is hopelessly incomplete and inaccurate.

Footnotes

99 For a more detailed critique of cost-benefit analysis of environmental degradation, see Heinzerling & Ackerman, Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection, Georgetown Environmental Law and Policy Institute (2002).

100 Id. citing W. Kip Viscusi, "Cigarette Taxation and the Social Consequences of Smoking," Working Paper No. 4891, 33 (National Bureau of Economic Research, October 1994); and Randall Lutter, "Valuing Children's Health: A Reassessment of the Benefits of Lower Lead Levels" AEI-Brookings Joint Center for Regulatory Studies Working Paper 00-02, at 3 (March 2000).

EPA Response

See EPA's response to comment #316bEFR.206.047 on incompleteness of EPA's analysis of the benefits of reduced cooling water intake.

See EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.206.047

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

EPA's Cost-Benefit Analysis is Hopelessly Biased, Inaccurate and Useless.

As Dr. Ackerman explains in his comments, EPA's analysis of the benefits of reduced cooling water intake is seriously incomplete, and can be considered as no more than an extreme lower bound on the complete benefits. Cost-benefit analysis is designed to weigh the relevant costs of a proposal against the corresponding benefits. This process cannot yield a meaningful result unless the calculations of costs and benefits are both complete. In the private sector, a balance sheet that weighs all of a company's income against some of its expenditures does not provide a useful picture of the company's true financial condition. Likewise, in the public sector, a comparison of complete costs and incomplete benefits does not provide an accurate picture of net benefits to society. <FN 101>

EPA has, however, produced a comparison of complete costs and incomplete benefits in this case. The costs of reducing the impacts of cooling water intake are monetary costs for marketed goods and services, such as production and installation of screens, cooling towers, and other equipment, and as a result there are no categories of costs which are intrinsically difficult to express in monetary terms. <FN 102>

In stark comparison, the calculation of the benefits of reducing cooling water intake consists of reduced damage to aquatic ecosystems, which is difficult to measure and monetize. EPA's analysis focuses only on valuing the benefits of killing fewer fish, which is itself a complex problem. Market prices are available only for a few commercially valuable fish species, and commercial prices do not necessarily capture all the value of avoided fish mortality. Furthermore, avoided fish kills are far from the only significant benefits of reduced ecosystem damages, since many other organisms and environmental services are also affected. <FN 103>

In the preamble to the Phase II Proposal and in the supporting Economic Benefit Analysis (EBA), EPA lists the categories of benefits that have been omitted, and the reasons why the environmental impacts of cooling water intake structures the benefits of regulating them have been significantly underestimated:

-Facility-provided monitoring data, the basis for EPA's analysis, typically focus on only a subset of the species impacted by impingement and entrainment (I&E), thus underestimating total losses.

-Monitoring data often pertain to conditions existing many years ago, before the Clean Water Act had improved aquatic conditions; if the numbers and diversity of fish were depressed by degraded water quality, estimates of I&E losses would be similarly low.

-Cumulative impacts of multiple facilities on the same fish population are often important, but have been considered only to a limited extent.

-Estimated recreational and commercial values include only the proportion of I&E losses that would have been caught, typically less than 20 percent of I&E mortality of recreationally and commercially valuable species.

-Secondary economic impacts such as effects on marinas, bait sales, and property values have not been included.

-Losses of invertebrate species such as lobsters, mussels, crabs, and shrimp were not included, even though these include commercially valuable species.

-Effects on fish-eating (piscivorous) birds were not included.

-Current fishing mortality rates often reflect already-depleted fisheries, as for example in the case of winter flounder near the Brayton Point facility, one of the EBA case studies.

-Forage species, accounting for the predominant share of I&E losses, are poorly documented, and their full ecological value to the food web is not considered.

-Non-use benefits are estimated only for recreational users, not for the population as a whole.

-Thermal impact reductions are not accounted for in some options, such as replacement of once-through cooling with cooling towers. <FN 104>

In addition, another portion of the EBA, Case Study Chapter A11, re-examines the areas of incompleteness from a different perspective, focusing on the ecological services that are disrupted by I&E, but are not addressed by conventional valuation methods. As explained in the EBA, those omitted or undervalued services include:

-decreased numbers of ecological keystone, rare, or sensitive species;
-decreased numbers of popular species that are not fished, perhaps because the fishery is closed;
-decreased numbers of special status (e.g., threatened or endangered) species;
-increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
-disruption of ecological niches and ecological strategies used by aquatic species;
-disruption of organic carbon and nutrient transfer through the food web;
-disruption of energy transfer through the food web;
-decreased local biodiversity;
-disruption of predator-prey relationships…
-disruption of age class structures of species;
-disruption of natural selection processes;
-disruption of public uses other than fishing, such as diving, boating, and birding; and
-disruption of public satisfaction with a healthy ecosystem. <FN 105>

In addition to these admissions by EPA, the scientists at Pisces have identified other areas of undervaluation in EPA's benefits analysis. These issues are explained in the Pisces Phase II Report and in Part IV of these comments, below. The lists of omissions and underestimates presented here clearly demonstrate the incompleteness of the benefits analysis in this case. Complete costs are being compared to a limited subset of benefits, causing environmental protection to appear as though it is not cost effective, when in fact it is. As Dr. Ackerman explains, "All that can be concluded from this misleading, incomplete comparison is that true, complete benefits must be larger, and net social benefits larger as well, for each of the various options under consideration." <FN 106>

Footnotes

101 Ackerman Phase II Comments, Section 1.

102 Id.

103 Id.

104 Id. at pp. 4-5 citing EBA Chapter C1.

105 Id., citing EBA Case Studies, p. A11-2.

106 Id at p. 6.

EPA Response

The Riverkeeper, Dr Ackerman, and other commenters have asserted that EPA's analysis of the benefits of reduced cooling water intake is seriously incomplete, and can be considered as no more than an extreme lower bound on the complete benefits. Commenters also asserted that the cost-benefit analysis is designed to weigh the relevant costs of a proposal against the corresponding benefits, and that this process cannot yield a meaningful result unless the calculations of costs and benefits are both complete. These commenters go on to say that EPA has produced a comparison of complete costs and incomplete benefits in this case. They assert the costs of reducing the impacts of cooling water intake are monetary costs for marketed goods and services, such as production and installation of screens, cooling towers, and other equipment, and as a result there are no categories of costs which are intrinsically difficult to express in monetary terms.

These commenters further assert that the benefits of reducing cooling water intake consists of reduced damage to aquatic ecosystems that is difficult to measure and monetize; EPA focuses on valuing the benefits of killing fewer fish, which is itself a complex problem; market prices are available only for a few commercially valuable fish species; commercial prices do not capture all the value of avoided fish mortality; avoided fish kills are not the only significant benefits of reduced ecosystem damages; and that many other organisms and environmental services are also affected. The commenter then goes on to assert EPA's list of categories of benefits omitted from the Phase II Proposal and the reasons why the environmental impacts of cooling water intake structures the benefits of regulating them have been significantly underestimated published in the preamble and supporting documents

These commenters assert that there are other areas of undervaluation in EPA's benefits analysis identified by commenters that EPA did not specifically list, and use these points to detail the incompleteness of EPA's analysis again pointing out that the benefits analysis is incomplete, especially in contrast to the completeness of the costs.

EPA agrees with the commenters that the benefit estimates are less complete than the cost estimates and that it is far more difficult to estimate benefits than it is to estimate costs because of the lack of scientific understanding of ecosystem benefits, the valuation tools available for estimating benefits, and the lack of a complete measurement of the losses. EPA provided a detailed discussion of many of the analysis shortcomings in the preamble for the proposal, the NODA, and in the documents accompanying the rule.

EPA agrees that the benefits have been omitted from the 316(b) Phase II benefits analysis, as well as from EPA's list of why the environmental impacts of cooling water intake structures and the benefits of regulating them have been significantly underestimated:

· Facility-provided monitoring data, the basis for EPA's analysis, typically focus on only a subset of the species impacted by impingement and entrainment (I&E), thus underestimating total losses.
· Monitoring data often pertain to conditions existing many years ago, before the Clean Water Act had improved aquatic conditions; if the numbers and diversity of fish were depressed by degraded water quality, estimates of I&E losses would be similarly low.
· Cumulative impacts of multiple facilities on the same fish population are often important, but have been considered only to a limited extent.
· Estimated recreational and commercial values include only the proportion of I&E losses that would have been caught, typically less than 20 percent of I&E mortality of recreationally and commercially valuable species.
· Secondary economic impacts such as effects on marinas, bait sales, and property values have not been included.
· Losses of invertebrate species such as lobsters, mussels, crabs, and shrimp were not included, even though these include commercially valuable species.
· Effects on fish-eating (piscivorous) birds were not included.
· Current fishing mortality rates often reflect already-depleted fisheries, as for example in the case of winter flounder near the Brayton Point facility, one of the EBA case studies.
· Forage species, accounting for the predominant share of I&E losses, are poorly documented, and their full ecological value to the food web is not considered.

EPA also agrees with the following taken from Chapter A9 of the EPA Case Study document which says that omitted or undervalued services include:
· decreased numbers of ecological keystone, rare, or sensitive species;
· decreased numbers of popular species that are not fished, perhaps because the fishery is closed;
· decreased numbers of special status (e.g., threatened or endangered) species;
· increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
· disruption of ecological niches and ecological strategies used by aquatic species;
· disruption of organic carbon and nutrient transfer through the food web;
· disruption of energy transfer through the food web;
· decreased local biodiversity;
· disruption of predator-prey relationships;
· disruption of age class structures of species;
· disruption of natural selection processes;
· disruption of public uses other than fishing, such as diving, boating, and birding; and
· disruption of public satisfaction with a healthy
· Thermal impact reductions are not accounted for in some options, such as replacement of once-through cooling with cooling towers.

Even in light of this, however, EPA disagrees that the benefit-cost analysis prepared for the 316(b) regulation is "misleading, and useless." No methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis. EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN #6-1931). The Agency believes that despite its limitations, the benefit-cost analysis prepared for the final 316(b) rule provides useful, significant, and sufficient information for rulemaking purposes. The Agency considered all of the relevant data in the § 316(b) rulemaking process.

EPA agrees with the commenter that EPA's use of the 50% rule at proposal meant that "Non-use benefits are estimated only for recreational users, not for the population as a whole." EPA agrees that both users and nonusers may have a nonuse value for a natural resource. In view of the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

See also EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.206.048

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The Use of Cost-Benefit as the Decision-Making Criterion Violates the CWA and EO 12866 Because the Law Requires Minimization of Adverse Environmental Impact, Not Maximization of Economic Benefit.

As explained above, Clean Water Act Section 316(b) requires EPA to adopt section 301 and 306 standards (i.e., mandatory limitations to be included in NPDES permits) governing cooling water intake structures. Further, these standards must reflect best technology available to minimize adverse environmental impact. This is the approach mandated by the relevant statutory authority.

In contravention of that statutory authority EPA, at the behest of OIRA, used the "maximize net benefits" approach instead of the statutorily-mandated approach. It is apparent that this was the approach used, because EPA rejected an alternative option (Federal Register Option 3 / EBA Options 1 and 2) even though it reduced impacts to a greater degree than the proposed option and was cost-effective, i.e,, benefits outweighed costs by a 3:2 margin, yielding net benefits of $255 million. <FN 107> EPA's stated rationale for rejecting this option was as follows:

EPA notes that the incremental costs of this option relative to the proposed option ($413 million) significantly outweigh the incremental benefits ($146 million). <FN 108>

Put another way, EPA chose the proposed option because it had greater net benefits (using EPA's flawed calculations) that the waterbody/capacity based closed-cycle option. This is the maximize net benefits approach.

Furthermore, it is clear that EPA adopted that approach because OIRA insisted upon it. The record clearly demonstrates that EPA had intended to propose the waterbody/capacity based closed-cycle option (Federal Register Option 3 / EBA Options 1 and 2), but was prevented from doing so by OIRA. <FN 109>

The fact the OIRA would seek to apply a "maximize net benefits" approach is perhaps not surprising since OIRA acts pursuant to Executive Order 12866, which refers to such an approach in its "Statement of Regulatory Philosophy and Principles." However, what this section of the Executive Order says is:

In choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts and equity), unless a statute requires another regulatory approach. <FN 110>

In this case, the statute clearly requires another regulatory approach. As explained in great detail in Part II, above, the Clean Water Act requires the imposition of a series of increasingly-stringent, technology-based controls to ratchet down water quality impairments as close to zero as possible. Costs play a minor role in EPA's best technology determinations. In promulgating BTA standards, EPA must minimize adverse environmental impacts, and costs are only relevant to the determination of whether the technology that minimizes impacts is economically achievable, or wholly disproportionate to the benefit. Since that is the regulatory approach mandated by Congress in the Clean Water Act, the statute trumps the Executive Order and the maximize net benefits principle of the EO 12866 is – by its own terms – inapplicable to Section 316(b) regulations.

As a result, EPA has, at the direction of OIRA, violated not only the Clean Water Act, but the Executive Order as well.

Footnotes

107 67 Fed. Reg. at 17158.

108 Id.

109 See Docket W-00-32, DCN # 4-4005 (OMB Review Draft for the Proposed Section 316(b) Rule for Large Cooling Water Intake Structures at Existing Power Generating Facilities) and Docket W-00-32, DCN # 4-4019 (Summary of Major Changes During Interagency Review).

110 Executive Order 12866 (September 30, 1993), § 1(a) (emphasis added).

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.206.049

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 22.01

Executive Orders (except EO 13211)

Lastly, despite its claims of transparency, OIRA is concealing documents concerning its evisceration of the rule in violation of Section 6(b)(4)(D) of the Executive Order which requires OIRA to make available to the public, after a notice of proposed rulemaking is published in the Federal Register, "all documents exchanged between OIRA and the agency during review by OIRA under this section." (Emphasis added.) OIRA has failed to place all documents exchanged between OIRA and EPA in its public docket, claiming that OIRA interprets "all documents" to mean only those documents exchanged between officials at SES-level or higher. <FN 111>

Footnotes

111 June 20, 2002 letter from OIRA Deputy Director Donald Arbuckle to Reed Super.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.206.050

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 7.01.03

Option 3--Site-specific determination

THE COMPLIANCE OPTIONS ARE ILLEGAL AND UNSOUND.

Despite describing the rule as a “national minimum … technology-based performance requirements,” <FN 112> EPA has failed to set a national minimum standard for technology or performance. Instead of setting a protective, technology-based standard, the rule would adopt and codify many of the site-specific arguments which permittees typically use to avoid closed-cycle cooling requirements. Since even environmentally sympathetic regulators lack the resources needed to rebut, or in most cases fully evaluate, these arguments, the Phase II Proposal will allow applicants to continue to obstruct and delay needed technology upgrades.

The two primary components of the rule that circumvent the purported technology standard are: (1) allowing applicants to attempt to replace fish they kill through “restoration measures” instead of installing technology to reduce or eliminate (i.e., minimize) the impact; and (3) Track III, which allows applicants to obtain both a site-specific BTA determination and more lenient requirements than the national standard.

Footnotes

112 67 Fed. Reg. 17140.

EPA Response

Please refer to the response to comment 316bEFR.206.027 for information about the regulatory approach for the final rule.

EPA also disagrees that today's final rule is less stringent than the previous implementation of 316(b). Please refer to the response to comment 316bEFR.202.003.

Comment ID 316bEFR.206.051

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Restoration Measures are Unreliable and Cannot Be Permitted In Lieu of Technology.

EPA is proposing to allow any and all in-scope facilities to use "restoration measures" in lieu of technology, whether they choose compliance option Track I (existing operation is BTA), Track II (existing plus proposed is BTA), or Track III (site-specific BTA determination). <FN 113> More specifically, the Phase II Proposal provides:

In lieu of, or in combination with, reducing impingement mortality and entrainment by implementing design and construction technologies or operational measures to comply with the performance standards specified in paragraph (b) of this section [for Tracks I and II] or the Director's determination pursuant to paragraph (c) of this section [for Track III], you may, with the Director's approval, employ restoration measures that will result in increases in fish and shellfish in the watershed. You must demonstrate to the director that you are maintaining fish and shellfish within the water body, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures… <FN 114>

While such measures may beneficial in compensating for past harms to the aquatic environment, they cannot be used as a substitute for dry cooling because they do not constitute best available technology for minimizing adverse environmental impact from cooling water intake structures, which is what Section 316(b) requires. Furthermore, restoration measures do not replace or compensate for the fish killed by cooling water intake structures.

Footnotes

113 40 CFR § 124.95(a)(1), (2); 40 CFR § 124.95 (c)(1)

114 40 CFR § 124.95(d).

EPA Response

For a discussion of the role of restoration measures in the final rule, see EPA's response to comment 316bEFR.056.003 as well as the preamble to the final rule.

Comment ID 316bEFR.206.052

Subject Matter Code 11.0

Role of Restoration

Author Name Reed Super

Organization Riverkeeper

Restoration Measures are Unreliable and Do Not Replace the Fish Killed by CWIS's.

Restoring aquatic habitat for fish, wildlife, and plant species is generally a worthwhile and environmentally beneficial activity. Throughout the country, extremely large areas of aquatic habitat have been destroyed by development, primarily by filling open water and wetlands. Restoration measures, if successful, can provide some level of mitigation for such development activities. However, restoration measures, whether successful or not, cannot replace the fish killed by impingement and entrainment at power plants.

EPA Response

EPA agrees with the commenter that restoration of aquatic ecosystems is generally a worthwhile activity. EPA also agrees that restoration does not aid precisely those individual aquatic organisms killed by impingement and entrainment in cooling water intake structures. Instead, restoration measures under today's rule are required, through the production and increase of fish and shellfish in the same waterbody or watershed as the cooling water intake structure, to minimize or to help minimize the adverse environmental impacts that derive from impingement and entrainment of individual aquatic organisms by the cooling water intake structure. For additional discussion of the role of restoration in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.206.053

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Habitat restoration measures have been employed most prominently in an attempt to mitigate impingement and entrainment at the Salem Nuclear Generating Station in New Jersey. It is therefore critically important to acknowledge that, as the Delaware Riverkeeper Network explains in its separately-submitted comments on this rule, the mitigation experiment occurring on the Delaware at Salem is failing. PSE&G has been unable to demonstrate that its restoration effort for the fish kills at its Salem plan is providing any benefit whatsoever to the fish populations of the Delaware estuary. Thus, it cannot demonstrate that the restoration measures are in any way minimizing the impingement and entrainment of over three billion Delaware River fish. Indeed, PSE&G cannot even demonstrate that if it were successful in eradicating and/or controlling phragmites, that this success would be sustainable without continuous intervening action. In fact, the primary result of PSE&G's mitigation proposal is that the Salem facility continues to kill over three billion Delaware River fish a year while PSE&G is now also harming thousands of acres of marshland by spraying it with glyphosate only to have the targeted phragmites return. There has been no minimization of adverse impact at Salem, as required by section 316(b).

Because the PSE&G restoration project at Salem is being held up as a national model for section 316(b) compliance, it is important to understand why restoration and cannot address the concerns that section 316(b) is intended to address – i.e. impingement and entrainment of fish. PSE&G's wetlands experiment involves restoring, enhancing and/or preserving 10,000 acres of what PSE&G characterizes as degraded wetlands. The majority of those wetlands are dominated by the phragmites plant; restoration efforts include herbicide application, mowing and prescribed burning in order to remove phragmites and replace it with spartina grasses. Some freshwater diked wetland are also being converted to salt marshes. The original argument supporting this program was that enhancement of these wetlands will increase fish production in the Delaware Estuary. PSE&G is, however, unable to demonstrate that their experiment, even if successful (which is doubtful at best), actually provides benefits to the estuary ecosystem. The numerous, fundamental problems with the restoration approach at Salem include the following:

PSE&G never provided scientific data indicating that food or habitat were limiting factors for the fish populations in the Delaware Estuary – and there is in fact no data or information that would indicate that this is in fact the case. Therefore, altering wetlands to increase food and habitat availability for fish is likely not to have any effect on fish populations in the estuary. <FN 115>

PSE&G's success criteria and evaluation methodology for its wetlands enhancement efforts do not include determining whether the fish populations of the River are benefiting from the wetlands restoration efforts. Instead their success criteria focus on change in vegetation coverage, algal productivity, macrophyte productivity, etc. <FN 116>

PSE&G has failed to demonstrate that even if it is successful at replacing the existing phragmites in these areas with other species of plants, that this change in vegetation is sustainable and will not be overrun by neighboring stands of phragmites within a matter of years. <FN 117>

PSE&G has failed to conduct the baseline data on the contributions of the phragmites stands to the food chain in order to make the necessary comparisons. It is very possible that the fish used the phragmites-dominated marshes in the same way and to the same degree as they would spartina-dominated marshes and therefore nothing has been truly gained by their efforts. <FN 118>

In fact, PSE&G's own data confirms, what other scientists have found, that phragmites-dominated marshes on the Delaware Bay contribute just as much basic nutrient material into the food web as spartina-dominated marshes. "As new data are generated, the general perception that regularly flooded phragmites marshes are less functional than the spartina marshes they replace does not appear to be upheld." <FN 119>

As a result, the Salem mitigation project, rather than being an example of why mitigation should be allowed, is actually a prime example of why it should not.

Footnotes

115 See Delaware Riverkeeper Network's comments on this rule.

116 Id.

117 Id.

118 Id.

119 Id., citing Judith S. Weis, Habitat and Food Value of Phragmites australis and Spartina alterniflora flor Fiddler Crabs, Grass Shrimp, and Larval Mummichogs, printed in New Jersey Flows, Water Resoruces Institute, Vol. 1, No. 1, Fall 2000. That article explained: "Efforts to restore salt marsh areas by replacing the undesired Phragmites with the desired Spartina are often justified by the assumption that the productivity of animal populations will be enhanced. However, evidence from the studies reported here as well as those of others (e.g. Fell et al., 1998; Wainright et al., 2000) does not support the general assumption that Phragmites leaf detritus is of poorer nutritional quality for estuarine consumers than that of Spartina." Phragmites is native to North America and has been found to be a component of Eastern U.S. marshes for 2000 to 4000 years at least. Multiple studies document that "Phragmites production is equivalent to the role of S. alterniflora production in the diet of key estuarine species" and that it is consumed by fish in the marsh. Phragmites has also been found beneficial in other ways with benefits beyond those provided by Spartina. For example they release less contaminants back into the environment than Spartina. "In comparison to a Spartina community, Phragmites enhances both mineral and organic decomposition, basically doubling the accretion potential of the marsh." "Phragmites function may actually exceed that of other wetland plants in ameliorating certain estuarine dilemmas like eutrophication and marsh loss." Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. 1, Winter 2000.

EPA Response

See EPA's response to comment 316bEFR.056.019.

Comment ID 316bEFR.206.054

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 11.0

Role of Restoration

In the Pisces Phase II Report, the scientists at Pisces discuss habitat restoration projects at length. Pisces begins by noting that while creation of a salt-marsh may replace the destruction of a salt marsh, like-for-like restorations for impingement and entrainment are impossible on the community level. <FN 120> Further, with any restoration project, there is a considerable time-lag, between the original damage and the establishment of the new resource at its full potential. NOAA's Habitat Equivalency Analysis (HEA) states: "The principal concept underlying the method is that the public can be compensated for past losses of habitat resources through habitat replacement projects providing additional resources of the same type". (NOAA, 1995). Thus the origin of the restoration concept is to be as compensation for finite, existing, discrete and quantifiable losses, rather than justification for continuing and future loss. <FN 121>

Pisces also reviewed the data from the Salem restoration project, among others, and found as follows:

In summary, the project sought to replace lost productivity, rather than address losses at source of particular species, such as the bay anchovy. It is unclear whether the enhanced productivity in the restored saltmarsh will in fact move through the food web to increase the number of bay anchovy, and other pelagic spawning species. What is more, the increased productivity could favour other species less sensitive to impingement and entrainment than the anchovy, resulting in a change in the species balance and increased predation on the target species… [T]there is strong evidence that it does not, and was not intended to, fulfill its stated aim of equivalency with the losses at the Salem plant. <FN 122>

In addition, Pisces noted numerous other negative attributes of the Salem restoration project, including:

-Any 'new fish' that are produced by the converted saltwater wetlands will also increase the number of fish that will become impinged, entrained and killed by the power plant;

-PSE&G ignores the lost productivity of the destroyed freshwater marsh, which while as productive as a salt marsh, nevertheless provides important habitat for many species.

-The Salem Estuary Enhancement Program has had a negative impact on species, such as the horseshoe crab, which have dramatically declined since 1993. <FN 123>

In its report, Pisces also reviewed a recent power plant repermitting proceeding in Morro Bay on the California coast in which California Energy Commission rejected habitat enhancement measures in large part because it was unclear as to whether these enhancements would directly aid the species most affected by impingement and entrainment. <FN 124>

Pisces concluded that there are very serious limitations of habitat enhancement as a means of mitigation for entrainment and impingement, particularly:

-Habitat equivalency analysis is primarily aimed at offsetting past losses or damage, rather than continuing loss;

-Considerable uncertainty exists as to whether equivalence can be focused on actual species harmed;

-Potential lack of availability of sufficient habitat to adequately offset losses or damage. <FN 125>

The general availability of restoration measures renders the proposal's performance criteria ineffective because their effectiveness is typically doubtful and impossible to accurately estimate. Restoration simply cannot replace the aquatic organisms killed by power plants. By including restoration measures as a compliance option in lieu of technologies and operational measures, EPA would give a seal of approval (an EPA imprimatur), thereby misleading the state permit-writers, applicants, and the public into believing that these measures can be effective, when they are not.

Footnotes

120 Id.

121 Id.

122 Id.

123 Id.

124 Id.

125 Id.

EPA Response

For information on the uncertainties associated with restoration and on EPA's goals for restoration in the context of the final rule, see EPA's response to comment 316bEFR.206.055.

A Director may approve of a restoration measure if it meets the requirements in the final rule, including those in sections 125.94 and 125.95. Timing of a restoration measure's performance, availability of suitable habitat, and net ecological benefit for the purposes of restoration are factors, among others, that the permittee and the permitting authority should consider when considering a particular restoration measure (see 67 FR 17148).

Comment ID 316bEFR.206.055

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.06
Restoration measures in place of technologies

Restoration Measures Cannot Play A Role In BTA.

The uncertainty and high failure rate of restoration measures – in addition to their inability to replace fish killed by impingement and entrainment – not only makes their inclusion in this rule poor policy, it is also a violation of the Clean Water Act. BAT requirements can not be predicated on an experimental technology. [cite]. Rather, there must be at least one facility where the technology has been successfully employed. The same is true for BTA, which is substantially similar to BAT. In the case of restoration measures, EPA has no evidence of restoration measures having successfully replaced the fish killed by a power plant – certainly, there is no such evidence from Salem. As a result, restoration may not be a component of BTA

Furthermore, restoration measures cannot legally be a component of BTA because such measures, such as fish hatcheries, fish restocking programs, removal of impediments to fish migration, and the enhancement or creation of wetlands are wholly unrelated to cooling water intake structures cannot be used to fulfill the requirements of section 316(b). Section 316(b) mandates that the location, design, construction and capacity of cooling water intake structures must reflect the best technology available. Restoration measures are not related to location, design, construction or capacity of cooling water intake structures, and therefore cannot be a component of BTA. Rather these measures, when proposed in the section 316(b) context, seek to allow facilities to continue to indiscriminately kill life rather than make attempts to curb, or stop, the damage they are inflicting. As a result, they violate the mandates of section 316(b) of the Clean Water Act.

While restoration cannot play a role in meeting the requirements of section 316(b) – it may be required in addition to 316(b) technology requirements in order to remediate for the past damage inflicted by facilities' CWIS'. For many years existing facilities with CWIS' have been indiscriminately killing fish. Requiring remediation to make up for these historical impacts is justified but it does not fulfill 316(b)'s technology requirements.

EPA Response

EPA agrees with the commenter that restoration measures can entail a number of uncertainties (see discussions at 67 FR 17146-17148 and 68 FR 13541-13543). EPA also acknowledges that, historically, performance of restoration projects in general has been mixed (see, e.g., Upstream: Salmon and Society in the Pacific Northwest, National Research Council, DCN 5-4068-R1 and Compensating for Wetland Losses under the Clean Water Act, National Research Council, DCN 4-4020). The requirements for restoration projects in the final rule are intended to lessen the uncertainties of restoration projects and enhance their performance.

EPA also agrees with the commenter that restoration measures do not prevent impingement and entrainment of individual fish. However, the goal of restoration measures under today's rule is not to reduce impingement and entrainment, but rather to produce and increase fish and shellfish in the impacted waterbody or watershed and in this way minimize the adverse environmental impact caused by the cooling water intake structure.

In addition, in the final rule, restoration projects need not address the same species impacted by the cooling water intake structure, i.e. be “in-kind” restoration. Permittees may pursue “out-of-kind” restoration measures, with the approval of the permitting authority, which address organisms of species other than those impacted by the cooling water intake structure. The Director may approve out-of-kind restoration so long as the permittee can demonstrate that the ecological benefits are substantially similar to or greater than the benefits from in-kind restoration. Multi-agency watershed restoration plans, site-specific peer-reviewed studies, and/or consultation and concurrence of appropriate federal, state, and tribal natural resource agencies must be part of the basis for this demonstration.

For a discussion of EPA’s authority to include restoration measures as a compliance option in today’s rule, see the preamble to the final rule. For discussions of restoration measures as an aspect of cooling water intake structure design, see the preamble to the final rule.

The commenter’s suggestion that restoration measures be used to remediate past damage is outside the scope of today’s rule, which concerns minimizing the impacts associated with the present and future operation of cooling water intake structures.

Comment ID 316bEFR.206.056

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The Track III Variances (Both Economic and Ecological) Are Unauthorized and Illegal.

The Phase II Proposal contains includes two separate variance from the performance standards. In the Track III compliance option, applicants may seek a site-specific determination of BTA requirements for a particular site. <FN 126> There are two ways to obtain a site-specific determination:

-by demonstrating that the facility's "costs of compliance with the applicable performance standards … would be significantly greater than the costs considered by the Administrator when establishing such performance standards" (the "economic variance"); or

-by demonstrating that the facility's "costs would be significantly greater than the benefits of complying with such performance standards" at the site (the "ecological variance"). <FN 127>

These two variances are unauthorized and their availability in a categorical BTA rule is illegal for several important reasons: (1) these variances unreasonably deviate from the cost test EPA has applied for 30 years of 316(b) permitting determinations; (2) the variances are unauthorized under the Clean Water Act which makes no provision for variances from BTA standards and only limited provision for variance from BAT standards; (3) the ecological variance requires the same kind of biased and inaccurate cost-benefit analysis that EPA used in determining the standard, but on a local level. If, despite its superior resources and a lengthy rule-making schedule, EPA could not come close to providing a full and accurate monetization of benefits (see Part III__, above), then state permit-writers will do an even more incomplete job with more limited resources and under the time pressure of a permitting proceeding; and (4) allowing permit standards for power plants to be determined on a site-by-site basis would allow industry to overwhelm state agencies and public intervenors with data that they will be hard-pressed to analyze, no less counter.

Footnotes

126 40 CFR § 125.94(a)(3) [proposed].

127 40 CFR § 125.94(2)(1) [proposed].

EPA Response

EPA disagrees. Today's rule in general, and the site-specific option in particular, will not impose a significant burden on states, tribes, local governments, environmental advocates, or the public. There is sufficient flexibility in the final rule that EPA expects facilities will use the site-specific compliance options infrequently.

Comment ID 316bEFR.206.057

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.07.01
RFC: Appropriateness of "wholly disproportionate"

First, the variances unreasonably deviate from EPA's long-standing cost test. Even though section 316(b) contains no mention of compliance costs, EPA has always contended "that there should be some reasonable relationship between the cost of cooling water intake structure control and the environmental benefits associated with its use." <FN 128> Based on a statement by one Congressman in the 1972 legislative history, EPA has long interpreted BTA to mean "best technology available commercially at an economically practicable cost." In so doing, EPA claims to be implementing "congressional concern that the application of best technology available should not impose an impractical and unbearable burden." <FN 129> EPA has traditionally measured economic practicability by applying the "wholly disproportionate test" to compare the benefits of cooling water intake technology against marginal cost to the ratepayer, i.e., the incremental electricity cost. Under EPA's traditional wholly disproportionate cost test, a cooling water intake structure technology would not be deemed to reflect BTA if the incremental costs of requiring the use of that technology are wholly disproportionate to the environmental benefits to be gained through its use.

But in the Phase II Proposal, EPA departs from the wholly disproportionate test, and includes two far more lenient variances. Whereas the wholly disproportionate test would require a deviation from best technology available only where the compliance costs would be unconscionable or "shock the conscience," the new significantly greater than test is far more lenient. EPA has not demonstrated the requisite need rationale for this deviation. Certainly, no showing has been made that these variance are necessary to avoid an "impractical and unbearable burden" on industry. Rather, they improperly seek to minimize industry's compliance costs in contravention of the mandate to minimize environmental impacts.

Footnotes

128 65 Fed. Reg. 49094

129 Id.

EPA Response

See response to 316bEFR.006.003. For a discussion of the site-specific compliance alternatives, see the preamble to the final rule and other documents in this record.

Comment ID 316bEFR.206.058

Subject Matter Code 2.04.04

Use cost-benefit tests

Author Name Reed Super

Organization Riverkeeper

Second, there is no statutory authority for variance from section 316(b) standards. Unlike BAT standards which have statutory variances in section 301(c) (economic variance to delay timetable) and section 301(n) (fundamentally different factors variance), Congress did not provide for a variance from BTA. Congress also did not provide for variance from section 306 new source performance standards. In that context, The United States Supreme Court in E.I. DuPont v. Train found unequivocally that the Clean Water Act does not allow a variance procedure for new sources:

It is clear that Congress intended these regulations to be absolute prohibitions. The use of the word "standards" implies as much. So does the description of the preferred standard as one "permitting no discharge of pollutants." It is "unlawful for any owner or operator of any new source to operate such source in violation of any standard applicable to such source." § 306(e). In striking contrast to § 301(c), there is no statutory provision for variances, and a variance provision would be inappropriate in a standard that was intended to insure national uniformity and "maximum feasible control" of new sources. <FN 130>

As with new source performance standards, no variance from BTA standards may be allowed, because EPA lacks the statutory authorization to do so.

Footnotes

130 E.I. DuPont v. Train, 430 U.S. 112, 138 (1977).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.059

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.07
RFC: Cost: benefit ratio for site-specific BTA?

Third, the ecological variance will require a cost-benefit analysis on the local level, which will undoubtedly be as incomplete, misleading and useless as the national cost-benefit analysis prepared for this rule, except that, as explained below, industry will likely be able to use it to its advantage.

EPA Response

Today's regulation specifies requirements for performing a benefits valuation study, which a facility seeking a site-specific determination of BTA based on cost-benefit considerations would need to provide to the Director. EPA believes that these requirements will help ensure that the site-specific benefit analyses are useful to the State Director.

Comment ID 316bEFR.206.060

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.07
RFC: Cost: benefit ratio for site-specific BTA?

Finally, site-specific BTA determinations will leave state agencies and interested citizens and groups at a significant disadvantage. In practice, it is at minimum a tremendous burden, and often impossible to review, comprehend, analyze and, where appropriate, refute, the enormous volume if information that applicants submit in support of their site-specific permitting demonstrations. In the absence of federal regulations, section 316(b) determinations have typically involved individualized ecological assessment and determination of best technology available for each proposed or renewed cooling water intake structure. This lack of categorical standards has resulted in uneven and conflicting regulation as well as enormous, unnecessary aquatic mortality, which runs contrary to the goals of the Clean Water Act and the direct mandate of section 316(b). The individualized assessments have typically relied on narrow and inaccurately applied population models, and have ignored other impacts on ecosystem health.

For 30 years, industry has used the threat of litigation and a variety of dubious interpretations of section 316(b) to avoid the imposition of BTA. A favorite strategy of industry is to threaten state permitting agencies with litigation in order to obtain a compromise settlement for limited mitigation or data gathering and study, rather than installing best technology. Even with extensive data collection, there has been continued disagreement among industry, permitting agencies, and environmental groups over ecological impacts.

The multiplicity of these individual determinations and the combination of ecological and mathematical/statistical expertise necessary to determine the complex population dynamics for individual species has granted industry a critical strategic advantage because of superior resources in these proceedings. This advantage is a key component in industry's strategy to avoid national technology based regulations. Industry's most common analytical tools in these individualized technical determinations are density-dependent models of fisheries populations. Cooling water users have for decades used arguments based on density-dependence to justify the destruction of large numbers of fish and crustaceans via impingement and entrainment at their CWISs. In many critical cases, mathematical models of density dependent compensation these models have been misapplied. As just one example, industry has misapplied commonly-used Ricker curves, originally developed for salmonid fisheries with intense competition for spawning space, is misapplied to the entrainment of other species which lack such intense competition. <FN 131> More fundamentally, typical compensation analysis relies on an ecologically baseless concept of "surplus production" which dismisses the ecological value of the tens of millions of fish which are a critical base of the food chain whether or not they grow to adulthood – even though their predators may be populated at far below their historic values.

Indeed, several state agencies commenting on the Phase I proposal , including New York, New Jersey and Michigan, cited the enormous burden they faced in trying to assess species and ecosystem effects caused by a particular power plant. The very purpose of categorical standards is to raise the technology determination to the federal level, and to produce national uniform technology standards that states will automatically apply, unless local water standards dictate inclusion of even stricter requirements. That is how Congress designed the Clean Water Act, and how it has functioned for 30 years. With the Phase II Proposal, EPA is attempting to rewrite the very core of the Nation's most fundamental water quality protection program. That misguided attempt will not survive judicial scrutiny.

Footnotes

131 See e.g. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permit Renewal for Bowline Point 1 & 2, Indian Point 2 & 3 and Roseton 1 & 2 Steam Generating Stations, December 1999, Appendix VI-4-B, relying on Ricker models to estimate the impact of entrainment on Atlantic tomcod young.

EPA Response

Please refer to the response to comment 316bEFR.404.051.

Comment ID 316bEFR.206.061

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Author Name Reed Super

Organization Riverkeeper

THE BENEFITS OF CLOSED-CYCLE COOLING FOR ALL IN-SCOPE FACILITIES MORE THAN JUSTIFY THE RETROFIT COSTS

As explained above in Part III, the Clean Water Act and Executive Order 12866 prohibit EPA from using cost-benefit analysis as the decision-making criterion for determining BTA standards. Nevertheless, a complete estimation of benefits would demonstrate that the monetary benefits of an all-cooling tower rule vastly exceed the costs. In his comments, Dr. Ackerman provides a more accurate, yet still conservative, estimate for just two of the dozens of areas that EPA admits it has undervalued benefits: non-use benefits and the value of fish not immediately landed by fisherman. The result of those two minor adjustments demonstrates that all of EPA's proposed options are cost-effective (i.e., benefits exceed costs), including the all cooling tower option (benefits exceed costs by $4.082 billion); the waterbody-flow-based cooling tower option (benefits exceed costs by at least $4.2 billion); and even the dry cooling option (benefits exceed costs by $7.728 billion). Notably, EPA's proposed option, which provides only 60 percent entrainment reduction, has the lowest net benefits ($3.764 billion). (See Part IV.A, below.)

Furthermore, there are a dozens of other aspects of the benefits analysis that EPA has undervalued or failed to value altogether. EPA has acknowledged many of these omissions in the preamble to the Phase II Proposal and in the EBA. In addition, as explained below and in the Pisces Phase II Report, there are myriad other significant shortcomings the benefits analysis, each resulting in an underestimation of benefits. The Pisces report demonstrates in worked examples how EPA could and should correct these omissions. Correcting for each of these undervalued aspects of the benefits analysis raises the benefits of each option, resulting in a further increase in the net benefits of the all cooling tower option. (See Part IV.B., below.)

In addition, because the costs of the cooling tower options are overstated, the net benefits of these options are actually larger, and the differential between them and the proposed option (which has no cooling towers) is even greater than adjustments to the benefits alone indicate. EPA should also make these appropriate downward adjustments to the compliance cost estimate for cooling towers. (See Part IV.C., below.)

Finally, the Habitat Replacement Cost (HRC) method of estimated benefits, which has drawn criticism from industry as overstating benefits, does in fact just the opposite. In light of the impossibility of quantifying and monetizing all the myriad, complex benefits of aquatic ecosystem protection, HRC provides a reasonable lower bound estimate of those benefits by measuring the cost to replace some, but not all of what is destroyed by power plants' cooling water intake structures. (See Part IV.D., below.)

EPA Response

See response to comment 316b.EFR.404.052.

Comment ID 316bEFR.206.062

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.02
Benefit Estimation Methodology

CORRECTING JUST TWO EVIDENT AREAS OF INCOMPLETENESS RAISES NET BENEFITS DRASTICALLY.

In his comments, Dr. Ackerman prepared an adjusted set of figures incorporating estimates of corrections to just two of EPA's many omissions and underestimates. <FN 132> Dr. Ackerman's first adjustment is for the underestimate of non-use benefits. As discussed above in Part III, EPA's estimation that non-use benefits would be only 0.5 times recreational benefits is based on extremely limited and outdated economic literature. <FN 133> Dr. Ackerman explains that a recent literature review finds that non-use benefits are on average 1.9 – 2.5 times all use values, rather than 0.5 times recreational benefits alone, as EPA assumed. Further, 1.9 – 2.5 times use value is still a conservative estimate for existence values of many natural ecosystems. <FN 134> To correct for EPA's underestimate in this area, Dr. Ackerman recalculated EPA's estimates assuming that non-use values are 2 times estimated recreational, commercial, and forage values. <FN 135>

Dr. Ackerman's second adjustment is for the unvalued fraction of the mortality of recreationally and commercially valuable species. EPA's methodology values only the fraction of those species that would have been caught in the absence of I&E mortality. That is, only the fraction of the fish that would have been caught are assigned any value; the rest are ignored, even though those same fish have the potential to be caught in subsequent years and to produce offspring which will yield increased catches in future years. The catch rate, or "landed fraction," is below 20% in every case, and below 10% in some cases. Thus, the great majority of impingement and entrainment mortality of the most valuable species is never valued.

The nonlanded fraction of these species – the ones that survive uncaught – have an obvious ecological, commercial, recreational and forage value. For one thing, most fish that are protected by CWIS technology, and that are not caught by fishermen, will still be available the next year to be caught fishermen in that year. These unlanded fish will not all disappear from the ecosystem, as EPA's models assume. Rather, many of them will be caught in future years, thus further increasing the commercial and recreational catch. <FN 136> Furthermore, these unlanded fish will reproduce, and their offspring is the source of the increased catch in future years. Since the fisheries in question are depressed (they are currently both fished and subjected to once-through cooling), the fish that are protected by CWIS technologies and not caught by fisherman will cause an increase in the population over time. Such increase will be larger than the first year increase attributable to the installation of a cooling tower, which after subtracting the nonlanded fish, is all that EPA has valued. <FN 137>

Unfortunately, EPA's available data do not presently allow for calculation of the present value of future reproduction of nonlanded fish; the calculation would be complex and would likely vary by species. Below in Part IV.B, we explain a worked example of such calculation prepared by Pisces. EPA should adopt such method for valuing the the unlanded species. But for present purposes, it is reasonable to assume that nonlanded fish have a value that is significantly greater than zero. Thus, Dr. Ackerman has conservatively assumed that nonlanded fish have a value equal to 0.25 times the value of landed fish of the same species. Dr. Ackerman's spreadsheet adjusts for the percentage reduction in losses achieved by each EBA policy option, calculating national baseline losses, and benefits of each policy option, replicating EPA's values when using EPA's assumptions.

Dr. Ackerman recalculated the spreadsheet three times: in Scenario A, keeping all EPA assumptions and input data, except assuming that non-use value is 2 times recreational, commercial and forage value; in Scenario B, restoring EPA's non-use assumption but assuming that nonlanded recreational and commercial fish are valued according to the above equation; and in Scenario C, combining my two assumptions. Dr. Ackerman's results, as shown in his Table 1, are as follows:

-Estimated benefits of each policy option are more than doubled in Scenario A, relative to the estimates in the EBA;

-Estimated benefits of each policy option are roughly doubled in Scenario B; and

-In Scenario C, combining the two adjustments, benefits of policy options are roughly 4-6 times the estimates in the EBA.

When compared to the costs of the policy options, as reported in the EBA, each of the three scenarios has significantly greater net social benefits. And, importantly, the order of policy options, ranked according to net social benefits, changes. EPA's EBA Option 5 – the dry cooling option – has the greatest net benefit in all three scenarios, as shown in Dr. Ackerman's Table 2. In Scenario C, combining the two adjustments, EPA's proposed option, i.e. EBA Option 3, is the one that fares worst. Options 1, 2, 3a, and 4 all have net benefits of $4.1 – $4.5 billion in Scenario C.

Because Dr. Ackerman's rough estimates of these two changes have such a large effect on the outcome of the analysis, EPA should explore both issues in greater detail. Specifically, as Dr. Ackerman recommends:

1. EPA should develop approaches to non-use value more consistent with the recent economic literature, to replace the outmoded "50% rule" used in the EBA; and

2. EPA should develop plausible values for the nonlanded fraction of I&E fish mortality. The one thing we know for certain is that the current estimate of zero is not the correct value. <FN 138>

The effect of such adjustments is far from trivial. They would show that all options in fact have large net benefits, and that EPA's incomplete valuation of benefits misleadingly favors the option that actually has the lowest net benefits. It is therefore critical that EPA carefully explore these corrections.

Footnotes

132 Ackerman Phase II Comments, Section 2.

133 Indeed, EPA has admitted that it understated non-use benefits. In the preamble to the Phase II Proposal it acknowledged:
-Nonuse benefits are most likely understated using the 50 percent rule because the recreational values used are likely to be understated.
-The 50 percent rule itself is conservative (e.g., only reflects any nonuse component of total value to recreational users. It does not reflect any nonuse benefits to recreational nonusers).
67 Fed. Reg. 17193.

134 Ackerman Phase II Comment at p. 6.

135 Id.

136 Of course, not all unlanded fish will return. To fully calculate this, one would have to factor in the average lifespan of the fish and average survival rates during the lifespan.

137 For a discussion of a method of calculating the worth of commercial species that are protected from impinged and entrained by cooling towers but not caught by fisherman in the first year, see Pisces Phase II Report, pp. 34-38, which is discussed below.

138 Ackerman Phase II Report at p. 8.

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. For EPA's response to comments that the Agency's benefit estimates are incomplete, please see response to comment #316bEFR.206.047.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. This assessment addresses the non-landed portion of recreational and commercial fish. For a detailed response to the issue of valuing the non-landed fraction of fish please see EPA's response to comment #316bEFR.336.009.

The Agency, however, did explore several alternative non-use valuation methods to appreciate the potential magnitude of non-use values, including meta-analysis and the benefit transfer method. For detail see Chapters A12, Non-Use Meta-Analysis Methodology, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN #6-0003). EPA considered all the material together in making its final Section 316(b) policy determination.

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.206.063

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

MANY OTHER ADJUSTMENTS ARE REQUIRED AND WOULD FURTHER INCREASE THE TOTAL BENEFITS AND NET BENEFITS FOR ALL REGULATORY OPTIONS.

As explained in Part III, EPA's benefits analysis is drastically incomplete and undervalues the benefits of minimizing impingement and entrainment. While data limitations and other constraints make it difficult or impossible for us recalculate EPA's the entire benefits analysis (other than in the two areas addressed in Part IV.A, above), Pisces Conservation has begun that process. In their report, the scientists at Pisces have identified a number of areas – some in addition to those acknowledged by EPA – where the benefits analysis undervalues the resource. Further, they have illustrated how those errors could be corrected.

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. As stated in the NODA, EPA attempted to expand its analysis of non-use benefits categories for the final Section 316(b) Phase II rule analysis. However, given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.206.064

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.05
Impacts to T&E species

Endangered Species Are Harmed and Killed By CWIS To A Far Greater Degree Than EPA Estimated.

In its benefits analysis, EPA has assumed that only two U.S. power plants (Pittsburg and Contra Costa in San Francisco Bay) out of a total of 550 in-scope facilities impinge or entrain endangered, threatened or otherwise special status species. That is, of course, patently wrong. Since power plants cooling water intake structures generally suck in a cross-section of all species present in the waterbody, any plant located near the habitat or range of a rare or special status species is likely to be impinging and/or entraining individuals of that species. As Pisces explains, "It should be assumed that all power plants situated on estuarine and coastal sites will impact to some degree threatened or endangered (T&E) species." <FN 139> Reliable data on the extent to which species are harmed and killed is not likely to be provided by the power industry for two primary reasons: first, because T&E species are, by definition, rare, they will appear in samples in much lower frequency than common species; and, second, there is a strong disincentive for plant operators to report the taking of T&E species, which may be prohibited by Federal and/or state law.

Nevertheless, it is clear that power plants do kill endangered species. As the Delaware Riverkeeper Network explains in its comments, endangered and threatened sea turtles and shortnose sturgeon are killed at Salem. Precise figures on these kills have not been provided, but they have been acknowledged and documented on the public record. A December 1998 report prepared by the National Marine Fisheries Service (NMFS) stated that Salem impacts the federally endangered shortnose sturgeon. While not a comprehensive tabulation of impacts, the report stated that 8 shortnose sturgeon were discovered in trash bars at Salem, and estimated that up to 11 shortnose sturgeon are impinged at Salem each year. Although there were no findings regarding entrainment, if adults are getting caught on trash racks it is highly likely that juveniles, and younger, are also getting killed there. Endangered and/or threatened sea turtles have also been injured and killed at Salem. The New Jersey permit record has information about the impacts to the federally threatened turtle populations injured and killed at Salem, and at one time required a turtle resuscitation program at that site. <FN 140>

There is also additional data concerning T&E species harmed and killed at other power plants. For example, the San Francisco Bay Delta estuary includes the following special status species:

1. Central Valley ESU steelhead - Oncorhynchus mykiss
2. Central Valley fall/late fall-run ESU Chinook salmon – Oncorhynchus tshwytscha
3. Central Valley spring-run ESU Chinook salmon – Oncorhynchus tshwytscha
4. Delta smelt – Hypomesus transpacificus
5. Green sturgeon – Acipenser medirostris
6. Longfin smelt – Spirinchus thaleichthys
7. Sacramento River winter-run ESU Chinook salmon – Oncorhynchus tshwytscha
8. Sacramento splittail – Pogonichthys macrolepidotus <FN 141>

These species are vulnerable to I&E at many Bay and Delta power plants in addition to the Pittsburg and Contra Costa plants.

In Morro Bay, California, an April 2002 staff report of the California Energy Commission noted that the estuary used for cooling water by Duke Energy's Morro Bay Generating Station is inhabited or potentially inhabited by the federally endangered tidewater goby (Eucycloglobius newberryi) and the steelhead trout (Oncorhyrnchus mykiss).

Lists of T&E species could be complied for almost all ocean and estuarine sites. For example, in the Hudson Estuary both shortnosed (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus) have been impinged on cooling water intakes. At many ocean and lower estuarine sites young turtles are potentially vulnerable to entrainment. At one power plant proposed for New York harbor, several turtle species were listed as potentially present, including:

1. Green sea turtle – Chelonia mydas
2. Loggerhead sea turtle – Caretta caretta
3. Leatherback - Dermochelys coriacea
4. Kemp's ridley turtle – Lepidochelys kempii
5. Hawksbill – Eretmochelys imbricata <FN 142>

Importantly, as Pisces notes in its report, as conservation measures for species such as sturgeons and turtles are successful, populations rise, resulting in extended ranges and the risk of higher impingement in future years. Thus, the fact that EPA is using old impingement and entrainment data reflecting the poorer water quality conditions of decades past has likely depressed the reported numbers of threatened and endangered species at power plants.

As a result, EPA's implicit assumption that T&E species are killed only at the Pittsburg and Contra Costa plants is wholly unsupportable, with the result that the benefits analysis is falsely skewed downwards. EPA should collect all available data concerning impingement and entrainment of endangered species, and collect all data of T&E ranges in the waters where in-scope facilities are located, and revise its benefits analysis to account for impacts to T&E species at the majority of the 550 in-scope facilities.

Footnotes

139 Pisces Phase II Report at p.62.

140 See August 5, 2002 comments of Delaware Riverkeeper Network.

141 Pisces Phase II Report at p 62.

142 With the exception of a few leatherbacks, most of the turtles in nearshore waters in the New York coastal region are small juveniles. The loggerhead is the most abundant, followed by the Kemp's Ridley. These two species, along with a few green turtles, move into harbours and estuarine waters, while the leatherback turtles remain along the coast and are rarely seen in embayments. Kemp's Ridley inhabits the shallower areas of Chesapeake Bay in search of blue crab, their preferred prey. Their preference for shallow waters and blue crabs makes the Kemp's Ridley the most likely sea turtle species to venture into the New York & New Jersey Harbor area. Similar lists would be produced for many east coast marine or lower estuarine power plants situated to the south of New York. Pisces Phase II Report at p. 63.

EPA Response

Please see the response to comment 316bEFR.077.008 and 316bEFR.077.053. The commenter is wrong to assert that EPA assumed that T&E species are lost to I&E only at the Pittsburg and Contra Costa facilities. Rather, EPA did a detailed analysis of T&E losses at these facilities to demonstrate the high value that is associated with such species. Unfortunately, EPA was unable to obtain impingement and entrainment data for T&E species at any of the other case study facilities, although it is known that sea turtles are lost at the Salem facility. In the case of Salem, the USFWS has not expressed concern about these losses and has issued an "incidental take" permit to the facility. Nonetheless, EPA is very concerned about impingement and entrainment of T&E species and spent considerable effort to compile information on the locations of listed marine, estuarine, and freshwater species and developed a methodology for evaluating such species. This information is presented in Chapter A13 of Part A of the Phase II Regional Study Document.

Comment ID 316bEFR.206.065

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.01.02
Methods to Evaluate I&E

EPA's Static Models Underestimate the Benefits of Minimizing Fish Kills.

EPA calculated the number of fish that would be protected from impingement and entrainment by the conversion to closed-cycle cooling. EPA then valued the commercial and recreational worth of those fish. For commercial fishing, it applied the traditional catch rate and valued only those fish that would be saved by a cooling tower, and then caught by a commercial fisherman. But all of the fish saved by the cooling tower have both ecological and monetary value. EPA's limited, static models do not however capture their value. As discussed above, Dr. Ackerman assigned those fish a value equal to 25 percent of the value of the landed fish. However, a more sophisticated method of valuing those fish is possible.

For step one of the analysis, assume that those fish are sterile and thus do not produce offspring. Although they escaped the fishermen in year one, the sterile, unlanded fish would still be in the waterbody in year two, year three, year four, and so on, up to the end of their lifespans, and would therefore be available to be caught by fisherman in those years. Thus, the available population would steadily increase during the lifespan of the species, at which point it would level off. EPA's static model assumes that the population increases only by the proportion of fish saved each year by the cooling tower, but it is clear that in a dynamic model, there are additional fish which will be landed, and therefore provide direct value simply because fish live much longer than one year.

For step two of the analysis, assume that the unlanded fish spawn, as they of course do. Because they are creating future generations of fish, the fish that are saved by a cooling tower and not landed by fishermen will during their lifespan, increase the population, thereby providing additional fish to be caught in subsequent years. Pisces has demonstrated with worked examples at Salem and Pilgrim a method for valuing these unlanded fish according to their reproductive value. At Salem alone, the commercial value of striped bass increased from about $56,000 per year to about $135,000 per year, which is a 141% increase. (See Pisces Phase II Report at p. 34-38.) Increases would be shown for all species at all plants, if EPA follows this method. EPA should recalculate its benefits analysis to take into account the value of fish that are not immediately landed and marketed.

EPA Response

Commenters have suggested that EPA's assessment of foregone fishery yield has neglected to account for the "reproductive value" of fish killed by I&E and has therefore underestimated net benefits. The concept of reproductive value refers to the notion that a fish killed prior to spawning represents not only a single death, but also the death of additional "potential" fish because, if the fish had not been killed, it would have spawned to produce additional fish.

This is similar to the financial concept of an interest-bearing account. That is, if a dollar is spent today, it is not simply a dollar spent, but also all of the interest that it might have accrued over time if it were saved in an interest-bearing account. According to this analogy, the spawning stock is like the principle in the bank account, and harvest is like the annual interest on the principle. However, unlike an interest-bearing account, a fish population cannot grow indefinitely because it is subject to a wide variety of biological constraints that prevent the population from growing without bound.

The commenter's example overstates the practical effect of reproductive value because it assumes that additional egg production will lead to proportional increases in the entire stock, that is, that stock size is density independent. Although EPA's analysis of foregone yield for the 316b Phase 2 rule did not include density dependent compensation or stock recruitment dynamics, EPA does not maintain that stock dynamics are, in fact, density independent.

The commenter's calculation of reproductive value also does not address the effects of the time lag between when fish are killed by I&E and when the potential additional harvest would be realized. Depending on species characteristics, the time lags involved could be many years because the expected time of realizing the reproductive value must be added to the expected time at which potential progeny would grow to harvestable age. The example cited by the commenter drastically overestimates the supposed bias because it implies that changes in the harvestable stock would be realized immediately.

For further discussion of fish population modeling in relation to the 316b rule, see EPA's response to Comment 316bEFR.005.009. Regarding compensation, please see response to Comment 316bEFR.025.015.

Comment ID 316bEFR.206.066

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

BECAUSE EPA HAS OVERSTATED COMPLIANCE COSTS FOR COOLING TOWERS, IT SHOULD MAKE APPROPRIATE DOWNWARD ADJUSTMENTS TO ITS ESTIMATES.

As also explained in Part III, EPA has significantly overstated the compliance costs of the closed-cycle cooling regulatory alternatives. In its comments on the proposed rule, Synapse Energy Economics describes a number of areas in which EPA must revise its cost estimates, including the following:

-EPA should annualize the capital costs of adding cooling towers over a longer period than 30 years to reflect the likely expected operating lives of those towers. <FN 143>

-Rather than using the baseline (i.e., once-through) system intake flow of affected plants to size the needed recirculating cooling towers and associated conduit systems, EPA should instead use Nuclear Regulatory Commission data indicating that "recirculating cooling systems have lower condenser flow to MW ratios than once-through systems, regardless of age or other characteristics" <FN 144> to properly size and cost the cooling system conversions. <FN 145>

-EPA should have used the cost of the more standard fiberglass reinforced plastic material for new cooling towers at existing fossil-fired facilities to calculate the capital costs of wet cooling towers, rather than redwood towers, as EPA has acknowledged that fiberglass has become "relatively standard" for new facility installations. <FN 146>

-EPA should revise its equations to more accurately reflect the actual costs of building a cooling tower in light of the fact that the equations used by EPA to quantify the capital cost of a new cooling tower produce cost estimates that "in almost all cases" exceeded the actual project costs, sometimes by as much as 25 percent of the actual costs. <FN 147> In the alternative, if the EPA decides to continue to use these equations without revision, it should not apply a 20 percent "retrofit factor" when quantifying the cost of adding a cooling tower at an existing facility because the combined use of both the existing equations and the 20 percent retrofit factor leads to unreasonably high estimates for the capital costs of adding a new cooling tower at an existing facility. <FN 148>

-EPA should adjust the costs associated with condenser upgrades (which EPA assumed affected facilities would elect to undertake as part of cooling system conversions from once-through to recirculating systems) in order to reflect reductions in O&M costs. Such O&M cost reductions can be expected from upgrading to the new materials which are less susceptible to failure and should lead to fewer tube leaks and, consequently, lower repair and repair outage-related costs. <FN 149>

-EPA should have used a range of lengths of concrete-lined steel piping for cooling water make-up water and blowdown that is more typical of existing facilities instead of using a range that might only apply to a limited number of plants. <FN 150>

-EPA should cost out all applicable compliance strategies – several of these compliance strategies are likely to be less costly than the strategies for which the EPA has developed costs – in order to develop an accurate assessment of each option's costs. <FN 151>

-EPA should reflect the repowering of coal-fired facilities to combined-cycle technology – at least 15 if which have recently occurred or are planned – because the costs of complying with any of these options would be lower for a repowered facility than for the original coal-fired plant.

-EPA should adjust its energy penalty calculations in accordance with the detailed explanations provided by Synapse. <FN 152>

Furthermore, EPA should also adjust its compliance costs to account for the fact that the costs of regulation are always overestimated in advance of their implementation. Once adopted, regulations encourage new technologies and more efficient ways of complying. Once study found that 92 percent of the time (11 out of 12 cases) costs estimated in advance of regulation were more than twice actual costs. <FN 153> Another study found that advance cost estimates were higher than actual costs 50 percent of the time, and below actual costs only 11% of the time. <FN 154> Most strikingly, before the 1990 Clean Air Act Amendments, industry anticipated that sulfur reduction measures would cost $1,500 per ton. In 2000, the actual cost was less then $150 per ton, a 90 percent decrease. <FN 155> In the present case, once cooling tower retrofits become more frequent, market factors and competition will drive the costs down. EPA's cost figures should reflect that fact.

And finally, EPA's compliance cost estimates should be adjusted to reflect the likelihood that older fossil-fired facilities will be repowered instead of retired as a result a closed-cycle retrofit mandate. Two facilities in New York State (Reliant Astoria Repowering Project and the Bethlehem Energy Center) have recently sought to significantly upgrade their plants by retrofitting closed-cycle cooling at the same time that they convert to combined-cycle natural gas technology. These plants, and others around the Country, are evidence that firms will seek to repower older, less efficient generating facilities and that such repowerings can include cooling towers as part of the repowered facility in place of once-through cooling. Such projects will provide significant environmental benefits in terms of reduced water usage and lowered air emissions and will offer substantial economic benefits for their owners. It is reasonable to assume that at least some plants will respond to a cooling tower regulation in such manner, and their costs would decrease as a result of the increased efficiency and reduced cooling water needs from combined-cycle technology.

By making these adjustments, EPA would come closer to estimating the true costs and true net benefits of the closed-cycle alternatives.

Footnotes

143 Synapse Phase II Report at p. 9.

144 Technical Development Document, at page 2.18.

145 Synapse Phase II Report at p. 9.

146 Synapse Phase II Report at p. 9.

147 Technical Development Document, at page 2.23.

148 Synapse Phase II Report at pp. 9-10.

149 Synapse Phase II Report at p. 10.

150 Synapse Phase II Report at p. 10.

151 Synapse Phase II Report at p. 10.

152 Synapse Phase II Report at p. 11-12.

153 Ackerman and Heinzerling, supra, at p. 28 citing Eban Goodstein, “Polluted Data,” American Prospect 8, November-December 1997 (http://www.prospect.org); Hart Hodges, “Falling Prices: Cost of Complying With Environmental Regulations Almost Always Less Than Advertised.” Economic Policy Institute, 1997 (http://epinet.org).

154 Id., citing Winston Harrigton, Richard D. Morgenstern, and Peter Nelson, “On the Accuracy of Regulatory Cost Estimates,” 19 Journal of Policy Analysis and Management 297-322 (Spring 2000).

155 Ackerman and Heinzerling, supra, at p. 28.

EPA Response

See response to comment 316b.EFR.404.058.

Comment ID 316bEFR.206.067

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

THE HABITAT REPLACEMENT COST METHOD OF VALUATION PROVIDES A REASONABLE LOWER BOUND ESTIMATE OF MONETARY BENEFITS.

In several of its case studies, EPA uses calculations of habitat-based replacement cost (HRC) to value the benefits of the regulatory alternatives. Use of the HRC method is based on the following rationale: Natural ecosystems produce numerous interrelated benefits, some of which are difficult or impossible to quantify, as EPA has admitted in the preamble and EBA. Thus, given the constraints of time, resources, data and human ability to quantify complex systems, a simpler approach is to calculate – to the extent possible – the replacement cost of the ecosystem that provides the benefits. <FN 156>

As Dr. Ackerman explains in his report, restoration cost is used as a measure of damages under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) for Superfund sites; under the National Marine Sanctuaries Act; and under the oil spill provisions of the Clean Water Act. Use of restoration costs was explicitly upheld in State of Ohio vs. US Dept of Interior, in which the U.S. Court of Appeals for the District of Columbia Circuit held in the CERCLA context:

Congress established a distinct preference for restoration cost as the measure of recovery in natural resources damage cases. <FN 157>

Insurance companies frequently value damages to property at estimated replacement cost. Valuation of assets at replacement cost is also a common practice in macroeconomics, where depreciation is routinely valued at replacement cost. For example, for a marketed asset, market value (as opposed to book value) is set at the current replacement cost. Such valuation is essential in understanding investments. Likewise, any detailed analysis of capital costs focuses on “economic depreciation”, or the replacement cost of consumed capital, as distinguished from accounting measures of depreciation based on book value or tax laws. <FN 158>

HRC valuations are often more expensive than other approaches to valuation. However, this is to be expected in light of the incompleteness of valuation when each particular service or benefit must be separately estimated. A separately evaluated list benefits might, if thorough and complete, show higher benefits than HRC because nature is generally more efficient in producing “ecosystem services” than artificial replacements can be, and because restoration cannot not completely restore what was destroyed. But since EPA’s itemization of benefits is utterly incomplete and significantly undervalues the benefits of cooling towers, HRC provides a closer approximation of true benefits.

Despite its limitations, HRC is valuable contribution to the process of valuation and provides a reasonable lower bound estimate of benefits. As a result, Dr. Ackerman recommends that EPA explore HRC valuation of additional sites, to broaden the data and analysis used in the estimates of benefits in this case. Specifically he recommends that EPA revise and expand the EBA Case Studies Chapter A11, explaining and supporting HRC calculations, discussing the theoretical basis for HRC, and identifying categories of ecosystem value that are not measured by any other techniques. <FN

159>

Footnotes

156 It is not possible to fully replace the aquatic organisms and ecosystem that are destroyed by impingement and entrainment at power plants. Attempts at “replacing” fish and other aspects of the environment may provide some benefit to some species, but cannot duplicate the natural systems which were destroyed, as the Pisces Phase II Report explains at pp. 48-60. As a result, HRC will not value 100% of the loss, but only some portion of it.

157 880 F.2d 432, 458 (1989).

158 Ackerman Phase II Report at p. 14, citing Frank C. Wykoff, “Economic Depreciation and the User Cost of Business-Leased Automobiles,” and other essays in Dale W. Jorgenson and Ralph Landau, editors, Technology and Capital Formation (MIT Press, 1989).

159 Ackerman Phase II Report at p. 13.

EPA Response

Please see the response to comments #316EFR.005.035 and #316EFR.029.113.

As noted in the response to comment #316EFR.005.035, the Agency no longer applies the HRC method as part of its benefits analysis for the 316b rule. The Agency agrees with many comments received that, in general, "costs" should not be confused for "values." However, EPA also notes that there are many instances in which cost-based information can provide useful insights to policy makers, and that under suitable circumstances, costs can be used as a proxy for (i.e., in lieu of) more desirable but less accessible "value" information. For example, cost-based data may be viewed as an indication of “value” where the costs are borne voluntarily by the individuals involved, or in cases where public policies reflect a broad consensus based on continuous input from the general public and the broad array of interested parties (especially where an adaptive management approach enables adjustments over time in what actions are taken and what costs are incurred).

Please also see the discussion of ecosystem services and values in Chapter A9 of the Regional Studies Document prepared for the final rule (DCN #6-0003).

Comment ID 316bEFR.206.068

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 7.01.03
Option 3--Site-specific determination

THE ALTERNATIVE SITE-SPECIFIC APPROACHES TO DEFINING BTA WOULD UNFAIRLY BURDEN THE PUBLIC AND WOULD CONTRAVENE THE CLEAN WATER ACT.

In the preamble to the Phase II Proposal, EPA requested comment on several site-specific regulatory alternative approaches for determining BTA. These alternative approaches operate on an even more case-by-case and site-specific basis than the Phase II Proposal, which has one site-specific compliance option, Track III. Four site-specific approaches are described in the preamble: an EPA-developed "sample site-specific rule," complete with proposed regulatory text; a site-specific alternative based on EPA's 1977 draft guidance; a regulatory approach suggested by the Utility Water Act Group (UWAG); and a regulatory approach suggested by the Public Service Electric and Gas (PSEG). <FN 160> Each of these approaches contravenes both the letter and the spirit of the Clean Water Act and should be given no further consideration by the Agency.

Footnotes

160 67 Fed. Reg. 17159-17162.

EPA Response

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.206.069

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA states that the site-specific approaches “would be based on the view that the location of each power plant and the associated intake structure design, construction, and capacity are unique, and that the optimal combination of measures to reflect [BTA] for minimizing [AEI] must be determined on a case-by-case basis.” <FN 161> But this is clearly wrong. Almost without exception, impacts from cooling water intake structures are reduced by between one and two orders of magnitude by conversion from once-through to closed-cycle cooling. While other additional measures may be appropriate based on location, adverse environmental impacts cannot be minimized without closed-cycle cooling, and thus cooling towers must be required unless they are wholly disproportionate to the benefits (e.g., the highly unusual circumstance where a plant is located in a waterbody that has no fish).

Footnotes

161 67 Fed. Reg. 17159

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.206.070

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Any site-specific approach would favor industry stakeholders and present an unreasonable burden on environmentalists and local officials. As EPA correctly recognized in its Phase I preamble:

The historical case-by-case approach requires significant resources on the part of the regulatory authorities that must implement section 316(b) requirement. [It] requires that each regulated facility must develop, submit, and refine studies that characterize or estimate potential adverse environmental impact. Such studies can take several years to complete and require the support of a multi-disciplinary team. In addition, given the iterative nature of the assessment process, industry as well as EPA regional and State regulatory authorities must expend significant resources assessing study plans and methods for characterizing the environmental impact occurring at each facility and evaluating those data to determine what constitutes BTA for each specific facility. <FN 162>

EPA actually understates the burden. Public commenters and intervenors have few resources to evaluate even the initial multi-disciplinary impact studies and volumes of technical supporting documents regarding CWIS characteristics and ecosystem impacts, let alone the months or years of hearings typically needed to adjudicate scientific disputes. Local officials and environmental advocates whose resources are dwarfed by those of industry should not be forced to counter industry's elaborate and self-serving technical obfuscation on generally applicable protection principles.

Footnotes

162 65 Fed. Reg. at 49079.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Comment ID 316bEFR.206.071

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 2.04.05
Implement a site-specific alternative

Any approach that does not set specific national, uniform performance standards for the critical determination of capacity minimization would also violate the Clean Water Act. By leaving the BTA determination to the NPDES permit writer (state agencies in delegated states and EPA regional offices in non-delegated states), EPA would have abdicated its non-discretionary duty under Section 316(b) to set national BTA standards for generally applicable impact minimization parameters. Local agencies could require different technologies based on a variety of considerations outside the Clean Water Act, or could be forced to do so by the resources of industry applicants. The result of this approach would inevitably be that different facilities and states would have different BTA requirements for CWISs, thus ensuring inconsistent protection and potentially even reviving the "race to the bottom." To avoid creating a disincentive to power generators in a deregulated energy environment, or to avert fears of increased energy costs, states might be even more reluctant to establish stringent measures than they were in the pre-1972 context.

EPA Response

In today's rule, EPA explicitly provides that under section 510 of the CWA nothing in the rule precludes or denies the right of a state or political subdivision of a state or an interstate agency to adopt or enforce any requirement with respect to control or abatement of pollution that is not less stringent than those required by Federal law.

Comment ID 316bEFR.206.072

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.02

Apply 316(b) before a det. of impact/AEI

Furthermore, the approaches suggested by industry would require the agency to define the phrase "adverse environmental impact" in section 316(b). The basic purpose of such a definition would be to require a determination of adverse environmental impact as a threshold before a permitting agency would even consider mandating BTA. Industry is trying to create an additional procedural hurdle to the regulation of cooling water intake structures, by requiring that a proposed CWIS attain a threshold of adverse impact before best technology can be required. That approach, however, is wholly unnecessary and inconsistent with the language of Section 316(b) and the structure of the Clean Water Act. <FN 163> The only threshold requirements for application of Section 316(b) standards are that facilities include a point source (which is a NPDES permit prerequisite), must be in an industry subject to Section 301 and 306 standards (which includes all significant users of cooling water), and must have a cooling water intake structure.

At the very least, determination of AEI as a threshold to regulation provides for months or years of delay, consuming the resources of agencies and intervenors alike, and in the case of existing facilities, unnecessarily continuing the slaughter of aquatic organisms. The New York State Department of Environmental Conservation ("DEC") has adopted the correct policy regarding adverse environmental impact as a regulatory threshold. DEC "considers the death of any fish at or through a cooling water intake to be an 'adverse impact.'" <FN 164> Like the NYS DEC, EPA should refuse to allocate public fish and wildlife resources to electric energy generators or other cooling water intakes. Congress drafted section 316(b) to minimize adverse impacts, and not merely to ensure the protection of a balanced, indigenous population as provided in section 316(a). In light of the Phase II Proposal's 50 MGD regulatory threshold (which assures that every in-scope facility will be one that causes adverse environmental impact) defining and determining the level of AEI should not create an unnecessary threshold to BTA regulation.

While it is not realistic to expect to save every fish, the killing of any aquatic life by cooling water intake structures is the adverse impact that EPA must minimize by requiring best available technology under section 316(b). Industries' proposed definition and threshold determination of AEI would complicate and delay this task.

Footnotes

163 For an in-depth discussion of why determination of AEI as a threshold to section 316(b) determination is both unnecessary and contravenes the Clean Water Act, see Minimizing adverse environmental impact: how murky the waters?, Super, R. W., and D. K. Gordon, pp 219-237 to be published in Defining and Assessing Adverse Environmental Impact, D. A. Dixon, J. Wisniewski, and J. A. Veil (Eds), 2002, (Swets & Zeitlinger and A. A. Balkema Publishers, The Netherlands).

164 New York State Department Of Environmental Conservation, Division Of Fish, Wildlife, and Marine Resources, "Clean Water Act Section 316(b), Statement provided to U.S. Environmental Protection Agency at June 29, 1998 public meeting to discuss adverse environmental impacts resulting from cooling water intake structures."

EPA Response

EPA disagrees. Today's rule in general, and the site-specific option in particular, will not impose a significant burden on states, tribes, local governments, environmental advocates, or the public. There is sufficient flexibility in the final rule that EPA expects facilities will use the site-specific compliance options infrequently.

Comment ID 316bEFR.206.073

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code NEW
Comment on new (Phase I) facility rule

THE SEGMENTS OF THE REGULATORY COMMUNITY DEFERRED TO LATER PHASES OF THIS RULEMAKING SHOULD BE REGULATED BASED ON IMPACTS, NOT TIMING.

Pursuant to the Amended Consent Decree in Riverkeeper v. Whitman, EPA's section 316(b) rulemaking has been divided into three phases. In Phase I, EPA is required regulate all new facilities using a cooling water intake structure; Phase II must address all existing power plants above a threshold level; and Phase III captures the power plants below the Phase II threshold, as well as existing non-power plant facilities. EPA has, however, made at least two deviations from that tri-furcated scheme, by deferring regulation of certain segments of the regulated community to later phases. In both cases, EPA claimed the deferral was necessary because it lacked adequate information on the relevant industrial group during the earlier regulatory phase.

Specifically, in the Phase I NODA EPA stated that it had not considered or projected impacts on offshore and coastal oil and gas drilling facilities in its Phase I proposal. <FN 165> As a result, EPA considered not including these facilities within the scope of the Phase I rule, and instead addressing them within the scope of the Phase II or Phase III rulemaking. <FN 166> In the final Phase I Rule, EPA determined that it would "propose and take final action on regulations for new offshore and coastal oil and gas facilities, as defined at 40 CFR 435.10 and 40 CFR 435.40, in the Phase III section 316(b) rule." <FN 167>

In addition, in the Phase I rule, EPA attempted to define "new facility" more narrowly than the definition under Section 306:

Modifications to an existing cooling water intake structure that do not serve the cooling water needs of a greenfield or stand alone facility in 40 CFR 122.2 and 122.29(b)(1), (2), and (4) (i.e., a facility that meets the definition of new source or new discharger and commences construction after the effective date of the rule) do not constitute a new facility subject to this rule. Thus, the definition of new facility under this rule is narrower than the definition of new source under section 306 of the CWA. <FN 168>

EPA's intent in defining "new facility" for purposes of the Phase I scope was to exclude any facility built at a site where there is currently an existing operation devoted to the same industrial purpose, regardless of whether its industrial process are substantially independent of the existing facility at the same site. <FN 169> For example, adding a new electric-generating unit (whether peaking or not) at an existing power plant site would not be a new facility under Phase I, but would be an existing facility under Phase II, under EPA staff's interpretation. <FN 170>

As with oil and gas extraction facilities, EPA chose to delay the regulation of these new source facilities from Phase I to Phase II because it lacked information during the earlier rulemaking phase:

EPA generally deferred regulation of new sources constructed on a site at which an existing source is located (see 40 CFR 122.29(b)(3)) until the agency completes analysis of its survey data on existing facilities. <FN 171>

Thus, with both deferrals, EPA has not claimed that the relevant segment of the regulated community should be subject to the same regulations as the facilities in the later phase, only that their regulations should be promulgated at the same time as the regulations for the facilities in the later phases. But EPA has ignored this important point in the Phase II proposal.

The Phase II Proposal makes no distinction in its thresholds or standards between existing facilities and those facilities that are new sources under CWA Section 306 and were purportedly not included as new facilities under the Phase I rule. But such facilities, because they are actually new facilities and are substantially independent from industrial processes at the existing facility on the same site, have the flexibility to install the technologies required in the Phase I rule. EPA has not established why these facilities should instead be regulated like existing facilities. Now that EPA has the survey data it was waiting for, it should do one of two things in promulgating the Phase II rule: either (1) amend the definition of new facility in 40 CFR § 125.83 to make clear that such definition will be consistent with the new source definition under CWA section 306 with respect to substantially independent processes; or, (2) if these new source facilities are to be considered existing facilities for section 316(b) purposes, EPA should provide separate standards for them consistent with the new facility standards.

Similarly, in Phase III, when promulgating regulations for existing industrial and small power plant facilities, EPA should not subject new oil and gas extraction facilities to those same (likely, more lenient) regulations by default. Rather, EPA should either include new oil and gas extraction facilities in the definition of new facilities (and thereby subject them to the Phase I standards) or should provide separate appropriate standards for that industry. With respect to the environmental impacts of offshore oil rigs, it is clear that such structures act like artificial reefs and are therefore extremely effective at attracting fish, which would then be exposed to impingement and entrainment. <FN 172> Indeed, industry has claimed that their oil rigs make excellent fishing spots. Thus, stringent cooling water intake regulations are necessary to protect fish at these facilities.

Footnotes

165 66 Fed Reg. at 28856.

166 66 Fed. Reg. at 28857.

167 66 Fed. Reg. at 65311.

168 66 Fed. Reg. at 65259 (emphasis added).

169 Telephone conversation with EPA staff, January 31, 2002.

170 Id. Whether the codified text of the Phase I regulations actually accomplishes what the preamble and staff claim to have intended is far from certain. Reading the regulations alone, the definition of new facility at 40 CFR § 125.83 appears to be consistent with, not narrower than, the definition of new source under CWA Section 306 and 40 CFR 122.29 because the references and citations in the Phase I rule to "stand alone" and "greenfield" facilities (40 CFR 122.29(b)(1)(i),(ii), and (iii)) and the "substantially independent" test for stand-alone facilities have been incorporated into 40 CFR § 125.83.

171 66 Fed. Reg. at 65286.

172 See PISCES Consulting, Ltd., Comments on new data and approaches for the regulation of cooling water intake structures, prepared by Dr. P.A. Henderson, June 22, 2001 at p. 1.

EPA Response

The comments regarding the Phase I rule are outside the scope of this rulemaking and require no response.

EPA also disagrees with the commenter's characterization of the Phase I new facility definition. The definition of a "new facility" in the Phase I rule (40 CFR 125.83) includes stand-alone facilities, which are further defined as a new separate facility constructed on property where an existing facility is located and whose processes are substantially independent of the existing facility at the same site. Thus, a new unit that is substantially independent could be a new facility if it meets other applicable criteria. The example in the comment (new electric generating unit, peaking or not, would be a new facility if it was substantially independent of the existing facility or met the other criteria in the definition. EPA believes that the definition of a "new facility" in the Phase I rule is consistent with EPA regulations at 122.29, since the latter uses total replacement and substantial independence as key criteria. Given such consistency, EPA is not inclined to amend the definition of a "new facility" as part of this rule.

Comment ID 316bEFR.206.074

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The integration of section 316(b)'s "best technology available" (BTA) requirement to minimize adverse environmental impacts with the effluent limitations under sections 301 and 306 indicates Congress's intent for national technology-based standards to control entrainment and impingement. EPA establishes industry-wide, nationally-uniform standards without regard to site-specific water parameters (such as receiving water quality) to govern the setting of individual NPDES permit limitations. Technology-based standards should bring all facilities up to state-of-the-art pollution control as quickly as possible (sometimes referred to as "technology forcing") and promote national consistency in NPDES permit limitations. <FN 27>

Congress chose the NPDES permitting program as the vehicle for minimizing adverse environmental impact by making the provisions of § 316(b) applicable to any facility containing a point source. <FN 28> Section 316(b)'s explicit cross-reference to sections 301 and 306 further clarifies that cooling water intake standards are an integral component of the NPDES technology-based regulations. Section 301 mandates the "best available technology" for existing sources while the section 306 new source performance standard must reflect the "best available demonstrated control technology." 33 U.S.C. §§ 1311(b)(2)(A), 1316(a)(1). Congress' use of substantially similar statutory language in Section 316(b) underscores its intent to incorporate that section's limitations into the categorical standards of sections 301 and 306:

[T]he regulations issued under § 316(b) are…closely related to the effluent limitations and new source performance standards of §§ 301 and 306… It bears emphasis that § 316(b)…requires § 301 and § 306 standards to deal with cooling water intake structures….[The] regulations [are] issued at least in part under the same statutory sections, some of which limit intake structures, others, effluent discharges. <FN 29>

Significantly, the Court in the VEPCO case contrasted the similarity between Section 316(b) standards and effluent limitations with the fundamentally different statutory scheme for water quality standards. <FN 30>

EPA may comply with its Section 316(b) mandate in one of two ways. One option is to implement Section 316(b) by including national performance standards for cooling water intake structures in each national, industry-specific Section 301 and 306 standard. The other option is to implement Section 316(b) with a free-standing, overarching regulation that would apply to all categories of point sources subject to Sections 301 and 306 that utilize cooling water intake structures. Either of these two options is permissible. <FN 31> EPA has chosen the latter.

But in either case, EPA's section 316(b) specifying BTA for minimizing adverse environmental impact must be national, technology-based regulations effluent limitations under sections 301 and 306. The statutory integration of these sections, along with the spare and direct "best technology available" mandate, clearly indicates Congressional intent that EPA set nationwide technology-based standards for cooling water intake structures in the same fashion as for discharges of chemical pollutants.

Footnotes

26 See 40 C.F.R Parts 402-699. In waters which violate ambient quality standards, a more restrictive set of limitations may apply. See 33 U.S.C.
§§ 1312, 1313, 40 C.F.R. Parts 130-131.

27 A primary objective of Congress in implementing nationally applicable standards was to avoid the "race to the bottom," which commonly occurred in the absence of uniform national effluent limitations prior to the adoption of the Act, where states would compete to attract and maintain industries by relaxing control requirements. See Hines, Controlling Industrial Water Pollution: Color the Problem Green, 9 B.C. Indus. and Comm. L. Rev. 553, 573 (1968); Grad, Treatise on Environmental Law, v.2, § 303[a-1].

28 33 U.S.C. § 1326(b).

29 Virginia Electric and Power Company v. Costle ("VEPCO"), 566 F.2d 446, 450 (4th Cir. 1977); see also Cronin v. Browner, 898 F.Supp. 1052, 1059 (S.D.N.Y. 1995).

30 VEPCO, 566 F.2d at 450.

31 Cronin v. Browner, 898 F.Supp. at 1060.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents. EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.206.075

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 4.01

Source data used by EPA

Furthermore, the Phase II Proposal violates Section 1(b)(7) of Executive Order 12866 which states that the Agency "shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information…" because much of the biological data and economic literature (e.g., on non-use benefits) is decades out-of-date.

EPA Response

EPA disagrees that the Phase II rule violates Section 1(b)(7) of Executive Order 12866. A large number of relevant biological studies were conducted in the 1970s and 1980s as part of early 316(b) permitting. Since that time, EPA has made efforts to include more recent data where available and to assess data quality, as demonstrated by EPA's 316(b) Technology Efficacy Database. In response to the commenter's emphasis on the use of older biological studies being used to calculate non-use benefits, EPA has searched diligently to identify any relevant data, and has selected what it considers to be the best in this instance. Finally, the commenter offers no more recent data or indication that data or literature is incorrect just because it is dated. EPA believes that it is upholding the intent of Executive Order 12866, by developing a rule that will have the greatest benefit to cost ratio.

Comment ID 316bEFR.206.076

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.01.02
Methods to Evaluate I&E

Baseline Impingement and Entrainment Is Significantly Higher than EPA Has Estimated.

The first significant correction EPA should make is to considerably increase the baseline impingement and entrainment data. This is critical because EPA has quantified the number of fish saved by various technologies by multiplying an effectiveness factor. The resulting number of saved fish is then multiplied by the value of those fish so as to measure the monetary benefit of the fish saving technology. Putting aside for the moment the obvious problems (discussed in Part III above) of monetizing fish deaths avoided, it is clear that an accurate, current assessment of power plant fish kills is necessary as a starting point. But EPA's data significantly understates these fish kills and should be corrected in at least the following respects:

-EPA's I&E data is decades old, much of it from the 1970s and 1980s, even though fish populations, and therefore the numbers of fish impinged and entrained at power plants, has increased over and since that period of time, due largely to improving water conditions such as increased sewage treatment. EPA should increase the baseline I&E data to account for such increases, and predict future increases by extrapolating such trends into the future. (See Pisces Phase II Report at pp. 22-27.)

-EPA has failed to account for increases in flow at Salem and other similarly situated plants, even though the data clearly indicates that Salem has increased its intake flow in recent years and EPA has acknowledged that the currently larger flows are anticipated to continue. As a result, EPA should not use the average flow data or the corresponding I&E data at Salem (or at any other plant where an increase in flow is likely to continue). Rather, it should use the current and projected flow data, and the corresponding I&E totals. (See Pisces Phase II Report at pp. 2-7.)

-EPA assumed all fish impinged are age 1. In fact, fish are impinged at all ages. Older, larger fish are more valuable for two reasons. First, when landed by fisherman, they weigh more and therefore yield more revenue. Second, when not landed, they produce offspring which can increase the size of the population. An age 6 striped bass is much more fecund than an age 1 striped bass, and is therefore worth more biologically. As Pisces examples demonstrates, by assuming all fish are age 1, EPA has undervalued impingement by between one and two orders of magnitude. EPA should adjust the impingement data to take into account the actual age of fish impinged. (See Pisces Phase II Report at pp. 5-19.)

-EPA's survival rates, which are key variables used to estimate the total mortality as age 1 equivalent numbers, are most likely too low, as they are based on historical data when populations were badly suppressed by environmental damage and over-exploitation. Changing the survivorship figures used in the age 1-equivalent calculations can have a large effect on the numbers of age 1-equivalents estimated to be entrained or impinged. More reliable estimates of age-1-equivalence would be obtained by increasing survival rates by 25%. (See Pisces Phase II Report at pp. 20-21.)

EPA Response

EPA recognizes that abundances of aquatic species, and therefore the numbers of organisms vulnerable to I&E, may have increased, decreased, or stayed the same at particular sites since the time of the available I&E studies or life history data. Unfortunately, it is uncertain how old data can be adjusted to for any given facility reflect current conditions, particularly given the many variables that influence the growth of biological populations.

As is common practice for EPA's regulatory analyses, EPA is not concerned with projecting potential future conditions.

Few facility impingement and entrainment monitoring studies provide information on the age distribution of impinged fish. In EPA's original case studies, EPA assumed that all impinged fish were age 1. Based on comments on this assumption and a review of available information on the ages of impinged fish, EPA’s final analysis for the 316b Phase II rule assumed that impinged fish range in age from juvenile to age 5 and the age distribution of impinged fish is species specific and follows a fixed distribution as indicated by the set of stage-specific survival rates for each species. In all cases, this method leads to an assumed age distribution that is dominated by juvenile stages, followed by age 1-age 5 fish, each in decreasing relative abundance. Please see Chapter A5 of Part A of the Phase II Regional Study Document for additional details.

The commenter provides no biological data that would allow EPA to increase estimated I&E rates by 25%.

Comment ID 316bEFR.206.077

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 6.01

Overview of I & E effects on organisms

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Entrainment and impingement of fish by power plants in the Great Lakes which use the once-through cooling process.” This document is referenced in comments by Pisces Conservation (4-1.77 or 316bEFR.077)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.078

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 7.03

Available I&E technologies

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Trial of a Johnson 715 ally wedge-wire screen at a UK coastal site.” This document is referenced in comments by Pisces Conservation (4-1.77 or 316bEFR.077)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.079

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 6.01

Overview of I & E effects on organisms

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Restoring an ecosystem torn asunder by a dam.” This document is referenced in comments by Pisces Conservation (4-1.77 or 316bEFR.077)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.080

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Author Name Reed Super

Organization Riverkeeper

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Reliability assessment 2001-2010: the reliability of bulk electric systems in North America.” This document is referenced in comments by Synapse (4-1.87 or 316bEFR.087)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.081

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 4.01.01
RFC: Effects of re-powering on intake flow

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Northern states to repower, convert Black Dog station." This document is referenced in comments by Synapse (4-1.87 or 316bEFR.087)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.082

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 4.01.01
RFC: Effects of re-powering on intake flow

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "PSI energy gets the nod to repower Noblesville with gas, boost capacity." This document is referenced in comments by Synapse (4-1.87 or 316bEFR.087)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.083

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02.05

Valuing CWIS effects on other species

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Economic benefits of rare and endangered species: summary and meta-analysis." This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.084

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “The discipline of cost-benefit analysis.” This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.085

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Economic depreciation and the user cost of business-leased automobiles." This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.086

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.02
Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Resource evaluation at a crossroads.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.087

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.02
Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Do contingent valuation estimates pass a "scope" test? A meta analysis.” This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.088

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Revised depreciation study for Gannon.”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.089

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.07
Documented facility examples of CWIS impacts

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Power generating facilities--Black Dog Plant."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.090

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Typical bills and average rates report.” This document is referenced in comments by Synapse (4-1.87 or 316bEFR.087)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.091

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Regulatory costs of mythic proportions.” This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.092

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.07
Documented facility examples of CWIS impacts

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): “Factors influencing impingement of fish by Lake Ontario power plants.” This document is referenced in comments by Pisces Conservation (4-1.77 or 316bEFR.077)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.093

Author Name Reed Super

Organization Riverkeeper

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "The humbugs of the anti-regulatory movement." This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.094

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 10.02
Benefit Estimation Methodology

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Pricing the priceless: cost-benefit analysis of environmental protection." This document is referenced in comments by Ackerman (4-1.14 or 316bEFR.014)

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.206.095

Author Name Reed Super
Organization Riverkeeper

Subject Matter Code 6.07
Documented facility examples of CWIS impacts

Riverkeeper submitted with its comments (OW-2002-0049, 4-2.06 in the docket or 316bEFR.206 in this database [see also 4-1.76 and 4-1.102]): "Comparison of fish impingement at the Palisades NPP for once-through and closed cycle cooling." This document is referenced in comments by Pisces Conservation (4-1.77 or 316bEFR.077)

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Alan E. Gaulke

On Behalf Of:

American Electric Power

Author ID Number:

316bEFR.207

Notes

EEI (316bEFR.072), EPRI (316bEFR.074), NEI (316bEFR.020), UWAG (316bEFR.041)

Comment ID 316bEFR.207.001

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code SUP

General statement of support

AEP was pleased to see a number of positive features in the draft rule that should be retained in the final rule:

-EPA concluded that cooling towers are too expensive and should not be retrofitted to existing facilities,

-EPA has proposed intake technologies some of which are familiar to AEP and which AEP believes can likely be engineered to most existing cooling water intakes, if required,

-EPA considered the cost of technology and benefits to the environment, and

-EPA uses the concept that not all water bodies require the same level of protection.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.207.002

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code OPP

General Statement of Opposition

AEP believes the rule can be further improved by doing the following:

-Basing the impact assessment on a population or community-level,

-Using population modeling and fishery resource management tools to evaluate impingement and entrainment effects,

-Allowing the permit writer to conduct a more site-specific analysis to determine best technology available, and

-Correcting the numerous errors in the case studies' biological and economic analyses.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.207.003

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Previously approved Section 316(b) determinations should be allowed to stand

The final rule should include a provision that allows the regulatory authority to accept Section 316(b) determinations made prior to the current rule making. Permitting authorities in a number of states have already invested heavily in their own Section 316(b) implementation process. Some of those states developed their own 316 guidance manuals based on the draft EPA guidance manual (U.S. EPA, 1977) and others implemented Section 316(b) based on the site-specific guidance provided by EPA. Forcing these states to redo this work would be a waste of effort. Likewise, there would be an unnecessary duplication of effort by the owners of these facilities for which the best technology available determinations for intake structures have been made.

EPA may need to provide guidance to regulatory authorities on how to assess the existing Section 316(b) determinations. That guidance should include instructions on determining if the prior determination was scientifically sound and is still applicable to the intake structure and waterbody. For example, instructions and guidance should include advice on how to evaluate changes to the intake structure since the intake was approved best technology available, which could invalidate the earlier conclusion. Also, significant changes in the aquatic or marine community may require collection of additional biological data. Some prior Section 316(b) determinations may be valid as they are, some may need to be updated with current biological and engineering information, and others may need to be redone, in which case the state should be allowed the option of asking that the original study be redone or ask that the permit holder reapply for intake technology determination under the new rule.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

In addition, EPA plans to provide guidance on implementing the Phase II rule.

Comment ID 316bEFR.207.004

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 7.02

Performance standards

EPA should allow permit writers to accept intake modifications as Best Technology Available without requiring compliance monitoring

The proposed rule requires that all intakes achieve a reduction in impingement mortality and that some intakes reduce entrainment rates by amounts EPA claims are typical of reductions reported in the literature for the intake technologies listed in the proposed rule. EPA appears to have examined the literature in sufficient detail to establish a credible range of impingement mortality reductions and entrainment rate reductions achievable at many intakes.

AEP suggests that EPA allow the permit writer to accept an intake technology mutually agreeable to the permit writer and to the owner or operator of the intake structure as the condition of the permit. It would be agreed the intake modification when properly installed, operated, and maintained would achieve an acceptable level of impingement mortality or entrainment rate reduction. Compliance monitoring would be unnecessary. This would significantly reduce permit compliance costs and would reduce the permitting agency's burden. There are two reasons for AEP making this suggestion, at some intakes the owners best efforts will not achieve the range of reductions in mortality or entrainment rates and demonstrating a reduction in mortality or entrainment rates will be very difficult in many cases.

EPA Response

EPA disagrees that intake modifications should be acceptable without compliance monitoring. If the facility modifies its intake structure and reduces its flow commensurate with a close-cycle system, the facility can opt for compliance alternative 1, which does not have any comprehensive demonstration requirements. EPA has documented the relation between reduced flow and the resulting decreases in both impingement and entrainment. In other cases, the modifications made to an intake structure are not as assured of achieving the desired reductions in impingement and/or entrainment. For this reason, EPA believes compliance monitoring is warranted.

The Technology Installation and Operation Plan (TIOP) allows a facility to select a suite of design and construction technologies, operational measures, and/or restoration measures and request that the implementation of the TIOP be considered the means of determining compliance with today's rule. This option is available to the permittee with the approval of the Director.

Comment ID 316bEFR.207.005

Subject Matter Code 17.08

Option: UWAG's recommended approach

Author Name Alan E. Gaulke

Organization American Electric Power

Preferred approach to the rule

AEP recommends that EPA adopt either of the two utility approaches, which are described in Section III of the Utility Water Act Group (UWAG) comments ("Comments of the Utility Water Act Group on EPA's Proposed Section 316(b) Rule for Phase II Existing Facilities and ICR No. 2060.1"). UWAG's approach was shared with EPA directly and presented at workshops and public meetings during the Phase I and Phase II portions of the rule development. AEP prefers the UWAG approach to EPA's because the utility approach defines "adverse environmental impact" in terms of assessing impacts to the biota in the cooling source waterbody at the population or community level, and which uses principles of ecological risk assessments to determine the need for and the level of protection needed in order to have best technology available.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.207.006

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

AEP believes that "adverse environmental impact" must be defined in the final regulation (or at least EPA must define what adverse environmental impact is not) and that proper use of "adverse environmental impact" must be performed at the population-level.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.207.007

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code SUP

General statement of support

EPA's approach has concepts and principles that make it a good starting point for a regulation that implements Section 316(b) as Congress apparently intended. It includes a strong commitment to select best technology available based on the concept that the cost of the technology bear some solid connection with the benefits to the environment. The draft rule contains a number of technical and procedural problems that need to be addressed before a workable and fair regulation can be issued in final form.

EPA Response

EPA believes today's final rule sufficiently addresses the concerns of the commenter. A more detailed discussion of the commenter's concerns can be found in the responses to comments 316bEFR.207.001-201.

Comment ID 316bEFR.207.008

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

EPA did not require cooling towers for intake technology

AEP agrees with EPA's conclusion that the cost of cooling towers compared with the benefits would not justify a cooling tower based standard. The estimated cost of retrofitting cooling towers to the four AEP-owned plants that were used for the Ohio River Case Study (Cardinal, Kammer, Sporn, and Tanners Creek Plants) would alone require a capital cost of $501,515,000 plus annual operation and maintenance costs (Appendix A).

EPA Response

EPA notes that the commenter's estimates of cooling tower retrofit costs at the four Ohio River facilities exceed those estimated by the Agency for the proposal and NODA. As such, these cost estimates serve to support and reinforce the Agency's decision to not base requirements of the final rule on closed-cycle cooling tower retrofits. See response to comment 316b.EFR.207.101.

Comment ID 316bEFR.207.009

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 7.03

Available I&E technologies

EPA has proposed effective intake technologies

AEP owns and operates facilities equipped with several of the intake technologies listed in the proposed rule, and is familiar with the literature reports of the effectiveness of those technologies not owned by AEP. These technologies can be cost effective approaches to reducing impingement and entrainment. EPA wisely opted to allow the facility owner and the permit writer to develop the intake technology that matches to site-specific conditions. There are likely to be site-specific limitations that will make one or more of the technologies too expensive or infeasible to use at some sites and feasible and cost effective to install at other sites. For example, the offshore intake at AEP's Donald C. Cook Nuclear Plant on Lake Michigan cannot be fitted with barrier nets. Barrier nets were evaluated during the original Section 316(b) evaluation of best technology available and rejected. The Tanners Creek Plant on the Ohio River could not be equipped with wedge-wire screen intakes. The volume of water used by this plant would require a large number of screen modules and this number of modules in the Ohio River could interfere with commercial and recreational navigation.

EPA Response

EPA appreciates the comment. Today's rule maintains the desired flexibility for facilities to determine the most cost-effective combination of design and construction technologies, operational measures, or restoration measures best suited to each individual facility.

Comment ID 316bEFR.207.010

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 7.03

Available I&E technologies

AEP encourages EPA to consider the value of behavioral barriers such as sound (which EPA mentioned once, FR 67(68): 17,142) center column), light, and physical barriers that function like behavioral barriers, angled bar racks. Behavioral barriers have advantages over physical barriers, but tend to be less well developed compared with physical barriers and may require site-specific development and fine-tuning.

EPA Response

EPA has evaluated available data on different behavioral barriers and included this discussion in Chapter 3 of the Technology Development Document (TDD). Behavioral barriers, where effective, are typically applicable to a small range of target species and must be deployed with caution.

Comment ID 316bEFR.207.011

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 10.1

General: cost tests

EPA correctly retains a cost benefit test in the rule

EPA correctly considers costs and benefits in the proposed rule. The draft guidance on 316(b) (U.S. EPA, 1977) had a provision that related the cost of the technology and the benefits such that the two were not wholly disproportionate. The proposed rule uses the term “significantly different.” AEP is uncertain how “wholly disproportionate” and “significantly different” compare. EPA should define “significantly different” to mean something close to a 1:1 ratio of cost to benefit to be consistent with economic principles.

EPA Response

The commenter fails to explain or document the “economic principles” it cites in order to support a 1:1 ratio of cost to benefit in the context of “significantly different."

See response to comment 316b.EFR.005.020 for the Agency's discussion of the economic principles related to maximizing net benefits.

For discussion of the definition of "significantly greater", see response to comment 316b.EFR.006.003.

Comment ID 316bEFR.207.012

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 14.01
RFC: 5% threshold and supporting documents

Plants on rivers and entrainment reduction standards

EPA has proposed to require impingement mortality reductions at intakes on rivers where the intake flow is less than 5% of the mean annual river flow. AEP fully agrees with the concept that there is a level of effect below which there is little or no potential for adverse environmental impact. Five percent of the mean annual flow is a proportion of the river below which there is little or no potential for adverse environmental impacts except in unusual circumstances, for example, when endangered species are present and will potentially be impacted.

EPA Response

EPA notes the comment and agrees, in part, with the commenter's assertion regarding the 5% threshold for freshwater rivers and streams. EPA believes maintaining the 5% threshold for entrainment performance standards is appropriate due to the increased likelihood a facility may entrain significant numbers of non-motile organisms (primarily eggs and larvae) at these higher withdrawal levels. Impingement, while influenced by cooling water withdrawals, is less likely to be driven by higher percentage withdrawals than is entrainment. EPA believes the 5% threshold is not warranted for impingement.

Comment ID 316bEFR.207.013

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 14.02

RFC: Alt. thresholds for entrainment (E) controls

EPA should not only retain this provision in the final rule, they should seriously consider increasing the percentage to 10% or 15% of the mean annual flow OR 5% of the mean flow for the major spawning period, which would likely be from four (April through July) to six months (March through August) depending upon the river.

EPA Response

EPA believes adopting a seasonal flow based on spawning events would be difficult to incorporate into a permit as seasonal flows, as well as spawning and migration patterns, are rarely consistent year to year. Incorporating a seasonal flow (or other standard) into a permit would introduce unnecessary implementation and monitoring costs on both the permitting authority and the facility. EPA believes the design intake flow standard for riverine facilities affords a level of protection for the source water body acceptable under most, if not all, stream conditions. The 5% threshold provides a consistent metric against which permit requirements can be developed. Today's rule maintains the 5% mean annual flow threshold.

Increasing the percentage to 10% or 15%, as the commenter notes, would not minimize the entrainment impacts associated with cooling water intake structures.

Comment ID 316bEFR.207.014

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Individual vs. population-level affects

AEP urges EPA to adopt concepts of population-level effects or community-level impact assessment into the final rule. EPA presents a discussion regarding the loss of individual organisms and the potential effects those losses may have on the structure and function of the ecosystem (FR 67(68): 17,137, left-hand column). At the bottom of the left-hand column on page 17,137, EPA lists four possible ecosystem-level effects due to "[d]ecreased numbers aquatic organisms." (While "aquatic" generally means only freshwater, we presume EPA means fresh and salt-water organisms where it uses the term, aquatic.) Halfway down the middle column on page 17,137 reads as follows, "EPA believes that many cooling water intake structures have a significant negative impact on aquatic organisms at the individual level. The studies discussed below suggest that these individual-level impacts can lead to negative impacts at higher organizational levels." AEP is concerned that EPA is blurring the distinction between two fundamental ecological concepts. Individual-level effects are those that affect individual organisms and those affects are measured at the tissue and organ level within an individual organism. Examples of individual-level effects due to impingement may include descaling, abrasion, contusions, tissue damage from pressure changes, and other mechanical disruptions of tissues and organs that could occur due to an individual fish encountering a cooling water intake. These effects may or may not cause the death of that individual fish. Examining the environmental consequences of the loss of a number of individual organisms is a population-level effect, not an individual level effect.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level. Please see response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact. Also, please see the response to comment 316bEFR.025.018.

EPA disagrees that the term aquatic generally means freshwater. Aquatic organisms are those growing or living in or frequenting water. In the citation provided by the author, EPA was referring to the Agency's concern regarding the loss of large numbers of organisms. The terminology confusing to this author has been removed from this section of the preamble to today's final rule.

Comment ID 316bEFR.207.015

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Determination of adverse environmental impacts at the population-level

The consequences of EPA's blurring the distinction between individual versus population-level effects is critical to the basis for EPA's justification of the approach they have taken in this rule and on the benefits EPA has estimated will result from implementing the rule as proposed.

EPA justifies rejecting the use of population-level impact assessment tools such as population modeling, stock recruitment models, and other fisheries resource management tools based partially on their assertion that impingement and entrainment affects are individual-level affects not population-level affects. EPA's interpretation of the difference between the two levels of impact analysis is best illustrated by their discussion in Chapter Al of Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (U.S. EPA, 2002). On page A6-7 EPA states that the NPDES Permit program under Section 301(b)(1)(c) of the Clean Water Act is based on individual-level water quality criteria. EPA states that, "by evaluating the effects of pollutants on growth, reproduction and mortality of individuals, EPA uses individual impacts as surrogates and precursors of population and ecosystem impacts." The fact is that the statistical models that EPA uses to evaluate the toxicity test data used to develop the water quality criteria are models that analyze the variability of a subsample of the entire population's response to a pollutant. Lowest observable effects concentrations (LOEC) and no observable effects concentrations (NOEC), which are two examples of endpoints EPA calculates from laboratory toxicity data, are population-level endpoints and not individual-level endpoints as EPA claims. Likewise, LC5O, EC5O, and IC25 endpoints, which are endpoints commonly calculated from laboratory data used to derive water quality criteria, too are population-level affects. Thus, Section 301(b)(1)(c), the water quality control portion of the NPDES Permit program, is based on population-level effects analyses and are not just surrogates for population-level effects using individual-level effects analyses.

Section 316(b) too should be based on population-level effects just as the water quality standards implemented under Section 301(b)(1)(c) are. The water quality criteria are calculated to protect populations of species from effects that will prevent the population from thriving. Individual organisms all have a limited life span. Few if any will live for as long as a point source discharge, such as a sewage treatment plant outfall, will exist. Cooling water intakes are also likely to exist longer than the life span of most, if not all, aquatic and marine biota. Therefore, water quality criteria and NPDES Permit limits were developed based on population-level effects and population-level effects should be the organizational level used to regulate cooling water intake structures. EPA has not conducted a population-level impacts analysis for the proposed rule making. EPA can incorporate a population-level impact analysis by applying a number of well-established and accepted population modeling tools and fishery management tools to the-case studies and by incorporating the population-level analysis into the whole process of making the best technology available determination (EPRI, 1999).

EPA Response

Section 316(b) of the CWA intends to minimize adverse environmental impact of cooling water intake structures. The lifespan of cooling water intake structures in relation to aquatic and marine biota is irrelevant. Many anthropogenic activities work concurrently on the environment. It is extremely difficult to separate the effects of any one factor. Because so many factors can cause or alleviate stress on an ecosystem, the large number of organisms killed by cooling water intake structures may be causing ecosystem or population level effects even though they may not be detectable nor attributable to a particular cooling water intake structure.

EPA believes that it is reasonable to interpret the minimization of adverse environmental impact as minimizing both the loss of aquatic organisms due to impingement and entrainment and the environmental effects of such loss. The Agency has long maintained that adverse environmental impact from cooling water intake structures must be minimized to the fullest extent practicable. The objective of section 316(b) includes population effects but EPA does not view adverse environmental impact as limited to demonstrated community or population level effects. EPA has considered the consequences associated with the loss of large numbers of aquatic organisms, including impacts on the stocks of various species, loss of compensatory reserve due to the deaths of these organisms and the overall health of ecosystems. Given all of these considerations, EPA determined that there are multiple types of undesirable and unacceptable adverse environmental impacts which result from impingement and entrainment and which must be minimized. Damage on the community or population level is extremely difficult to quantify and attribute to a particular cooling water intake structure given the vast number of environmental factors and anthropogenic factors which work concurrently on fisheries at that organizational level. In addition, changes in populations may be masked by the considerable natural variation in the size of fish populations. Many cooling water intake structures have been in operation for decades. During these years, fish populations have been affected by other factors such as overfishing, habitat alteration and water quality changes. Populations of aquatic organisms in the vicinity of cooling water intake structures may appear to remain stable despite the impingement and entrainment of vast numbers; however, this stability may be due to improvements in water quality and implementation of fishery management plans, which should result in a steady increase in fish populations. At the same time, habitat degradation may be reducing populations. Because of these simultaneously-occurring factors, the determination of a change in a population that is directly attributable to the operation of a cooling water intake structure may prove to be impossible unless a facility commences or significantly changes operation and the nearby populations instantly crash in response. For these reasons, EPA has selected individuals because they are a more reliable metric than population or ecosystem level effects.

Today's rule will reduce the number of organisms killed in a waterbody by impingement and entrainment by cooling water intake structures. This reduction in fish mortality will aid fisheries by reducing one of the many types of stresses upon them. There are other sections of the Clean Water Act which seek to reduce other types of environmental stressors to improve fishing and swimming in the waters of the United States. Today's final rule serves to protect individuals which will in turn protect populations. The rule also authorizes the use of restoration measures when the Director determines that the use of design and construction technologies and/or operational measures alone is infeasible, less cost-effective, or less environmentally desirable than meeting the applicable impingement and entrainment requirements in whole or in part through the use of restoration measures.

Please see chapter A6, EPA's Approach to Modeling Effects of I&E Reductions on Fishery Yield, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule for the discussion regarding the use of population-level analyses in this rulemaking. Please see the section IV of the preamble to today's final rule and response to comment 316bEFR.025.018 for the discussion regarding environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.207.016

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Significance to AEP of EPA's using individual-level impact analyses rather than population-level analyses

EPA uses the number of fish impinged and entrained as the basis for assessing impact due to cooling water intake operation without providing a population context. The problem that this lack of a population level impact analyses creates can be illustrated with this example. An annual impingement loss of 5,000 fish from a population of 8,000 fish will likely affect the viability of the population. However, 5,000 fish lost from a population of 100,000,000 fish would very likely not affect the viability of the population and thus would not be adverse environmental impact. The proposed rule cites examples of impingement and entrainment rates for power plants on the Great Lakes, tidal rivers and ocean intakes that EPA calls extensive and appreciable. Knowing only the number of fish lost from the lake as EPA provides in their example, one has no way of knowing whether there is potential for significant harm or whether there is adverse environmental impact to be minimized.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level.

The areas in which the populations are located mentioned by the author of this comment are unclear. If these two hypothetical populations occupy the same amount of space in the vicinity of the hypothetical facilities, then the difference in the numbers impinged as percentages of the populations may be a reflection of the amount of flow into the facility. In other words, for a facility to impinge only 5,000 fish in a population of 100,000,000 it would have to have a much smaller flow than a facility that impinges 5,000 fish from a population of 8,000. Or if the flows are the same at the two hypothetical facilities, then the impingement of only 5,000 fish from a population of 100,000,000 may be a reflection that this facility already has substantial impingement controls in place. Without more information, it is extremely difficult for EPA to answer this hypothetical question.

That said, if a facility is operating in a waterbody where the number of organisms killed by the intake structure represents a substantial portion of the population in the vicinity of the facility, a permit director may be justified in imposing stricter standards.

Comment ID 316bEFR.207.017

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 6.04
Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Numbers of fish lost viewed in a population-level assessment

EPA cites one million fish were killed within a three-week period as an instance of extensive losses (FR 67(68):17,138). The event EPA refers to was reported for AEP's Donald C. Cook Nuclear Plant on Lake Michigan. Closer examination of this event and placing the one million fish lost due to impingement in a population-level context will show why AEP completely disagrees with EPA's characterization of the loss of one million fish from Lake Michigan as extensive. Nearly all of the one million fish were alewives (Alosa pseudoharengus). There is good reason to question the value of alewives even being in the Lake Michigan ecosystem, and one million alewives is a tiny portion of the alewife biomass in Lake Michigan.

Alewives were introduced to Lake Michigan in the 1940s and the initial population grew until by the late 1960s catastrophic die-offs due to lack of food, cold stress or other unknown causes were occurring at many location around Lake Michigan (Greenwood, 1970). In the late 1960s alewives died and wash up on beaches in Chicago, Milwaukee and other cities in sufficient numbers as to create windrows of dead fish several feet thick for miles along the shoreline, which caused a public health nuisance. The states bordering Lake Michigan, who had begun in the 1960s to stock trout and salmon native to the Pacific Northwest, intensified their efforts in the early 1970s to control the alewife population by stocking Lake Michigan with predators and developing a sport fishery.

Since 1970, alewives have been a significant factor, some positive and many negative, in the Lake Michigan fish community. Many factors have driven the quality and quantity of the fish community in Lake Michigan, and Madenjian, et al., (2002) documented these changes in Lake Michigan from 1970 through 2000. The authors discuss the value of alewives as a fish species in Lake Michigan and describe how alewife abundance has affected the abundance of native fish species such as deepwater sculpin (Myoxocephalus thompsoni), yellow perch (Perca fiavescens), burbot (Lota lota), and the bloater (Coregonus hoyi). They concluded the increase in abundance of the introduced alewife caused or contributed to the decline of four native species and the recovery of all five of these species was the result of the decline of the alewife populations. Madenjian, et al. (2002) attributed the decline of the alewife population entirely to predation from the stocked salmon and trout. No mention was made of cooling water intake impingement and entrainment.

Hatch, et al. (1981) estimated the biomass available to trawls taken between the depths of 9 to 110 meters was between 40,800 and 104,000 metric tons during the years 1971 through 1978. Presuming 20 alewives per kilogram, the alewife biomass expressed in numbers of fish would be between 816,000,000 and 2,080,000,000. One million alewives is 0.12% to 0.05% of the alewives in Lake Michigan between the 9 and 110-meter depth contour let alone the entire lake, hardly an extensive number of fish when compared with the entire population. Even applying the method in the proposed rule for converting forage fish biomass into sport fish biomass would result in an increase in sport fish biomass too small for anglers to perceive an increase in the quality of fishing. Fish populations that are not affected by impingement or entrainment may vary due to factors that are completely segregated from cooling water intakes. In the paper summarizing changes in fish populations of Lake

Michigan from 1970 through 2000, the authors noted increases and decreases of fish populations due to changes in predation rates, introduction of exotic species, and changes in water quality. They noted in particular the reduction in fish biomass was due to the reduction in nutrients resulting from the control of phosphorus discharges into Lake Michigan (Madenjian, et al., 2002). Unless the rule is changed to be based on impacts at the population-level or community-level impacts, cooling water owners and operators could be in the position of spending money and effort to fish populations where no measurable improvement is going to result from the effort.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level. Please see response to comment 316bEFR.025.018 for the discussion regarding environmental impacts associated with cooling water intake structures.

The commenter asserts that one million fish killed by a cooling water intake structure in a 3 week period is not extensive; the commenter bases this conclusion solely on the fact that nearly all of the fish were alewives. EPA disagrees that the species of the fish makes such a huge loss (in a short period of time) somehow acceptable. In order for species to coexist in a given area and utilize the same resource, they must occupy a separate and distinct niche. EPA believes all species native to a given waterbody warrant the same level of protection. Although alewives were introduced into Lake Michigan and the author may question the value of alewives, their presence in the waterbody indicates that they do occupy a distinct niche and contribute to the food chain in the ecosystem. It should not be the role of cooling water intake structures to reduce the number of an introduced species in a waterbody because they do not distinguish between killing alewives and native fish. The facility cited, the Donald C. Cook Nuclear Plant on Lake Michigan, has experienced several emergency shutdowns due to clogging of the intake pipes by massive influxes of fish. Please see section IV of the preamble for more detail. Reducing the number of organisms impinged and entrained at this facility could aid in alleviating this problem.

Comment ID 316bEFR.207.018

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 6.04
Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Density dependent feedback is not taken into account

If EPA looks only at the number of organisms impinged and entrained and does not evaluate impacts at the population level, then EPA's assumption that all fish impinged and entrained will directly increase the population of fish in the waterbody by the number of fish impinged and entrained has no scientific support. In a waterbody where fish populations are below the carrying capacity of the waterbody, there may well be a near one-to-one increase in the population. For fish populations that are at the carrying capacity of the waterbody, there will almost certainly be no direct increase in the population. Perry et al, (2002) modeled the effects of impingement and entrainment at six of the nine power plants EPA studied in their Ohio River Case Study. The authors determined the effect on six fish populations of removing impingement and entrainment losses in five Ohio River pools. In only six out of the thirty possible combinations of species and pools was there the potential for any significant increase in population likely to occur. The other combinations of populations and pools showed there was either no likelihood for population increase (16) or the populations were of insufficient size to make a determination (8). In short, the modeling shows that a complete elimination of impingement and entrainment would likely do very little to increase those fish species populations in those pools of the river. Earlier observations on the Ohio River fish community (Van Hassel et al., 1988) showed fish populations in the river to be relatively stable (relative abundance not showing strong trends up or down) and diversity was increasing. Unless EPA uses a population-level analysis of potential impacts from impingement and entrainment, power plant owners will be modifying their cooling water intake structures at considerable expense with no discernable benefit to the ecosystem.

Unless impacts are determined using population-level assessments, a utility that opted to mitigate the impingement and entrainment losses at one of its facilities would fail to show any improvement in the fish community if the fish were at their carrying capacity in that waterbody. Fish populations at the carrying capacity of the waterbody would not increase in population with stocking, habitat improvement, or other mitigation. If fish populations do not increase due to eliminating impingement and entrainment effects, it is also possible those populations will not increase as a result of the mitigation effort.

EPA Response

EPA disagrees with this comment, reducing the number of fish killed by impingement and entrainment allows for the possibility for the population to increase. Minimizing adverse environmental impact serves to reduce one of the many stresses faced by populations of aquatic organisms. The question that should be asked in the example above, is what are the other stresses present in the waterbody that are preventing fish populations to rebound in the model? Section 316(b) is an important tool to reduce one stressor recognized by Congress: the continued killing of billions of fish yearly by cooling water intake structures. This rule will complement fishery management plans and water quality improvements that aim to reduce stress on the nation's fisheries. Please see the response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation. Please see the response to comment 316bEFR.025.018 for the discussion regarding environmental impacts associated with cooling water intake structures.

Comment ID 316bEFR.207.019

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Site-specific factors need to be considered in determining adverse environmental impacts and best technology available

States, EPA Regional offices, and tribes implemented Section 316(b) using the draft guidance document (U.S. EPA, 1977) for all determinations of best technology available done prior to this rule making. One of the key features of the draft guidance document was the site-specific application of the decision process. Biological and engineering data and evaluations were conducted and determinations made on those data and analyses. EPA has included site-specific determinations of best technology available for those intakes where the cost of achieving the impingement and entrainment reductions significantly exceed the benefits, referred to as the cost-benefit analysis. AEP agrees the cost-benefit analysis is important in this rule and that it must be site-specific. One example of how variable entrainment and impingement rates can be at cooling water intake structures located within a few miles of each other on the same waterbody can be seen in the Ohio River Case Study (U.S. EPA, 2002). Miami Fort and Tanners Creek Plants are about five miles apart on the Ohio River. Entrainment at Miami Fort on a flow-weighted basis was nearly 30 times the rate at Tanners Creek. Impingement was twice as high at Miami Fort as it was at Tanners Creek. The reasons for the difference are unclear. One obvious feature is that the Great Miami River enters the Ohio River on the same side and between the two plants. Tanners Creek draws water from the Ohio River that is primarily Great Miami River water. Two other examples from the Ohio River Case Study illustrate the differences between plants and impingement and entrainment rates. Clifty Creek, a six-unit plant, and Kyger Creek Stations, a five-unit plant, are nearly identical in all other regards. They have identical units, nearly identical intake structures, both intake structures are set back from the shoreline of the river, and the plants have similar intake water flows. For all their similarities, Kyger Creek Station entrains about eight times more fish eggs and larval than Clifty Creek Station, and Clifty Creek impinges about twelve times more juvenile and adult fish as Kyger Creek Station.

These are not isolated examples. The entrainment and impingement rates for all the Ohio River Case Study plants were compared and there was little similarity among the plants (EA, 2002, Table 2, attached as Appendix B).

The differences among the Ohio River Case study plants alone supports the need for more site-specific application of the 316(b) rule. EPA has not examined the differences among intakes located on rivers across the country, and therefore has not justified using the Ohio River Case Study to represent the impact at river intakes across the US. They need to justify their use of one set of criteria for all river intakes. From AEP's experience, we believe EPA will conclude there is too much variability among intakes across the US to generalize from the Ohio River intakes to all river intakes across the country.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

Comment ID 316bEFR.207.020

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 3.03

Definition: Waters of the U.S.

Cooling water intakes on lakes, reservoirs, and ponds

AEP has a number of cooling ponds and reservoirs that were constructed and permitted for the purpose of providing cooling water for a power plant. It is our understanding that these are part of the thermal treatment system for the plant and excluded from the waters of the U.S. definition on that basis. The discussion in the proposed rule seems to bring that understanding into question, "cooling ponds are neither categorically included nor categorically excluded from the definition of "waters of the United States." On this point AEP endorses the comment and discussion in the UWAG comments regarding cooling ponds and waters of the U.S. definitions. Intake structures on cooling ponds should not be regulated under Section 316(b).

EPA Response

See response to 316bEFR.006.001.

Comment ID 316bEFR.207.021

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 10.01.01

Ecological Risk Assessment

Case Studies

EPA described their case studies as ecological risk assessments using facility data to quantitatively evaluate impingement and entrainment risks to aquatic organisms. AEP fully agrees with the intent of the case studies, but urges EPA to correct the numerous errors that occur in the case study reports. EPA cited their ecological risk assessment guidelines (U.S. EPA, 1998) as the source of the ecological risk assessment method. AEP agrees the EPA ecological risk assessment guideline is a useful and appropriate guideline for the purpose EPA intended. AEP urges EPA to use their ecological risk assessment guidelines in a much broader role in the final rule.

EPA Response

EPA agrees. Please see Chapter A1 of the Phase II Regional Study Document for a discussion of ecological risk assessment in the context of section 316b.

Comment ID 316bEFR.207.022

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 10.03.02
Ohio Watershed

Ohio River Case Study

The Ohio River Case Study was done to estimate the loss of fish from the Ohio River fish community due to impingement and entrainment at the nine power plants used in the study and to then extrapolate the impingement and entrainment losses at the nine plants to the other in-scope cooling water intakes on the river. The owners of the nine power plants in the Ohio River Case Study and several other power companies contracted an environmental consultant, EA, Engineering, Science, and Technology (EA) to review the Ohio River Case Study. EA determined that EPA improperly aggregated fish species, improperly extrapolated impingement and entrainment results from the nine plants to the other in-scope facilities, and made incorrect assumptions when using the impingement and entrainment extrapolations to estimate the benefit to the recreational fishery. EA's review is included as part of AEP's comments as Appendix B.

Dr. Ivar Strand was asked by the Electric Power Research Institute to review the economic benefit analysis of the draft Phase II rule and report his findings. Dr. Strand's report is attached to these comments as Appendix C. Some of the errors EPA made in the estimation of the number of fish and the number of pounds of production foregone that were reported in the EA review (Appendix B) inflated the impingement and entrainment losses beyond what they should be. Dr. Strand noted among other things that EPA further inflated the value of the impinged and entrained fish to a degree that the result is not believable. EPA's benefits analysis shows the impinged and entrained fish have a value of $150/pound. This is clearly an error and needs to be corrected in the final rule. Dr. Strand makes a number of suggestions as to where EPA may have made mistakes to arrive at this inflated benefit value. Dr. Strand further puts EPA's Ohio River Case Study results in perspective by citing a study of fishing success in a reach of the Ohio River that closely matches the reach of the case study (Schell, et al. 1996). In 1992 and 1993, angling in the Ohio River produced 2,500,000 fish. EPA's case study estimated 54,000 pounds of fish were lost from the Ohio River from impingement and entrainment. If the fish lost from the Ohio River due to impingement and entrainment were one pound each, the fish lost from the Ohio River would represent 2% of the angling harvest. A 2% change in angling success is probably imperceptible to anglers. The 2% changes is a maximum estimated increase. Perry et al. (2002) indicated Ohio River fish populations would generally not increase if impingement and entrainment losses were eliminated and EA (Appendix B) show that EPA's estimates of total losses were likely too high due to incorrect aggregations of larval fish and other problems with EPA's report causing the losses to be inflated.

EPA Response

The commenter expresses concern about EPA's production foregone method. For additional information on the method and adjustments made for EPA's final analysis, please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and EPA's response to Comment 316bEFR.305.003.

Specific concerns regarding the Ohio case study analysis are addressed in EPA's response to comment 316bEFR.074.305.

Comment ID 316bEFR.207.023

Author Name Alan E. Gaulke

Organization American Electric Power

Subject Matter Code 10.03.07

Great Lakes

Great Lakes Case Study

AEP urges EPA to discard the use of the J. R. Whiting Plant as the typical Great Lakes plant. The location of this plant alone makes it unique in the entire Great Lakes. It is located at the apex of a long narrow bay formed by the Woodtick Peninsula and the western shore of Lake Erie. No other plant on the Great Lakes is located on a small shallow bay. Bays in general tend to be areas where fish congregate in larger numbers than in the open lake. Fish congregate in bays because bays tend to be more productive and there is more food there compared with the open lake. The bay formed by the Woodtick Peninsula is on the most productive end of the most productive of the five Great Lakes. Any impingement and entrainment loss extrapolations to other cooling water intakes on Lake Erie are likely to be over estimates. Lake Erie tends to be mesotrophic, a classification between oligotrophic, nutrient poor water, and eutrophic, nutrient rich water. The other four Great Lakes are more oligotrophic, and less productive than Lake Erie. Less productive lakes tend to support fewer fish in the same volume of water. Most if not all other cooling water intakes on the Great Lakes draw water from the less productive open lake. Offshore waters tend to be less productive than the shoreline. Many Great Lakes cooling water intakes are offshore, further reducing the comparability of J. R. Whiting with other Great Lakes cooling water intakes.

EPA Response

As is the case for many facility studies, JR Whiting studies were conducted over 20 years ago. EPA agrees that there may have been changes in species relative abundances since that time that would in turn influence I&E rates. However, more recent I&E data are not available.

In addition, EPA wishes to correct the commenter's misunderstanding that JR Whiting was chosen because it was likely to have higher I&E rates than other Great Lakes facilities. In fact, EPA selected the JR Whiting facility for evaluation because it was considered highly relevant for the benefits analysis, given that it is one of the few facilities that has collected I&E data before and after implementation to reduce I&E.

Finally, EPA notes that data from three facilities (JR Whiting, Monroe, and D.C. Cook) were extrapolated to other Great Lake facilities. Results were averaged across all facilities to obtain a regional estimate. See EPA's response to Comment 316bEFR.041.041 for a discussion of EPA's extrapolation approach and its objectives.

Comment ID 316bEFR.207.024

Subject Matter Code 10.03.03
Tampa Bay

Author Name Alan E. Gaulke
Organization American Electric Power

Tampa Bay Case Study

AEP urges EPA to allow great latitude in using Tampa Bay Estuary as the example of Gulf of Mexico ecosystems and potential for impact on the fish populations in the Gulf of Mexico. The contrast between Tampa Bay and Laguna Madre near Corpus Christi is stark. Tampa Bay is a mixture of freshwater from the rivers draining into the bay and the water from the Gulf. Laguna Madre is a hyper saline bay behind a barrier island. The fauna and flora of the two water bodies and the productivity of the two water bodies are very different.

EPA Response

EPA recognizes that there are site-specific details that distinguish the environment surrounding individual facilities. For the Gulf of Mexico regional analysis, EPA evaluated other facilities in addition to Tampa Bay in an attempt to capture some of the differences within the region. However, the purpose of EPA's regional analysis for the final rule was not to develop precise I&E estimates for individual facilities, but rather to develop an estimate of average I&E for the entire region. Please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and response to Comment 316bEFR.041.041 for additional information on EPA's extrapolation approach. Details of the Gulf of Mexico regional study are provided in Part F of the Regional Analysis Document.

Comment ID 316bEFR.207.101

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

APPENDIX A

COST UPDATE OF COOLING TOWER RETROFIT COST ESTIMATE

JASON HETTERINGER, AEP PRO SERV

APRIL 2002

Cost Update of Cooling Tower Retrofit Cost Estimate

From: Jason Hettinger

Executive Summary:
The following American Electric Plants (AEP) were evaluated:

Plant	Costs (2002 dollars)	Capacity (MW)	Dollars per Kilowatt
Cardinal Unit 1 & Unit 2	$149,368,000	1,200	$124.47
Conesville Unit 1 - Unit 3	$34,551,000	415	$83.25
Kammer Unit 1 — Unit 3	$87,879,000	630	$139.49
Kanawha River Unit 1 & Unit 2	$43,246,000	400	$108.11
Muskingum Unit 1-Unit 4	$103,668,000	840	$123.41
Picway Unit 5	$11,004,000	100	$110.04
Sporn Unit 1 - Unit 5	$154,598,000	1,050	$147.24
Tanners Creek Unit 1 - Unit 4	$109,670,000	995	$110.22

The average dollars per kilowatt for the plants is 118.28/kW in 2002 dollars. This cost estimate was determined by using up-to-date quotes and cost factoring estimates for equipment and labor. The data, calculations, and references are located in the appendixes.

Objective:
Update the cost estimate for AEP power plants in 2002 dollars for the cooling tower retrofit estimate that was completed in 1992.

Assumptions
-All previous design assumptions are valid (B. Cashner Report)
-All locations for cooling towers are applicable per plant (B. Cashner Report)
-Delivery charges for the concrete pressure pipe are assumed for southern Ohio area and will change per plant location
-Electrical costs were very conservative and determined to be valid (including the possibility of installing new transformers or associated euipment to meet demand)
-Labor estimates were calculated based upon a determined percentage of equipment costs per

equipment type (Plant Design & Economics for Chemical Engineers; Peters & Timmerhaus; 3rd ed.; (pg 169, Table 6)

Analysis

The project completed by Bob Cashner in 1992 determined what equipment was needed to modify all once through cooling system to a closed loop cooling system for AEP plants. This project bases was evaluated and the cost analysis information was extracted for price modification from 1992 dollars to 2002 dollars. The cost analysis was based on the information developed from the 1992 cooling tower study of changing the entire large once through cooling units for the power plants to a closed loop system. The equipment size and quantity was not exhaustively examined and assumed to be valid due to the time allotted.

The first set of calculations performed used the original cost information and the time value of money equation with an average inflation factor over the past 10 years. This inflation rate was computed from the consumer price index (appendix). This information was put into a tabular format and needed to be validated. The time value of money equation used was: (199.2 Costs)*(1+.03)9 = (2002 Costs)

To validate the time value of money results, the 1992 cost estimate equations and information were recalculated. The price information was updated by contacting vendors that supplied the original quotes and cost factoring (six-tenths rule). The pricing information was gathered from the sources shown below:

Equipment (Pricing)	Source
Concrete pressure pipe	Price Brothers Budgetary quote
Motor (350 rpm, 1500-3000 hp)	Per Ideal Electric Co.
New Pumps	Cost Factored from Sand Sage Project
Impeller	Cost Factored from Sand Sage Project
Hot & Cold Sump	Per F. Brezny
Flume	Per F. Brezny
Electrical	Not changed per S. Ridenbaugh
Cooling Towers	Marley Quote (no change)

The current cost estimate includes material and labor costs and is in 2002 dollars. The labor rate was estimated on a percentage of national material costs if it was not included as a material and labor combined costs. This percentage changed due to the equipment and scope of work. Listed below are the labor estimates and percentages.

Equipment (Labor Costs)	Labor Costs as a Percent of Material
Concrete Pipe	45%
New Pump Installation	60%
Pump Impeller Replacement	50%
Pump Motor Replacement	50%

** Source: Plant Design & Economics for Chemical Engineers: Peters & Timmerhaus 3rd ed.: (pg 169, Table 6)

After the costs were determined, the difference between the time value of money calculation and cost up dating was approximately 30%. This difference was too great to justify using the time value of money as the basis to determine the dollars per kilowatt, so each AEP plant was updated using the present cost information.

Other Recommendations

The assumption of the engineering and location placements still being valid needs to be confirmed if a more precise estimate is needed (0 - + 10%). For the cost estimate of 0 -+20% this information does not need to be evaluated in detail. The following needs to be addressed to confirm the engineering analysis is still valid for a 0 - +10% cost estimate:

-Sump locations

-Cooling tower improvements

-Electrical requirements for the new equipment verses present plant structure (i.e. new transformers may need installed to meet demand)

-Improved pump efficiencies

-Cooling water flow changes

-Environmental permit costs

[see hard copy for tables in appendix]

EPA Response

EPA reviewed the appendix study and the hard copy tables. EPA notes that the costs estimated by the commenter for this Ohio River case study generally would exceed those utilizing the proposal and NODA methodology developed by the Agency. See response to comment 316b.EFR.208.002.

Comment ID 316bEFR.207.201

Author Name Alan E. Gaulke
Organization American Electric Power

Subject Matter Code 10.03.02
Ohio Watershed

INTRODUCTION

EA Engineering, Science and Technology was contracted by a consortium of Ohio River power plant operators to constructively critique the Ohio River Case Study (EPA 2002). EA was asked to review the biological assumptions and calculation methods as they were applied by EPA to the nine Ohio River Power plants utilized in the case study, the extrapolation of these data to the whole river and to comment on compensation in Ohio River fish populations.

Our comments begin with a discussion of EPA species aggregation methods, followed by sections concerning verification of EPA calculations and assumptions needed for the calculations, the extrapolation of data from the nine power plants to the whole river, discussion of EPA assumptions related to intake flow, changes in Ohio River fish populations and intake impact study methods. The comments continue with general observations concerning the RUM model and the recreational fishery, and presents a number of specific items that need clarification or correction. We conclude with three issues that should be taken into consideration, impingement number biases due to winter kill of gizzard shad, entrainment survival, and compensation.

A couple of items stand out as a result of the review of the Ohio River Case study. The way different species were lumped together by EPA produced a number of problems including the inability to accurately assess monetary values. Another is the problems and inaccuracies of extrapolating the individual number data from the nine power plants on specific reaches of the river to the entire Ohio River. These errors would be compounded if EPA attempts to extrapolate from the Ohio River system to freshwater systems nationwide. The best method for intake impact assessments continues to be a site-specific approach. Basing the extrapolations to the whole river system on observed population level impacts rather than strictly on numbers would be more acceptable..

IMPROPER AGGREGATION OF FISH SPECIES

In Chapter A5 of EPA's Ohio River Case Study ("Case Study"), it was stated that a small fraction of species identified from impingement and entrainment records were not evaluated individually, but rather were aggregated into species groups. The stated reason for this was that there was a lack of life history information for these aggregated species. This aggregation process is puzzling on several levels. In some cases, this may result at most in scientific debate. In other cases, there may be serious implications with regard to estimated impacts of entrainment and impingement, and, most importantly, related economic valuations.

First, we take exception to EPA's assertion that "a small fraction of species" was aggregated. A review of Appendix C2 of the Case Study reveals no less than 37 full species that were aggregated at one or more of the 9 CWIS facilities. When compared to Table C3-l of the Case Study, which lists 78 fish species considered to be vulnerable to Ohio River intakes, the aggregated species represent 47 percent - nearly one half—of the vulnerable species in the river (not a "small fraction").

Aside from the 37 full species that were aggregated, a number of the aggregated "species" are actually groups, e.g., "herring species," "shiner species," and "Lepomis sunfish." Many of these groupings were undoubtedly necessitated by the available state-of-the-art of larval fish taxonomy. Whereas we understand the need to deal with such groups, we believe the taxonomic choices were flawed in many cases, as discussed further below.

The aggregation rationale of "a lack of life history information" is questionable. It should be clarified here that when referencing "life history" data, EPA was referring to the few parameters listed in Appendix C l of the Case Study. These parameters are natural mortality, fishing mortality, fraction vulnerable to fishery, and weight, all by life stage. Additional life history data such as fecundity were available in the Docket. This information was used in EPA's calculation of age 1 equivalents, lost fishery yield, and production foregone. Although some of the information in Appendix C1 is based on species-specific literature data, the natural mortality rates for eggs and larvae, are, with few exceptions, not species specific. Nearly all of the egg and larval natural mortality rates in Appendix Cl are referenced to either Bartell and Campbell (2000) or PSE&G (1999). Examination of the Bartell and Campbell reference indicates that, in every case where they were referenced by EPA as the source for a species' egg and/or larval natural mortality rate, Bartell and Campbell's documentation for the numbers was "professional judgment." Thus, in no case was the natural mortality data for young life stages based on real data, or at all species specific. EPA's reference for most egg and larval natural mortality rates was PSE&G (1999). This is Appendix F of PSE&G's 1999 316(b) demonstration for the Salem Station on Delaware Bay. Based on discussions with PSE&G personnel, our understanding is that they developed generic mortality rates (as averages of mortality rates for more common estuarine species) for their non-RIS species, including some freshwater species that are rarely encountered at Salem. To the best of our understanding, EPA employed these generic (actually estuarine-species based) mortality rates for the bulk of Ohio River species. So again, just as with the Bartell and Campbell-derived numbers, the PSE&G-referenced numbers are not species specific and are not even based on freshwater species. An excellent reference which could have been used to obtain species specific information is Breder and Rosen (1966).

Aside from the questionable rationale for how the groupings or aggregations of species were derived to begin with, the implications of those groupings must be addressed. At four of the nine Ohio River CWIS evaluated, "temperate basses" were aggregated with small mouth bass. This makes no biological sense given that the white bass (the most common temperate bass in the Ohio River), is a broadcast spawner that lays over ½ million eggs (Case Study Chapter C3), whereas the small mouth bass lays many fewer eggs (3,000 to 21,100, Carlander 1977) and guards them on the nest. As a result of these important differences in life history and behavior (e.g., differences in fecundity, spawning behavior, larval survival, etc.), the loss of a given number of white bass eggs or larvae is quite different than the loss of the same number of small mouth bass eggs and larvae. Thus, lumping these species together is not valid with regard to impact, and especially valuation, because of the greater economic value assigned to the small mouth bass. For example, based on replacement value, AFS (1992) values adult white bass at $1.15 per pound, one quarter of the value assigned to adult small mouth bass ($4.48 per pound).

The primary species small mouth bass not only includes "temperate basses," as discussed above, but also includes largemouth bass and spotted bass at nearly all CWIS. While this may be a reasonable accommodation for the upper river where small mouth bass are moderately common, it constitutes a serious misrepresentation for the lower river where largemouth and spotted bass are much more common. Because of the greater value generally assigned to small mouth bass (AFS 1992), considering all Micropterus to be small mouth bass would inflate impact and valuation particularly in the lower river where small mouth is uncommon.

“Percid species” were aggregated with yellow perch at five of the CWIS evaluated. Assigning percid larvae to yellow perch is totally inappropriate. Larval taxonomy is such that when percid larvae are encountered; the taxonomist can normally assign the larvae to one of three groups; Stizostedion (walleye or sauger), yellow perch, or unidentified percids (darters). When larvae are assigned to unidentified percid, it means that the specimens in question are not Stizostedion, they are not yellow perch, but instead are one of the many darter species inhabiting the Ohio River. In rare cases, the specimens may be so damaged as to preclude assignment to any one of the three percid groups. But in the vast majority of cases, unidentified percids means they are not yellow perch, nor are they Stizostedion therefore they should not be assigned to the yellow perch category. In fact, it is very likely that even many of those specimens originally reported as yellow perch may not be that species. Yellow perch is a rare species, largely confined to the Upper Ohio. Our examination of the combined ORERP and ORSANCO database (Lohner et al 2000) reveals that only 24 adult yellow perch were collected over the 19 year period examined (1981 through 1998), an average of roughly one adult yellow perch per year despite significant effort each year over the upper and middle river. Given the miniscule adult population, the reports of rather large numbers of yellow perch larvae in the river are questionable. Some Percina larvae (logperch in particular) are quite similar to yellow perch larvae and we believe many of these early reports are based on Percina, probably logperch, rather than yellow perch. In any case, ascribing “percid species” to yellow perch would inflate impacts and valuation.

The “walleye/sauger” aggregated “species” is understandable given the state of the art of fish larval taxonomy. But it would have been much more acceptable to ascribe any reports of this “species” to the abundant sauger rather than the uncommon walleye. Again, there are implications regarding the perceived impact and valuation.

Although it may not have impact or valuation implications, the separation of emerald shiner and bluntnose minnow as primary species is biologically awkward. Any other shiner species is aggregated with emerald shiner, while “minnow species” is typically aggregated with bluntnose minnow. The bluntnose minnow is fairly common in the upper river, but rare in the lower river. Further, it is a crevice spawner with generally lower fecundity than the emerald shiner. It is likely that the “minnow species” taxon reported for a number of CWIS was most likely emerald shiner rather than bluntnose minnow. As an “r” strategist (Pianka, 1970), emerald shiner, which produces a large number of eggs, would be much more able to withstand losses than bluntnose minnow, a “k” strategist, which produces a low number of eggs.

A last example concerns gizzard shad and skipjack herring. We acknowledge that from a valuation standpoint it probably doesn’t matter which species clupeid larvae are assigned to. However, it demonstrates again that EPA did not understand the ramifications of the decisions they were making regarding aggregating of species. As best we can determine, whenever EPA saw the designation “Herring” they assigned those specimens to skipjack herring, when in fact the authors of the original reports were simply using the common name for the clupeid family, (i.e., the herrings). Unidentified herring should be assigned to gizzard shad, not to skipjack herring (or left as unidentified herring) because gizzard shad is one of the most abundant fishes in the river, whereas skipjack herring, though common, are much less abundant (EA 2001). In fact, in years of exceptional hatches, gizzard shad become a nuisance in the river and depress the catch of game species (Schell 1996).

The effect of these aggregation discrepancies on the EPA evaluation is illustrated below with examples from the actual study reports for the Ohio River CWIS facilities. These study reports are the original impingement and entrainment reports for the facilities as documented in Table C3-3, Appendix C3 of the Case Study.

-For the Cardinal facility, EPA reported 633,500 yellow perch entrained; these were recorded as "Percid (Percidae)" in the original study report. Also, 810,400 "Walleye/Sauger (Stizostedion)" reported entrained for the year in the original study report were recorded as Walleye in EPA's Table C3-10.

-For the Kammer facility, an annual entrainment estimate of 478,000 walleye in EPA Table C3-10 were recorded as "Walleye/Sauger (Stizostedion)" in the original study report. EPA reported 628,100 yellow perch entrained of which 147,000 were actually listed as "Percid (Percidae)" from the original report.

-For the Philip Sporn facility, an annual entrainment total of 19,100 small mouth bass was reported by EPA. These actually had been reported as "Temperate Bass (Morone)" in the original study report. EPA reported 1,637,500 yellow perch entrained of which 42 percent (682,400) were actually reported as "Percid (Percidae)" in the original report. Over 2 million entrained "Walleye/Sauger (Stizostedion)" reported in the original study report were recorded as walleye by the EPA.

-For the Kyger Creek facility, 95,100 small mouth bass were reported entrained by EPA; these were actually reported as the much less valuable "Temperate bass (Morone)" in the original study report. Nearly all of 15,659,000 walleye reported by EPA were actually recorded as "Walleye/Sauger (Stizostedion)" in the original study report. Similarly, nearly all of 1,199,400 yellow perch reported entrained by EPA were actually recorded as "Percid (Percidae)" in the original study report.

-For the Clifty Creek facility, EPA's entrainment Table C3-l0 contains several entries that cannot be traced back to the original study report. For example, EPA reported 319,368 sauger larvae and 58,067 walleye larvae. No such taxonomic breakdown exists in the original study report: However, the 377,592 "Walleye/Sauger (Stizostedion)" from the original study report is very close to the total of the sauger and walleye larvae reported by EPA. How EPA distinguished between species when it was not done in the original study report is unknown. Also, EPA lists 145,167 small mouth bass entrained. But there are no small mouth bass, largemouth bass, spotted bass, or even bass species reported in the original study report.

These are only a few of the aggregation discrepancies that can be identified for these and other species groups at nearly all of the Ohio River CWIS facilities. As discussed above, some may represent only biological awkwardness, but do not necessarily skew impact and valuation. Others clearly skew impact because of differences in life history parameters (e.g., Morone vs. Micropterus), and subsequent evaluation (e.g., Morone vs. Micropterus, small mouth vs. largemouth bass, percids {darters] vs. yellow perch).

What is a better approach?

(1) Do not aggregate beyond what was done by the original authors. EPA's stated reason for aggregating was found to be in fact, not true. To the extent that the life history data they employed are at all supportable, they would be equally applicable to any aggregated species.

(2) Ignore rare species. This would have virtually no effect on impact and valuation.

(3) In lieu of aggregating, apportion those unavoidable groupings, primarily from entrainment (e.g., minnow species, percid species, herring species, sunfish species) based on the known abundance of juvenile/adults in the river. Extensive monitoring programs have been carried out in the river and data exist with which to credibly apportion entrained "groups" among species.

DIFFICULTY VERIFYING EPA ASSUMPTIONS AND CALCULATIONS

It is a standard precept of science that an experiment or calculation must be able to be duplicated or verified by other parties. Given the significant environmental and economic ramifications of the proposed Phase II 316(b) rule, all necessary information should have been made available by EPA so that their calculation of impingement and entrainment impact and valuation in the Ohio River Case Study could be verified. Due to a variety of data gaps and unverifiable numbers, and in spite of considerable effort, we have been unable to do that.

We first attempted to verify model parameters, particularly life history information. Of the important egg and larvae natural mortality rates, we were able to verify one, that for natural mortality of muskellunge eggs, which was calculated from data in Carlander (1969). EPA also cited Carlander (1977) as a source of egg survival data for small mouth bass. But the egg natural mortality value in EPA Table C1-21 cannot be calculated from any survival value in Carlander (1977). A number of the natural mortality rates in EPA Appendix Cl are referenced to Bartell and Campbell (2000). In this reference, these are daily mortality rates documented as "professional judgment." We could not relate these rates to those in EPA Appendix C1. In response to our inquiry, an EPA representative informed us that the daily rates in Bartell and Campbell were multiplied by the number of days in a stage (egg or larval stage, etc.) to calculate the "Natural Mortality (per stage)" mortality rates in EPA Appendix C1. We were informed that the number of days used per stage were available in the Docket. When we accessed the spreadsheets in the docket that we had been directed to, life stage durations were not evident. Nor could we verify any of the EPA mortality rates referenced to Bartell and Campbell using any published information regarding stage duration.

We also asked an EPA representative for clarification of those egg and larval natural mortality rates for Ohio River fish that were referenced in EPA's Appendix C1 to PSE&G (1999), which is Appendix F of the 316(b) demonstration for Salem Generating Station. We were told that Salem mortality rates were only used in a "few limited cases". In fact, the majority of egg and larval natural mortality rates for Ohio River fish in Appendix C1 are referenced to PSE&G (1999). With few exceptions, we could not confirm the relationship between PSE&G values and EPA's Appendix C1 values using independent literature sources. Our question regarding which Salem rates were used for Ohio River fish has gone unanswered.

Our comments on the economic valuations are provided separately, but we note here that many of the same problems are involved; there was simply not enough information provided to verify EPA's results.

Given that EPA has extrapolated data from nine facilities to the entire Ohio River, and has indicated the possibility of extrapolating these results to other U.S. rivers, the environmental and economic implications are huge. And yet the EPA approach and results cannot be verified. We do not believe this is acceptable.

What EPA should have done, at a minimum for at least one fish species, is to make available every single input parameter and calculation, starting with the verified natural survival of an egg, and ending with the economic loss valuation for that species. in addition, all data and information used in the calculations for all species should have been provided.

PROBLEMS WITH EXTROPOLATING DATA BEYOND THE NINE CASE STUDY PLANTS

Even if we agree that the I&E estimates for the nine case study plants were developed correctly (which clearly they were not), there are problems with extrapolating these data to the remainder of the river and even more problems with extrapolating them outside the mainstem Ohio River. In Chapter C3, EPA indicates that the results from the nine case study plants were extrapolated to "other inscope and out-of-scope CWIS on the Ohio River" and that Section C3-9 represents a summary of "the total cumulative impact of all Ohio River CWIS" (p. C3-1).

On p. C3-22 they indicate that this was accomplished by assuming that I&E is strictly proportional to intake flow and that I&E at the nine Ohio River case study facilities are representative of I&E at other CWIS in the same or nearby pools. However, as documented elsewhere in this report, I&E rates are proportional to intake flow (see Section 5.3). A significant number of plants are affected by this extrapolation procedure. According to Table C3-l4, there are 10 in-scope plants that are located downstream of the McAlpine Pool (the downstream-most pool with one of nine studied plants in it):

Plant	Pool
Cane Run	Cannelton
Mill Creek	"
R. Gallager	"
Coleman	Newburgh
Elmer Smith	"
FB Culley	"
Rockport	"
Warrick	"
Joppa Steam	L&D 53
Shawnee	"

In Tables C3-15 and C3-16, EPA indicates that data from the Clifty Creek Plant (McAlpine Pool) were extrapolated to these 10 plants as well as to 8 out-of-scope facilities. However, in Table C3-l 7 and subsequent tables, data are presented separately for the Newburgh Pool, a pool which is not defined in Table C3-16.

In addition to erroneously assuming I&E is proportional to intake flow, there are serious problems with extrapolating the results from the Clifty Creek Station, a middle river plant, to these other facilities, all located in the lower river. This is because there are significant differences in community composition between the middle and lower river (Pearson and Pearson 1989). Species preferring cooler waters (e.g., walleye, small mouth bass, redhorse, yellow perch, etc.) decline rapidly in abundance as one proceeds downriver. There are even shifts in the forage community. For example, threadfin shad tends to be rare in the upper river, uncommon in the middle river, but common to abundant in the lower river (EA 1993). Several of the most valuable species listed by EPA (e.g., small mouth bass, yellow perch, and walleye) are effectively absent in the lower river. Thus, the differences between the middle and lower river are not merely exercises in biological correctness; they have clearcut valuation ramifications.

The long term fisheries studies sponsored by the Ohio River users group provides additional longitudinal trend information (EA 2001). A few taxa, notably gizzard shad and small cyprinids (primarily emerald shiner), have been abundant to very common at all study areas in all, or nearly all, years. Additional taxa have consistently been common from locations in both the upper and middle river sections, but have also demonstrated no clear longitudinal pattern. These include Lepisosteus spp. (mainly longnose gar), channel catfish, Morone spp. (mostly white bass), Stizostedion spp. (principally sauger), and drum. Conversely, several taxa have exhibited consistent longitudinal patterns with regard to abundance. Common carp, round-bodied suckers (primarily redhorses), sunfishes (mostly bluegill), certain Micropterus spp. (small mouth and spotted basses), and small percids (primarily logperch) have been most numerous at upper river study areas. In contrast, taxa that typically have been more abundant at middle river study areas include skipjack herring and flathead catfish. Carpiodes spp. (mainly river carpsucker and quiliback) and Ictiobus spp. (primarily small mouth buffalo) were more numerous in middle river study areas from 1981 through 1990, but have been as or more abundant in the upper river collections since 1991.

This leads to our final observation regarding extrapolations. Apparently EPA plans, or at least had planned, to extrapolate the Ohio River results to rivers nationwide. This should either not be done at all or done with extreme caution. As demonstrated above, even within the Ohio itself, there are significant faunal shifts as one moves throughout the river. Studies in several Ohio River tributaries, such as the Wabash River (EA 1989) and the Muskingum River (EA 1991a & b) demonstrate that even the tributaries have decidedly different fish communities. The differences will be even greater when one moves to rivers further west (e.g., the Missouri), further east (e.g., the Susquehanna), further south (e.g., the Oconee), or further north (e.g., the Wisconsin). These differences are why numerous experts, including the authors of this report, have argued that 316(b) assessments must be site-specific. In most cases, such data are available and, if they are not, then it would be the responsibility of the facility owner to collect relevant data. Such approach is far superior to extrapolating from wide geographic areas with vastly different biotas.

REVIEW OF KEY EPA ASSUMPTIONS

5.1 Impingement and entrainment studies were probably done using poor and outdated techniques.

The impingement and entrainment study techniques used in the late 1970’s at the nine Ohio River case facilities, varied to some degree due to site-specific conditions. Icthyoplankton samples were collected during a 24-hour period using submersible pumps or by tapping into the circulating water system. With two exceptions when nets with larger openings were used, the samples were filtered through nets with a mesh size of 500 or 505 um. Samples were collected on a weekly basis during spring and summer. Some programs also collected samples every two weeks in early fall and monthly during late fall and winter. The sampling period was either for one year or during the period when spawning, drift, and nursery activities would be occurring.

Impingement samples were collected for one year over 24 hour periods. For most of the studies weekly samples were collected during spring through early fall and bimonthly samples collected in late fall and winter. The exceptions were 1) W.H. Sammis where samples were collected every eight days and 2) W.C. Beckjord where samples were collected every week during April through June and every two weeks from July through March. Samples were collected from baskets or screens with a mesh size of 3/8 inch through which the screen wash was filtered.

Extrapolations of actual entrainment and impingement numbers to annual estimates were made using traditional methods. Annual extrapolations were presented by species and/or total numbers.

The methods used in the Ohio River Case Study facilities are still appropriate and are still being used. EA is conducting a number of 316(b) related studies in 2002 using the same types of gear (i.e., pumps, towed nets, and taps into the circulating water system) that were used in studies designed to investigate entrainment and impingement impacts 25 years ago. Icthyoplankton studies being conducted by EA at river locations utilize No. 0 mesh (500 um) nets and samples are collected weekly over 24 hour periods. The basic methods of obtaining samples and analyzing them have not changed. Additional freshwater larval identification keys have been published in the past 25 years. These additional keys aid in identifications from the family level to the genus and occasionally the species level for some families; however, the ability to provide accurate species level identifications for some freshwater larval fishes is still relatively rare. However in general, the taxonomy is at the level where it is often possible to appropriately aggregate genera and species to allow meaningful assessments. Cyprinidae (minnows) is an example of a family where identification keys to species or even genus level continues to be incomplete and inadequate for numerous species.

One area where new methods have been developed is in the area of entrainment survival. Historically, survival studies were not part of most 316(b) demonstrations. For most facilities, the level of intake impacts observed did not result in adverse population changes so it was not necessary to conduct follow-up survival studies.

Under the new 316(b) regulations for new facilities, USEPA is requiring verification monitoring after operation begins, which includes two years of once a month 24 hour impingement monitoring and two years of once every two weeks of entrainment sampling over a 24 hour period during peak periods of reproduction, drift and abundance. Although the studies used for the case facilities covered only one year (a number of the facilities had additional studies which were not used), these studies were much more intensive (weekly to bi-weekly impingement, and entrainment which in some cases was year round) than is now being required by the new source rule.

In conclusion, impingement and entrainment studies performed by the facilities used in the Ohio River Case Study were not conducted using poor or outdated techniques.

5.2 EPA stated that the Ohio River has improved since the impingement and entrainment studies were done and the changes have likely resulted in an underestimation of impingement and entrainment losses. Impingement and entrainment studies are now old and not representative of current conditions.

We agree that there have been improvements in the water quality of Ohio River due to a number of factors including improved wastewater treatment technologies, controls on construction stormwater runoff, tighter permit limits, improvements in urban and agricultural runoffs and improvements in wetland protection. Based on improved water quality, the EPA has made the assumption that the fish populations have shown dramatic improvement. As a result of these improvements, EPA suggests that the case studies (which ended in 1978 and 1979 not 1977 as indicated by EPA) appreciably underestimated the numbers of fish that would be entrained and impinged now.

An Ohio River users group has funded long-term fisheries monitoring at various locations in the upper and middle areas of the Ohio River beginning in the early 70's. These data, although available to EPA, appear not to have been utilized by EPA or their consultants.

Not every location is sampled every year and there have been additions and deletions to the program over time. Locations that provide long-term data and provide good spatial coverage of the river are discussed below. Annual electro fishing surveys have been conducted near the following facilities; Cardinal (river mile 76.7)(21 years), Kyger Creek (river mile 260)(16 years), Beckjord (river mile 453)(11 years), and Tanners Creek (river mile 494)(21 years). These studies have documented widely varying levels of total abundance (EA 2001, Lohner et al 2000). No clear pattern of increasing or decreasing total abundance has been evident. Numerous factors are hypothesized to influence annual variation. One of the most important of these is flow regime, which affects both spawning and recruitment success for most species, as well as sampling for all species.

Taxonomic richness has also varied considerably between years at each of the four long-term plant sites. However, the variation in richness was most associated with the presence or absence of uncommonly encountered species; no invasions or extinctions of common species were noted. High persistence, in terms of species presence, of Ohio River fish communities has been documented despite large-scale environmental perturbations (1988, 1991, and 1999 droughts; 1989 and 1990 floods).

In Chapter C3 of the Ohio River Case Study, EPA indicates that the main species at risk based on their abundance in impingement and entrainment collections are emerald shiner (Notropis atherinoides), freshwater drum (Aplodinotus grunniens), gizzard shad, (Dorosoma cepedianum), sauger (Stizostedion canadense), white bass (Morone chiysops), white crappie (Pomoxis annularis), and white sucker (Catostomus Commersoni). First of all, white sucker is an uncommon or even rare fish in the Ohio River (EA 2001) and certainly is not at particular risk.

Annual trends between 1981 and 2001 in the abundance of some of the more abundant species or groups at each of the four long-term plant sites are summarized in Table 1. Gizzard shad, common carp, several small cyprinids, sunfishes, and drum were generally common or abundant in all study years since 1981. Abundances of these species have varied widely but have not conformed to clear patterns of increasing or decreasing over time. However, several other taxa have generally increased in abundance in recent survey years, particularly since 1986. Higher catch rates of Carpiodes/Ictiobus spp., round-bodied suckers, small percids, and Stizostedion spp. have been observed since 1991, and likely reflect the change in sampling methodology to night electro fishing beginning that year rather than a real increase in their abundance. Water quality improvements are a thought to be a potential factor for the increase in abundance in recent years of skipjack herring, Hiodon spp. (notably in the upper river), channel catfish, flathead catfish, Morone spp., Micropterus spp., and drum. So although there have been some improvements, the current fish community in the Ohio River is not dramatically different than that present when the case studies were conducted. It is particularly important to recognize that the species that dominate the entrainment and/or impingement catches (i.e., gizzard shad, emerald shiner, freshwater drum, and minnows in general) have not changed in abundance. The improvements are mainly in the taxa less commonly entrained or impinged.

5.3 EPA equates higher flows with higher I&E rates.

EPA continues to assume a direct relationship between intake flow and the entrainment and impingement of organisms. The industry continues to maintain and to provide data to prove that such a direct relationship cannot be a general assumption. The relationship between a facility and entrainment and impingement is site-specific. Although flow is an important consideration for entrainment, it is not possible to predict entrainment accurately using only intake flow. Using intake flow as a direct predictor of the magnitude of intake impact on organisms that have the ability to move throughout the water column and exhibit other behavioral choices, as organisms susceptible to impingement can, is an even much greater error.

Table 2 presents the design intake flows in increasing order, for the nine facilities that are the basis of the Ohio River Case Study. Except for known errors, intake flow values were taken from the EPA case study document. For Miami Fort, since units 3 and 4 were retired in 1982, the design intake flow presented in the 316 (b) study cited by EPA rather than the present lower value EPA presented in Table C1-3 was utilized. Utility representatives indicated that the values for W.C. Beckjord and W.H. Sammis were incorrect. Therefore, the value from the 316(b) report was used for W.C. Beckjord and the value provided by the utility representative was used for W.H. Sammis. The annual entrainment and impingement numbers were obtained from the studies cited by EPA and are shown for each intake flow. There is no consistent pattern in the data.

[see hard copy for tables]

The highest entrainment occurred at a plant with a design intake flow of 1805 cfs, while the second and third highest entrainment occurred at the facilities with intake flows of 1066 and 756 cfs, respectively. The lowest entrainment occurred at a plant with a flow value of 1649 cfs, whereas the second lowest entrainment occurred at the plant with the highest intake, flow (2180 cfs). Tanners Creek and Kyger Creek have design flows that differ by <10 % yet entrainment estimates differ by 50-fold between these two plants (Table 2).

The highest impingement (2.3 million) occurred at a facility with a design intake flow of 2024 cfs, whereas the plant with the highest design flow (2180 cfs) had an estimated annual impingement rate of 379 thousand. The lowest impingement (13 thousand) occurred at a facility with an intake flow of 1086 cfs. Four facilities had impingement estimates that ranged from 162 to 186 thousand while the intake flow ranged from 756 to 1805 cfs. Impingement at two facilities ranged from 47 to 52 thousand, whereas the intake flows at these two plants ranged from 1144 to 1607 cfs, respectively.

6. GENERAL OBSERVATIONS: RUM MODEL AND RECREATIONAL FISHERY

In addition to the various detailed comments provided herein, we have several general observations regarding the report and, in particular the RUM model. We agree that the Ohio River offers excellent angling opportunities but believe EPA overstates its significance when it suggests that the river is “famed for its gamefish” (pCl-5). EPA has listed several species as recreational species (Table C3-1) that clearly are not, e.g. coho salmon, grass pickerel, paddlefish (a filter feeder that can only be caught by snagging) and stonecat.

White sucker is listed as one of the main species at risk (pC3-1), where in fact this species is quite rare in the river (EA 2001).

EPA suggests on pC3-21, pC3-38, and elsewhere that the both I & E results collected ~ 25 years ago underestimate the scope of the problem because of water quality improvements in the river. We agree that water quality has improved. However, the species that have benefited most from this improvement are non-game species and forage species (e.g., various minnows, darters, redhorse, etc.). The species vulnerable to impingement and entrainment in the 1970’s (i.e., gizzard shad, drum, emerald shiner, carpsuckers/buffaloes) are no more abundant today than they were more than 20 years ago (EA 2001). The fact that the species most susceptible to I & E continue to be abundant itself suggests the problem is not as severe as EPA suggests.

As described in greater detail elsewhere in these comments, EPA suggests that large numbers of key sport species are being lost. However, much of this “loss” is a result of the inappropriate way in which EPA aggregated species. For example, because of inappropriately grouping various species, EPA concludes that two-thirds of the dollar loss to recreational fishery comes from only two species, small mouth bass and walleye (Table C4-3).

The replacement costs for forage species (Table C4-4) are driven by a few species, some of the most prominent of which are either unaffected by the magnitude of the losses calculated by EPA or which are undesirable species. For example, population modeling efforts have shown that despite gizzard shad being the most impinged species in the river, no significant effects at the population level could be detected when the entrainment and impingement losses were added back into the system (Lohner et al. 2000). Furthermore, we are not aware of any biologists familiar with the river that believe shad populations are limited by impingement and entrainment losses. With regard to entrainment, the forage species that accounts for the most value is common carp. We do not believe there is a single fish manager on the river that believes that the loss of common carp is a bad thing. In fact, given the negative attributes of this species, we are confident these managers would like to see the number lost be increased if that were somehow possible.

In describing the RUM model, EPA notes that “A majority of anglers from Pennsylvania and West Virginia target coldwater species,” and suggests that differences in allocation of target species between Ohio’s anglers and Pennsylvania and West Virginia are unlikely to have a significant effect on welfare estimates because “a significant portion of Pennsylvania and West Virginia anglers (25 and 27 percent) target warm water species; and both coldwater (salmon) and warm water species (e.g., sauger) are affected by I&E in the Ohio River.” We are not sure about the validity of the first reason but it is absurd to suggest that coldwater species are affected by I & E in the Ohio River. On rare occasion, a trout or even a salmon has been reported from the river, but it is not biologically credible that these fish represent anything other than statistical anomalies.

EPA made numerous assumptions regarding anglers that use the Ohio River (e.g., where they came from, what species they target, the value of their trips). Apparently, most of the data EPA used came from a national survey. EPA missed an important reference. Ohio DNR (Schell 1996) conducted an extensive recreational survey of the Ohio River, which contains considerable information that EPA should have at least considered. The survey report presents data by location, pool, habitat type and the entire survey area. Information is provided for both shore and boat angling and for specific species.

On p C5-6, EPA describes bow it calculated fish abundance using data in the Ohio EPA database. The fact the values are based on catch per 300m indicates that these data came from wadeable streams, and therefore, not applicable to a large river such as the Ohio River. Furthermore, it appears that EPA ranked the sites based on total biomass. In wadeable streams most of the biomass is made up of minnows, darters, and other various non-game species (e.g. white sucker) and thus would provide little or no information for anglers to choose the streams they wished to fish. Use of wadeable stream biomass data to rank large river sites is not appropriate. Lastly, the Ohio values are relative, not absolute indicators of abundance. In a wadable stream or even a small river, the catch rate over a narrow linear band (i.e., the band covered by the electrofisher) may approximate the abundance of fish in such systems. However, in large rivers, and certainly in the Ohio River, these data would need to be expanded to account for the width of the river, as was done by Lohner et al. (2000) in their Ohio River population model. We were not able to confirm if data other than the wadeable stream information was used or if an expansion factor was applied to adjust for river width, but it appears they were not.

Even if we agreed with EPA' s assertion that the visual appearance of the site may play an important role in the anglers decision to visit a particular site (p C5-6), using total Kjeldahl nitrogen as a proxy for visual water quality at the sites is totally inappropriate.

ADDITIONAL ITEMS REQUIRING CLARIFICATION OR CORRECTION

As we reviewed the EPA document a number of individual items appeared to be incorrect or need clarification. Some of the items are presented in this section.

A. Table C3-6 on pages C3-23/24 - Annual Impingement. Clifty Creek. EPA indicated on Table C3-4 that they had used the annual impingement estimates as presented in the EIA, 1978 report. If the numbers for Clifty Creek presented in Table C3-6 are added the total number is 1,727,393; however, the actual EIA report indicates the total was 2,268,73. The numbers for individual species do not agree either.

B. Table C3-6 on pages C3-23/24 - Annual impingement. Miami Fort. EPA indicated on Table C3-4 that they multiplied the number of fish impinged by the fraction of the days sampled for the year (365/36 or 10.139) to obtain annual impingement estimates. If the species numbers for Miami Fort presented in Table C3-6 are added, the total number is 221,354. The actual report indicates 17,319 fish were actually impinged during the study. Multiplying 17,319 by 10.139 is 175,597. In addition to that inconsistency, the actual number of days sampled was 39 so the correct factor to use should have been 365/39 or 9.359, which results in an estimate of 162,089.

C. Table C3-6 on pages C3-23/24 - Annual Impingement. W.H. Sammis. This is only facility for which EPA included crayfish. If crayfish numbers are removed, the total obtained by adding the individual species numbers presented in EPA Table C3-6 is very close to the impingement estimate in the actual report.

D. Page C2-11. Kammer — The design flow presented is 1068 MGD when it is actually 1086 cfs. In terms of MGD, it would be 689. Standardization on which units to use would have prevented this type of error. The case study uses MGD, GPD, gpm, and cfs.

E. Page C2-12. Clifty Creek — The design flow presented is 2034 MGD when it is actually 2034 cfs. In terms of MGD, it would be 1312. Standardization on which units to use would have prevented this type of error.

F. Not having the definitions and source for design intake flow and average annual flow rate as presented on Table C1 -3 on page C1 -9 and operational flow as presented in Table C1l3-14 on page C3-35, made it difficult to confirm the values and utilize them in our review.

G. Table C3-2. W.C. Beckjord. EPA indicated a page (dealing with impingement methods) was missing from the document. Page 17 is the missing page from the 316(b) demonstration document for Beckjord and Miami Fort dated July 20, 1979. The page is missing from the file copy of the original report.

H. In Chapter C3 of the Ohio River Case Study, EPA indicates that the main species at risk based on their abundance in impingement and entrainment collections are emerald shiner, freshwater drum, gizzard shad, sauger, white bass, white crappie, and white sucker. It is unclear as to whether this statement refers to the numbers from the actual reports, EPA's summary of those reports (Table C3-6), or is from other summaries based on species groupings rather than individual species. Neither white crappie or white sucker appear on Table C3-6 leading one to think that this statement is based on the EPA groupings list where white crappie is included under black crappie and white sucker appears under sucker spp. At the same time for example, both skipjack herring and gizzard shad, as well as longear sunfish and sunfish spp., appear on Table C3-6 which under EPA groupings contain different species depending upon the facility. The inconsistency in how the species groupings were applied makes it difficult to confirm numbers and interpret the statements.

I. W.H. Sammis Station staff indicated that the once through intake flow indicated on page C1-1 of the case study is correct (1360 MGD, the amount submitted on the Detailed Questionnaire form was 1,361,376,000 GPD). The flow indicated on page C2-10 (1803 MGD) is incorrect. This appears to have resulted in an incorrect calculation of cfs on Table C1-3. The total for W.H. Sammis should be 2180 cfs not 2790 cfs.

J. According to Table C3-2, EPA based their extrapolations on a 1977-1978 impingement study (EIA 1978) and ignored a 1985-1986 study (EA 1987). Given the fact that EPA emphasizes that earlier studies do not reflect recent improvements in water quality, we find it curious that EPA utilized the older study and disregarded the more recent one. On page C3-16, EPA refers to the 1985-1986 study and seems to imply that they used those results. However, this interpretation is at odds with the reference they cite in Table C3-2 as the source of their data. Since both are valid studies, we recommend that both be used.

WINTER MORTALITY OF GIZZARD SHAD BIASES IMPIMGEMENT RESULTS

EPA reported, without comment, on sampling techniques at many of the CWIS that included not counting fish as impinged that were obviously dead before the impingement. We concur with this approach, as there are many occasions when a fish that died from natural, or other non-impingement causes, floats into a CWIS. Typically, following an initial cleaning run, there is a hold period of from 4 to 24 hours before screens are rotated for sampling. Experienced field technicians can easily separate live fish from those dead more than the 4-24-hour hold period, based on the physical condition of the fish.

There is another aspect of naturally dying fish that is particularly pertinent to the Ohio River that we wish to highlight. Based on the data EPA has compiled for the nine CW1S, gizzard shad is by far the most abundant impinged fish, representing approximately 85 percent of impinged fish throughout the river. It has been well-documented that the gizzard shad is vulnerable to water temperature drops and that it is "winter-killed readily" (Trautman 1981, White et al. 1986). The Ohio River drainage is near the northern extension of the species" natural range. As a result of this, it is very likely that a significant portion of the 2.3 million gizzard shad estimated to have been impinged annually at the 9 CWIS would have died naturally, probably within hours had they not been impinged. This assertion is supported by the various impingement studies on the river which show that impingement rates are highest in the winter, exactly what one would expect if winter kill is a real phenomenon. For example, at the Cardinal Plant, 93 percent of the annual estimated number of gizzard shad impinged in 1978-79 were recorded between November 23rd and January 26th. At the Miami Fort Plant, 65 percent of the total annual impingement catch of gizzard shad occurred on January 5, 1978 in association with a sudden and severe temperature drop. We believe natural winter kills of shad may have contributed to a significant overestimation of impingement impacts (and valuation) on the Ohio River.

We do not fault the sampling technologies employed in the prior impingement studies, i.e., if it was impinged and alive, it was counted. But we believe overlooking the unique and well known vulnerability of gizzard shad has resulted in biased estimates of past impingement, and would also in any future studies.

We believe that special protocols could be developed to separate true impingement mortality of gizzard shad from the concurrence of impingement and a natural winter-kill event. Lines of evidence could include:

-time of year (fall through winter)
-has the impingement event coincided with a water temperature drop?
-does the event represent a significant increase in impinged gizzard shad relative to prior days?
-is there evidence of stressed or lethargic gizzard shad in or near the intake? (Cold-stressed gizzard shad will often swim erratically on the surface.) Systematic surveys could be done, by boat if necessary, to make this determination.

Recognizing this phenomenon would remove a significant bias in the impingement estimates for the Ohio River. We further seek EPA's support in addressing this phenomenon in any future impingement studies in the gizzard shad's range, including individual site-specific assessments.

ENTRAINMENT SURVIVAL SHOULD NOT BE IGNORED

In Chapter A7 of EPA's (2002) Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (EPA-821-R-02-002), EPA provided a discussion of current knowledge regarding entrainment survival, and proposed protocols for conducting “sound” entrainment survival studies. This discussion served in part as EPA’s rationale for assuming 100 percent mortality of entrained organisms in the Ohio River case study. The bulk of Chapter A7 consisted of EPA’s critique of 13 previous entrainment survival studies, 12 of which were reviewed and summarized by EPRJ (2000). EA doesn’t wish at this time to respond to individual points made by EPA in Chapter A7. We do, however, wish to clarify some aspects of entrainment survival. The EPRI (2000) report Review of Entrainment Survival Studies: 1970-2000 was a historical examination of entrainment survival studies. That some of the studies reviewed, particularly earlier ones, were less than scientifically rigorous should not be unexpected. EPA’s Chapter A7 fails to acknowledge the evolution of technology and techniques from earlier to later periods that permitted more scientifically credible estimates of entrainment survival. As a result, the overall tone of Chapter A7 is negative to an unwarranted extent.

The technology and experience base exists today to conduct rigorous, scientifically credible measurements of entrainment survival. The larva table technology, which was developed and refined primarily in studies of the Hudson River power plants, represents state-of-the-art technology for collection of entrained organisms with minimal sampling damage. Englert and Boreman (1988), in discussing convergent estimates of conditional entrainment mortality between government and utility scientists in the Hudson River study stated that “…the larva table demonstrated that a considerable percentage of the entrained organisms survived passage through the plant.” The acceptability of the technology by all parties was clear.

In their Chapter A7, EPA provided guidance and protocols for future entrainment survival studies. There is in fact very little that we disagree with. We submit that, with few exceptions, these protocols have already been implemented in the more comprehensive and recent entrainment survival studies that have been conducted. Nor do we disagree with EPA’s assertion that a predictive model of entrainment survival could be developed based on additional studies. This was essentially EPRI (2000)’s final conclusion with regard to entrainment survival assessment: “There is the potential, perhaps in a future project, to move from a qualitative screening tool to a quantitative predictive model.”

In summary, we believe that the tools and experience exist right now to conduct rigorous, credible assessments of entrainment survival at individual facilities, and to ultimately create a predictive model for extrapolation of entrainment survival estimates from one facility to another. We hope that this potential will not be overlooked or obviated as EPA moves toward finalization of the Phase II rule.

COMPENSATION

Compensation is fundamental to the management of all biological systems. Different compensatory mechanisms have been studied in both terrestrial and aquatic systems (Krebs 1985; Cappuccino and Price 1995; Hassel, Latto and May 1989), for most animal groups (Hassell 1978) and for plants (Harper 1977). Compensation was one of the issues the Utility Water Act Group (UWAG) addressed during the 2002 review process for the proposed 316(b) rule for new facilities. In their November 2000 comments as part of docket W-00-03, UWAG provided a review of compensation in fish. Compensation is not just a theory, the concept has been acknowledged and studied by the scientific community. Hilborn and Walters (1992) cite a number of examples of the use of compensation principles in the management of fisheries by resource agencies.

All biological populations need to have some density dependence to persist, and particularly to support exploitation (Kimmerer 1999). Density dependence refers to feedback between abundance and growth, reproduction and/or survival. It is widely acknowledged that biological populations are limited by resources such as food and space. In response to limited resources, population growth and stability is achieved by changes in birth and death rates. With decreasing population size, increased birth rates and/or decreased death rates are expected, while decreased birth rates and/or increased death rates are expected with increasing population size. Compensatory processes increase individual and population growth at low population density and decrease growth at high population density (McFadden 1977). Compensation tends to stabilize populations leading to healthier populations and communities.

Understanding the site specific role of compensation is important to accurately assessing power plant impacts on fish populations. Entrainment and impingement can remove large numbers of young fish from the population, which without compensation could result in population declines. Compensation can act to offset power plant entrainment and impingement related losses in the same way compensation operates to makeup for losses due to natural and other anthropogenic causes (Rose 1999).

The following is a summary of compensation mechanisms in fish populations based on responses at the individual level (EPRI 1987) that are expected to be operating in the Ohio River.

1. Growth compensation: As fish numbers are decreased there will be more food per individual, and therefore, on average the remaining individuals will grow faster and become larger.

2. Fecundity compensation: The fewer but larger female fish generally produce more eggs per individual and may spawn more often because there is a higher food ration per individual.

3. Mortality compensation: Due to growth compensation, the early life stages of larval and juvenile fish can grow faster and reduce the chance of becoming food. Higher food rations per individual means the individual fish is in better condition, which results in better survival.

Rose (1999) indicates that the magnitude of the compensatory response and the life stages in which they operate vary among species depending on their life history strategy and site specific conditions. The compensatory response in survival during early ages is one of the most important factors for many species (Meyers and Cadigan 1993).

Measuring the changes in growth, survival, reproduction, and movement processes that lead to compensation can be difficult in field situations. Population abundance can be measured over time to see if whether the population is stable or changing and particular life stage parameters like juvenile mortality can be measured. However, using field monitoring to track how the observed compensatory response in a population actually occurred is very difficult. But it is not necessary to understand exactly how compensation has occurred in order to quantify compensation. The fact that the long-term monitoring of the Ohio River conducted as part of the Ohio River Ecological Research Program (ORERP) has documented no major shifts in abundance provides strong albeit indirect evidence that compensation is working.

Rose (1999) indicates that methods are available that permit compensation to be represented in models that do not rely on having detailed empirical evidence for exactly how compensation is operating. If a detailed understanding of how compensation works is needed, Rose recommends an approach based on life history theory (three general strategies; opportunistic, periodic, and equilibrium) and individual based modeling.

There are a number of examples of compensation in freshwater, estuarine and marine fish species that can be found in the literature that provide evidence that compensation occurs. Species studied include striped bass (NMFS 1998, Pace 1993), blueback herring (Crecco and Gibson 1990), and yellow perch-walleye (Mills et al. 1987, Mills et al. 1987, Rose et al. 1999). Meyers et al. analyzed a number of species (1995).

EPA Response

EPA notes that the Ohio case study presented at proposal is not included in EPA's final analysis and Regional Study Document for the Phase II rule. Therefore, much of this comment no longer applies.

Nonetheless, EPA wishes to note that in all cases EPA made a good faith effort to obtain the best information available on the fish species evaluated, including information from local biologists and peer-reviewed fisheries literature. Since the time of proposal, EPA has re-evaluated much of the data used for the Ohio study to ensure the reasonableness of the data that were used and made any adjustments that were deemed necessary to improve the reliability of EPA's evaluations, including the grouping of species.

Despite EPA's extensive data collection effort, EPA recognizes that life history information is lacking or highly uncertain for many individual fish species. This is one reason EPA chose to evaluate species groups rather than individual species for its final analysis. Information on the data used for the Inland study, which replaced the Ohio study in EPA's final analysis, is available in Part H of the Regional Analysis Document (DCN #6-0003).

EPA also notes that extrapolation of I&E data was necessary because I&E studies have not been conducted at most of the over 550 facilities in scope of the rule. For an explanation of EPA's extrapolation procedure for the regional analysis for its final benefits analysis, please see Chapter A5 of the Regional Analysis Document and response to Comment 316bEFR.041.041.

EPA made a good faith effort to provide information on data sources, assumptions, and calculations used for its I&E evaluations, and regrets any difficulties the commenter may have had in locating this information. I&E methods are discussed in Chapter A5 of the Regional Analysis Document. Life history data used for the Inland analysis, along with data sources, are provided in Appendix H1 of the Inland Report presented in Part H of the Regional Analysis Document.

Regarding EPA's assumption, for the purposes of its national analysis, that I&E is proportional to flow, please see EPA's response to Comment 316bEFR.041.037.

Please see Chapter A7 of the Regional Analysis Document and response to Comment

316bEFR.306.506 for a discussion of EPA's conclusions concerning entrainment survival.

Please see response to Comment 316bEFR.025.015 for EPA's rationale for not considering potential compensation in its analyses of foregone fishery yield. Note, however, that foregone fishery yield is calculated for commercial and recreational species only, which applies to only about 2 percent of I&E losses.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Doug Dixon

On Behalf Of:

EPRI (Electric Power Research Inst)

Author ID Number:

316bEFR.208

Comment ID 316bEFR.208.001

Author Name Doug Dixon
Organization EPRI (Electric Power Research Inst)

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

Cooling System Retrofit Cost Analysis

EPRI

July 26, 2002

1. INTRODUCTION

Scope of study

The focus of this study is on the costs of the "cooling tower option" for meeting the 316 (b) regulations. Information from a variety of sources is collected and organized to provide a reliable estimate of the likely costs of retrofitting wet cooling towers onto existing plants originally constructed with once-through cooling. Costs estimated for existing plants conducted by utilities and in some cases independent studies by architect/engineering firms are identified, scaled up from the date of the study to reflect 2002 costs and correlated against postulated important plant characteristics. Studies that have attempted to use generalized costing rules to estimate the costs for all units potentially subject to the Proposed rule are examined. The results of these studies are compared with data from studies of specific plants when available. The agreement or lack thereof is used to estimate the range of costs likely to be encountered and these are compared to the EPA results.

While the primary emphasis is on the capital costs of the retrofit, it is recognized that the effects of using recirculated cooling on plants originally designed for once-through cooling can include changes in the O&M costs, an increase in the plant heat rate and a reduction in the plant output capacity particularly during the warmest and most humid days of the year. Simple estimates are provided to establish the range of these costs as well. Finally, the use of recirculated cooling, while doubtless reducing the intake of water into a plant's cooling system, may introduce other environmental impacts. These are considered briefly.

Organization of report

The remainder of the report is organized into seven sections. Sections 2 through 5 deal solely with capital costs. Section 2 reviews the EPA methodology and cost estimates. Sections 3 and 4 collect, review and correlate information from individual plant studies by utilities and A&E's (Section 3) and cost studies based on generalized costing rules (Section 4). Section 4 also presents comparisons of the studies with the individual plant information and intercomparisons of the various generalized cost estimates. Section 5 presents comparisons with EPA results.

Section 6 reviews the cost of increased O&M requirements, of increased heat rates and of hot-day capacity loss. Section 7 reviews other environmental issues that might result from the introduction of recirculated cooling on a widespread basis at once-through cooled plants. Finally, Section 8 summarizes conclusions drawn from these analyses.

2. EPA ANALYSIS

Introduction

This section provides a brief review of the cost analysis methodology used by EPA in their development of the proposed Phase II rule. In addition to the proposed rule itself, the primary sources of information are

-EPA Economic & Benefits Analysis; EPA-821-R-02-001 (2)
-Case Study Analyses; EPA-821-R-02-002 (3)
-Technical Development Document; EPA-821-R-02-003 (4)

Underlying methodology and assumptions

The EPA approach to developing the likely cost of the "all cooling towers" option is based on a few major assumptions.

1. The addition of a cooling tower at a plant will connect to the existing condenser and the circulating cooling water flow rate will be unchanged, and
2. Portions of existing condenser conduit systems can be used, although some intake modification and conduit branching may be required.
3. The EPA cost development methodology used new facility, or "greenfield", cost estimates that are then adjusted by multiplying "factors" in order to determine the cost of retrofit at a plant of the same size (circulating water flow rate).

Items 1 and 2 are illustrated for purposes of discussion in Figures 2-1 and 2-2, which show schematically the rearrangement of the circulating water piping and make-up and blowdown conduits that are needed.

[see hard copy for figure]
Figure 2-1

[see hard copy for figure]
Figure 2-2

Cooling system re-optimization:

The issue of whether the circulating water flow and condenser configuration are kept the same is an important one. Systems originally designed for and operated on once-through cooling typically have a higher condenser flow rate than do systems designed originally for recirculated cooling with cooling towers for the following reasons:

1. The circulating water loop head requirements are substantially lower for once-through systems where the major pressure drop occurs across the tube side of the condenser. In a recirculated system the head rise needed to lift the water to the spray deck at the top of the cooling tower is added to the

condenser pressure drop increasing the required pumping power by a factor of two or three if the flow rate is the same.

2. For a given heat load , the temperature rise of the cooling water as it flows through the condenser is inversely proportional to the flow rate. Therefore, for a given condensing temperature, the mean temperature difference across the condenser is greater for a lower water temperature rise (higher flow) allowing for a smaller condenser. Typically, once-through systems optimize at flow rates corresponding to a temperature rise of 10 to 15 F with a circulating water flow rate of 400 to 700 gpm/MW as shown in Figure 2-3 for the 50 plants for which cost data were obtained.

3. On the other hand, cooling towers operate more effectively at higher temperatures and lower water flow rates. The higher inlet temperatures would provide for a larger driving force for heat rejection to the atmosphere, thereby reducing the required size and fan horsepower of the tower. Therefore, compared to a once-through system, an optimized tower system normally has higher temperature rises across the condenser, lower circulating flow rates resulting in lower pumping power, a smaller and less expensive tower, but with increased condenser area.

[see hard copy for figure]
Figure 2-3

Therefore, a retrofit strategy which leaves the circulating water flow and condenser unchanged results in a tower which is more costly and pumping requirements that are higher (the tower would have to be larger to handle the higher volumes of water at the lower inlet temperature) than an optimized recirculated system but avoids the cost of retrofitting the condenser and minimizes the modifications required to the circulating water piping.

A retrofit strategy that re-optimizes the balance of the cooling system to accommodate the change to a recirculated system by cutting the circulating water flow rate by 40 to 60%, will require major condenser tube-side modifications to keep the tube side water velocities at sufficiently high levels. This typically requires a change from a one-pass to a two-pass tube side, rearrangement of the water boxes, and rerouting of the inlet and outlet piping. These modifications may require substantial time and effort to gain access to the condenser through the turbine hall walls, and to rearrange massive piping in the area below the turbine exhaust.

The approach which re-optimizes the cooling water system as part of the retrofit typically incurs higher costs for the retrofit itself but results in more efficient operation with lower heat rates and lower operating energy requirements over the remaining life of the plant. Therefore, this strategy would be preferentially applied to large, base-loaded (low heat rate plants) with long remaining life. EPA has not made this distinction in their analysis. However, as will be noted later, nearly all the case studies done at individual plants by the owners themselves or by A&E firms adopted a similar strategy so virtually no data exist to establish the difference in either capital cost or lifetime operating costs definitively.

Use of existing circulating water piping circuit

The ability to use existing circulating water piping is an important feature of minimizing the cost of retrofit. It depends on two factors: the ability of the existing piping to handle any increased pressure and the availability of a place to locate the cooling tower in reasonable proximity to the turbine hall and the existing condenser.

1. The need to pump the hot water from the condenser to the top of the tower imposes a higher pressure on the condenser tubes, the inlet and exit waterboxes and all piping from the circulating water pumps to the cooling towers. In many cases, neither the waterboxes nor the piping itself is designed to withstand this additional pressure, which might be an increase of 15 to 30 psi. In these cases, reinforcement or even replacement may be required at substantial additional cost.

2. At some sites, the only feasible place to locate a cooling tower may be quite far from the condenser and the existing inlet and discharge structures. There are also some sites that are so constrained that placement of a wet cooling tower is essentially impossible. Some studies have required the placement of the tower as much as one-half mile away, requiring the installation of 4000 to 6000 feet of new circulating water conduit.

New facility costs

The estimates for new facility costs were documented in the support documents (5, 6, 7, 8) published in conjunction with the 316(b) Phase I Rule for New Facilities. These costs were subjected to industry review at the time of that rule making but are summarized briefly here for convenience of reference.

The fundamental cost element was for the cooling tower itself. The estimates, based on “discussions with experienced industry representatives”, were as follows:

The range of costs were expressed as $ per gpm of circulating water flow for towers with water flow rates less than or greater than 10,000 gpm (corresponds to plants of about 20 MW)

BASE TOWER COSTS---NEW FACILITIES*

Circ. Water Flow Rate	Approach (Tcold – Tambient wet bulb)	Cost Factor ($/gpm)
< 10,000 gpm	10	30
“	5	50
> 10,000 gpm	10	30 - 25
	5	50 - 45

** for towers up to 204,000 gpm; larger systems assumed multiple towers

Additional scale factors included:

Material factors:
Douglas fir 1.0
Redwood 1.12
Concrete 1.4
FRP 1.1 (fiberglass reinforced plastic)

Fill factors:
Film fill 1.0
Splash fill 1.1

Non-fouling film fill   1.1

Total installed cooling tower costs were taken as 1.8 times the cooling tower capital costs.

The capital cost included

- Wet mechanical draft tower, furnished and erected (with internal tower piping, □□ risers and valves, fans, motors, electrical service and housing)
- Site preparation, clearing and grading
- Excavations for basins and piping
- Circulating water piping, valves and fittings to and from condenser
- Access roads
- Full circulating pumps and housing
- Installed concrete basins, sumps and footings
- Electrical wiring, controls and transformers
- Blowdown water treatment facility
- Acceptance testing and installation.

The x 1.8 multiplier also accounted for construction management, mobilization and demobilization, design engineering and architectural fees, contractor overhead and profit, turnkey fee and contingencies.

Therefore, for a redwood tower with splash fill designed for a 10F approach in a size range near 200,000 gpm, the cost is given by

$25/gpm x 1.12 x 1.1 x 1.8 = $55.4/gpm

Comparison with other cost estimates:

There are other recent cost estimates for new wet cooling towers to be found in publications by Maulbetsch and DiFilippo (9) and by Burns and Micheletti (10).

Costs for just the cooling tower (purchased and erected) for various local climatic conditions ranged from $20 to $25/gpm. The inclusion of the other elements included in the EPA estimate of "base capital cost" increased this value by a factor of about 1.5 resulting in a cost of $37.5/gpm to be compared to EPA's $25./gpm. However, the usual multiplier in the several studies of new and retrofit costs (including recent work by Burns & Micheletti (10), Stone & Webster (11) and others (12)) for indirect costs average to 1.35. These costs included construction management, mobilization and demobilization, design engineering and architectural fees, contractor overhead and profit, turnkey fee and contingencies. Applying this to the estimates in Maulbetsch and DiFilippo (9) gives a system installed cost of about $50/gpm, which is in essential agreement with the EPA value. An informal survey (13) of recent tower purchasers in the industry at the time of publication of the M&D report suggested that the estimates were close to the range of their recent experience.   It should be noted that significantly higher cost estimates could be found in recent literature (10, 14) although the basis for a direct comparison with EPA results is not easy to define.

Retrofit vs. new installations

Capital cost estimates for retrofit cooling towers were based on “greenfield” cost estimates described above using:

-For fossil plants: redwood, mechanical draft towers with splash fill
-For nuclear plants: concrete, mechanical draft towers with splash fill.

It was recognized that the construction and installation process was generally more difficult, time-consuming and costly when done on the site of an existing, operating facility with attendant interferences of existing structures, overhead and underground interferences and the on-going conduct of business. These additional costs were described as including such items as:

-Branching or diversion of cooling water delivery systems,
-Reinforcement of retrofitted conduit system connections,
-Partial of full demolition of conduit systems and/or structures,
-Additional excavation activities
-Temporary delays in construction schedules
-Potential small land purchases
-Hiring of additional (beyond those typical for the “greenfield” cost estimates) equipment and personnel for subsurface construction
-Potential additional cooling water (recirculating or make-up delivery needs), and
-Expedited construction schedules and administrative and construction-related safety procedures.

The factor applied to account for these costs was chosen by the Agency as 20% for “activity necessary to convert cooling systems” and 30% for “upgrading of cooling water intake structures and screens”.

In addition to this retrofit factor, two other multipliers were applied:

1. A contingency factor of 10% to account for miscellaneous unspecified uncertainties associated with a construction project, and
2. A regional cost factor to account for local differences in labor and material costs. These were applied on a state-by state basis and ranged from 0.739 (for SOuth Carolina) to 1.245 (for Alaska).

The magnitude of these adjustment factors is of paramount importance in determining the appropriateness of the estimated retrofit cost estimates. A number of comments are relevant:

1. The regional cost factor is based on well-documented information from the R. S. Means Cost Works 2001 (15). This approach to accounting for local cost differences is well established and consistent with methods in other studies.
2. The 10% contingency factor, while presented without any supporting evidence, is also consistent with similar estimating methods used by others.
3. The retrofit factor, however, is also selected without any documentation or reference to any supporting data or information based on experience with comparable projects at new vs. existing facilities. While confirming (or contradictory) evidence is difficult to find, there are reasons to believe that the 20% adjustment factor will underestimate the retrofit-related costs in many (although perhaps not all) cases. Specifically,

-Site-specific retrofit costs studies show a high degree of variability from costs based on commonly accepted scaling methods. Cooling tower cost estimating methods are often based on the use of a $/gpm rule of thumb. This is approach is used by tower vendors, A&E firms and experienced users and is based almost entirely on the field's experience with tower construction at new sites. EPA used this approach as well. It can, therefore, be reasonably assumed that the variability in careful engineering estimates of site-specific retrofit costs, which will be documented for about 50 cases in Section 3, is due to differences in the degree of difficulty associated with the retrofit aspects of each project.

-It is also reasonable to assume that the lower bound of these costs is associated with the "easiest" retrofit cases, which would correspond most closely to a new facility project free of the interferences encountered at most existing facilities. As will be seen, the lower bound of the case data corresponds reasonably well with the "greenfield" cost estimating rules proposed by EPA, while the mid-range of the data is 40 to 60% higher with many cases ranging to a factor of 2 to 4 times more expensive.

-Discussions were held with project managers at actual sites where construction projects of a similar nature to cooling system retrofits were either underway or had been estimated in detail for potential future site modifications. In all cases, the cost increments associated with constraints imposed on the project by the complexities of construction at an existing site were claimed to be significantly greater than 20%, with estimates ranging from 50% to 100%. This range is reasonably consistent with what might be inferred from the case study estimates discussed above. The reasons given for the incremental costs included many that were apparently not included (or at least not specifically identified) in EPA's discussion of their retrofit cost factor. These included

i. The need to locate new structures far from their preferred location because of pre-existing structures, switchgear, access roads, etc.
ii. The extreme difficulty of installing underground piping in the presence of pre-existing piping and cables that had to avoided or relocated. In one instance, the installation of a circulating water line for a new unit located on the back of an existing site encountered over 150 interferences and increased the cost of normal estimates on a "per ft. diameter-ft. length" basis by a factor of nearly five.
iii. The need to locate material laydown areas and crew parking areas several miles from the site with an attendant effect on productivity alone estimated at 10 to 20%.
iv. The inability, in some cases, to carry out some aspects of the project in parallel with others where the site access would be blocked by a structure that construction of them could not commence until all others were completed.

While it is not possible to generalize such experience to all sites, they establish the point that very high retrofit factors will inevitably be encountered at many facilities.

3. RETROFIT COST DATA--INDIVIDUAL PLANTS

Data Sources

Cost estimates for retrofitting once-through cooling systems to recirculated systems were solicited from many utilities including EPRI and Utility Water Act Group (UWAG) member companies. In addition, a brief literature search was conducted for published studies. Cost information was obtained for 50 plants. These were grouped by fuel type (nuclear or fossil), plant size (> or < 500MW) and source water type (fresh, brackish or saline). Table 3-1 gives the distribution of the plant data among the categories. Appendix A tabulates the plants (identified by sequential numbering as Plant “n”) with pertinent information about plant capacity, circulating water flow rate, location by region, fuel, source water type, retrofit cost data (as reported and scaled to 2002$, and the estimates for the plant from the Stone & Webster study (16).

Distribution of Plants With Data (50)

NUCLEAR (15)

	Saline	Brackish	Fresh
> 500 MW (15)	5	5	5
< 500 MW (0)	0	0	0

FOSSIL (35)

	Saline	Brackish	Fresh
> 500 MW (29)	2	8	19
< 500 MW (6)	1	1	4

Table 3-1

The source information came in varying forms and some adjustments were often required to put them on a common basis. The two most important considerations were the year in which the estimate was made and whether or not ancillary costs were included in addition to the direct costs.

Year of estimate

In all cases, the year in which the estimates were made was reported. The dates of the estimates ranged from 1973 to 2002. For estimates made in years prior to 2002, the values were scaled up to 2002 dollars using the appropriate multiplier from the Engineering News Record’s Construction Cost Index (ENR-CCI), available at http://enr.construction.com/cost/costcci.asp. These factors are displayed in Table 3-2. The increase over the past ten years is equivalent to a compound escalation rate of 2.8%.

[see hard copy for figure]

Construction Cost Index History (1908-2002)

In a few instances, the utility supplying the data provided a separate estimate of updated costs from original earlier estimates. These were generally close to, but not necessarily identical to the factor that would be derived from the ENR-CCI. In those cases, the utility estimate was used on the basis that it might better reflect local circumstances.

Level of detail

The information provided for the cost of retrofit at a particular plant varied from a “single number estimate” to fully documented engineering studies. Two important questions for the “single number estimates” were:

1. What was the extent of the retrofit?

2. What ancillary project costs were included?

Extent of retrofit

"Extent of retrofit" refers to whether or not the plant cooling system was re-optimized to account for the different operating characteristics of a recirculated system. Specifically, in what might be characterized as a "minimum modifications retrofit" the existing cooling circuit would be left largely unchanged. The circulating water flow would be kept the same; the surface condenser would be unchanged. A wet cooling tower (typically mechanical draft) would be inserted into the cooling water flow loop; the circulating water pumps would be replaced or upgraded to meet the increased head requirements imposed by the need to pump water to the top of the tower; the circulating water lines would be re-routed or reinforced as required; and make-up and blowdown pumps, lines and treatment facilities would be added. This approach is a minimum initial capital cost approach but results in a less than optimum design and operating condition for a recirculated cooling system.

Re-optimized retrofit

Compared to once-through cooling, recirculated cooling is normally designed with lower circulating water flow rates due to the higher head rise required to pump the water to the top of the tower, typically 40 to 60 feet above the condenser outlet. The lower flow results in higher temperature rise across the condenser. The tower is then optimized for a higher range (Th on – Tc off) and a lower L/G (liquid to gas ratio) than would be the case for a tower operating at the flow and temperature rise of the original once-through system. This results in a lower cost tower with a closer approach to ambient wet bulb than the unoptimized case.

However, the steam surface condenser would then need to be reconfigured to maintain its performance at the lower flow, higher range conditions. Typically, this would be accomplished by changing the tube side from a one-pass to a two-pass design in order to maintain the water velocity in the tubes at an acceptably high level. This in turn requires substantial re-arrangement of the inlet and outlet headers and piping and often considerable demolition (and subsequent rebuilding) of the turbine building walls in order to gain access to the condenser for the modifications.

Re-optimization, therefore, adds considerably to the initial capital cost of retrofit but results in a system with substantially lower operating cost (lower pump and fan power requirements) and lower performance penalties for the remaining life of the plant. Therefore, the re-optimization approach would be used only for large, typically base-load plant with a long remaining life. With only two exceptions, all of the cost information used in this analysis was for "minimum modification retrofits".

Ancillary costs

The fully documented studies presented direct cost items including purchased equipment and installation costs. Table 3-3 displays a listing of typical cost elements, taken from a published study of retrofit cost estimates for a large nuclear plant (11). In addition, ancillary cost elements are added in order to develop a realistic "total project cost". One such set of cost categories is listed in Table 3-4, taken from a study of the Millstone Plant presented to the Connecticut Department of Environmental Protection (Ref. 12). These cost are normally "factored" or estimated as a percentage of the Direct Costs. The percentages used in the Millstone study are given in Table 3-4. Based on these values, the ancillary costs add 37% to the Direct Costs of the retrofit.

[see hard copy for figure]
Table 3-3: Typical Cost Elements for Recirculated Retrofit (from Ref. 11)

Table 3-4: Typical Ancillary Costs

Cost Category	% of Direct Cost
Construction Management	7
Engineering	10
AFI*/Contingency	20

* Allowance for Indeterminates

Other studies include similar adjustments to the Direct Costs. Regardless of the exact categorization, the total adjustment ranged from 35% to 45% in the case of one utility study.

In interpreting the "single number estimates" received for individual plants, it was not clear whether the cost represented the Direct Cost or the total project cost. Telephone inquiries to all sources that could be reached indicated that in most (but not all) cases the total project cost was included but it was seldom known what percent of the total was represented by the ancillary costs. In cases where it was determined that only the direct costs had been reported, the cost was increased by 40% to put it on a consistent basis with the rest. For cases where it could not be determined which costs were reported, it was assumed that the reported cost was the total project cost.

Cost information from individual plant case studies

The cost data for each of the plants, scaled to a comparable basis in 2002$, is displayed in Figures 3-1 through 3-6.

Cost vs. Plant Size:
Figure 3-1 plots the cost against plant size in MW. This is consistent with the conventional means of normalizing cost data for power plant equipment on a $/kW basis.

[see hard copy for figure]
Figure 3-1

In this case, the correlation, while roughly proportional, is poor. The costs range from well below $100/MW to well above $250/MW. This is due in part to the fact that the cost of cooling system components is more closely related to the amount of water being circulated and cooled than to the heat load being rejected. Additionally, the circulating water flow rate per MW of plant capacity is not constant but varies considerably from plant to plant as a function of heat rate and design choice, as shown in Figure 2-3, suggesting that a correlating factor of $/gpm would be more directly related to the size and capability of the cooling system. As discussed in Section 2, this is in fact the scaling factor in common use in the cooling system industry and that which was used by EPA and others in cost analyses of both new and retrofit cooling systems.

Cost vs. Circulating Water Flow Rate

Figure 3-2 displays the same data against circulating water flow rate.

[see hard copy for figure]
Figure 3-2

While the general correlation against flow rate is improved over that against plant capacity, a considerable range still exists and numerous outliers are evident.

The following figures show the results of trying to categorize the results by plant type (fossil vs. nuclear) in Figure 3-3 and by source water type (saline vs. brackish vs. fresh) in Figure 3-4.

[see hard copy for figure]
Figure 3-3

[see hard copy for figure]
Figure 3-4

Fossil vs. nuclear plants:

The data in Figure 3-3 suggests that there is no consistent separation between the costs at nuclear vs. fossil plants. The nuclear plant cost estimates exhibit much greater variability than do the fossil plant estimates with outliers on both the high and low cost extremes. However, many of the plants fall in a range that is indistinguishable from the majority of the fossil plants over a nearly five-fold range of cooling system size as measured by circulating water flow rate.

Source water type

Figure 3-4 suggests a similar conclusion for the effect of source water type. Retrofit costs for plants using brackish water plants exhibit higher variability than do those for either fresh or saline water. While this may be indicative of greater inherent variability in water properties within the class designated as brackish, it seems unlikely that the case study results reflected that detailed an analysis. The apparent variability in costs in the brackish category may more likely be attributed to the fact that those points which might be considered outliers are also nuclear plants which exhibit greater variability for all water types.

This hypothesis is investigated further in Figures 3-5 and 3-6 that refine the analysis further by separating the data both by fuel type and source water type. Figure 3-5 shows all the fossil plants separated by water type.

[see hard copy for figure]
Figure 3-5

With one or two notable exceptions (one on the high cost side, the other on the low cost side, both of which are brackish water sites), there is reasonable correlation across all source water types within a range of +/- 35 to 50%.

On the other hand, Figure 3-6, which displays similar information for the nuclear case studies, exhibits very high variability for all source water types.

[see hard copy for figure]
Figure 3-6

The overall conclusion is that neither size nor flow rate scaling, or differences associated with fuel or service water type account adequately for the site-specific differences in retrofit costs. This is clear from a detailed look at some of the individual case study documents.

For example, in a study of nine individual plants at a single utility, the site-specific elements at each plant were factored from an in-depth study at one of the plants. The cost of retrofit was broken into 15 separate elements. The scale factors for many of the major elements varied from 1.0 to 3.3 across the other plants. In one instance, 2/3 of the cost of retrofit at one of the plants was for items that were completely absent at all the others. Clearly the retrofit costs at each of the plants was dominated by site-specific adjustments rather than by simple scale factors based on size or flow rate.

In a survey of EPRI and UWAG members, utilities were asked to assess the seriousness of eight potential site-specific issues which might make retrofit more difficult and more costly at their plants.

The specific issues raised were

1. Availability of land at the site to place a cooling tower.
2. Distance of a preferred site from the turbine/condenser
3. Likelihood of interferences to installation of new circulating water piping.
4. Unacceptable site geology or topography for tower support
5. Drift or plume problems
6. Noise problems
7. Aqueous discharge constraints on blowdown
8. Need to re-optimize condenser or reinforce condenser for increased pressure

Responses were received for a total of 56 plants. Table 3-5 indicates the number of plants at which each issue was deemed to be a problem for cooling system retrofit. Each of the issues was identified at least 1/3 of the plants with some at nearly all. The most common concerns were the difficulty of finding a site near the turbine/condenser and the difficulty of installing circulating water piping in the midst of existing underground interferences.

[see hard copy for figure]
Table 3-5

EPA Response

See response to comment 316b.EFR.208.002. This appendix is continued in comment 316b.EFR.208.002 and the Agency responds to both portions of the analysis there.

Comment ID 316bEFR.208.002

Author Name Doug Dixon

Organization EPRI (Electric Power Research Inst)

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

4. INDEPENDENT RETROFIT COST STUDIES

Three independent studies have been conducted recently to estimate the cost retrofitting existing facilities from once through cooling to closed-cycle cooling. These studies were done by Stone & Webster Engineering Corporation (SWEC), the Washington Group, Incorporated (WGI) and the National Energy Technology laboratory (NETL). A brief review of the methodology used in each study and a comparison of the results to the individual plant data presented in Section 3 follows.

SWEC Study

The SWEC developed a retrofit cost estimate for each of 1041 units currently using once-through cooling. The cost for each was scaled from one of six reference plants for which detailed cost estimates of a cooling system retrofit had been conducted in the past. These reference plants, listed in Table 4-1, cover a range of plant fuel, source water type and plant size. The total retrofit cost for each reference plant was aggregated in four categories as:

-Labor
-Materials
-Equipment, and
-Indirect costs.

For each individual unit, a reference plant was chosen which was most representative of the unit being estimated. The cost was then scaled from the selected reference plant using two scale factors.

1. The labor cost component was adjusted for regional differences in wages and productivity between the individual unit and the reference plant.
2. The adjusted total cost (adjusted labor plus materials, equipment and indirect) was then scaled from the reference plant to the individual unit on the basis of circulating water flow rate.

This approach is essentially that used by EPA except that SWEC made the regional cost adjustment on the labor component while EPA applied an adjustment factor to the total cost.

The assumption was made, as it was in all of the studies and in the EPA development, that the circulating water flow rate remained the same for the retrofitted closed-cycle system as for the original once-through system.

No attempt was made to adjust each estimate for local conditions or site-specific "degree of difficulty". The cost estimates, because of the method used, will inherently reflect whatever local retrofit issues or difficulties pertained at the chosen reference plant. Figure 4-1 displays graphically the costs that would be generated by each of the reference plants for the range of circulating water flow rates. With the exception of Plant X5, they are all within a relatively narrow cost range from \$185/gpm to \$212/gpm. Plant X5 represents a situation where relatively little work had to be done to upgrade the circulating water and make-up water systems.

[see hard copy for figure]
Table 4-1

Figures 4-2 through 4-5 display comparisons to the individual plant case study data with the results of the SWEC estimates. These estimates give excellent (+/- 25%) agreement against approximately 2/3 of the individual plant data as shown in Figure 4-2 and reasonable agreement (-25%/+50%) for all but about 20% of the cases. A few points are substantial outliers exceeding the estimates by a factor of two or more.

It is noteworthy that most of the deviation is in the direction of underestimating the individual plant costs rather than overestimating. In fact, the data cluster itself has a reasonably well-defined lower bound while discontinuities and outliers characterize the high cost boundary. This is consistent with the notion of a reasonably well-defined “minimum cost retrofit” (such as might be represented by new facility construction) modified by site-specific differences, which lead to a range of high-end costs, which are not predictable on the basis of simple scaling laws.

Figures 4-3 through 4-5 break the comparison down by the categories of fuel (fossil/nuclear), source water type (fresh/brackish/saline) and SWEC reference plant.

Figure 4-3 indicates that the agreement is generally better for the fossil units than for the nuclear units, which account for all but one of the plants where the retrofit costs exceeded the estimates scaled from the nuclear reference plants by more than a factor of two. A number of the nuclear plants, however, agreed extremely well with the estimates suggesting again that sites where no significant site-specific difficulties exist are comparable and can be scaled by cooling system size or circulating water flow rate. However, sites where issues exist can incur costs significantly in excess of what would be expected.

Figure 4-4 seems to indicate greater differences from scaled estimates for brackish sites. However, as was discussed in Section 3, many of the brackish sites exhibiting large differences from the estimates are also nuclear plants making it difficult to attribute the cause of the variability to the source water or the fuel type.

Figure 4-5 shows no particular separation in the quality of the estimates associated with the choice of base reference plant. This is somewhat to be expected since the range of cost (per gpm of circulating water flow rate) is not large (+/- ~ 7% as seen from Table 4-1). Reference plant X5, the largest nuclear plant, has a significantly lower cost per gpm (by about 30% from the average of the other 5 base plants) and does under-predict three of the larger nuclear units. On the other hand, it predicts three others quite well, suggesting again that site-specific issues are often the dominant determination of the costs of retrofit.

[see hard copy for figure]
Figure 4-1

[see hard copy for figure]
Figure 4-2

[see hard copy for figure]
Figure 4-3

[see hard copy for figure]
Figure 4-4

[see hard copy for figure]
Figure 4-5

Washington Group Study

The Washington Group completed another study to estimate the costs of cooling system retrofit (Ref. YY). The approach taken in this study was quite different. For each unit in the population of units eligible for retrofit, information was obtained from an industry database, on the power generation thermal cycle, steam conditions and unit size and grouped the units by these variables. The reject heat load to the condenser was then calculated based on heat balance equations chosen as appropriate for each grouping. A constant cooling water temperature rise across the condenser of 12° F was chosen for each unit and, from this, a cooling water flow rate could be calculated and a cooling water flow per unit plant output could be determined.

Costs for closed-cycle cooling systems were determined from vendor estimates and contractor experience for fresh and saltwater cooling systems for a range of cooling tower sizes. In addition to the cooling tower structure, costs were added for the cooling tower basin, circulating water pumps, circulating water pipe costs, make-up water treatment system, circulating water chemical treatment system, make water pump, electrical equipment and connections, and additional multipliers for engineering, construction management, interest during construction, startup, contingency and fees. All the costs were then normalized on a cost per circulating water flow rate ($/gpm) and applied to the unit groupings developed for the different thermal cycles and associated heat rates.

Retrofit issues were addressed in a limited fashion. The circulating water lines were calculated on the basis of 1000-foot length (implying a 500 foot distance between the condenser and the tower) for each case. This was felt to be longer than would normally the case in new plant construction and chosen to account for difficulty in finding a closer location for the tower at an existing site. New circulating water pumps were included to account for the increased head rise required to pump the water to the top of the tower. Beyond these two items, the cost elements were essentially identical to new facility costs.

A comparison of the results of this analysis to the individual plant costs discussed in Section 3 is presented in Figure 4-6. The WGI estimates are consistent with the lower bound of the individual plant data as might be expected for estimates which are consistent with new facility costs and which do not reflect issues related to retrofit conditions.

The range of cost per gpm costs developed in this manner range from $70 to $95 per gpm for fresh water units and from $95 to $125 per gpm for saltwater units. This compares to the SWEC scale factors based on site-specific studies of projects carried out under retrofit conditions of $140 to $212 per gpm. This comparison is further indication that a 20 to 30% adjustment to new facility costs to account for retrofit issues is insufficient.

[see hard copy for figure]
Figure 4-6

National Energy Technology Laboratory (NETL)

A brief study of retrofit costs at four sites was conducted by NETL. The sites were:

-1700 MW (2 units) nuclear plant on brackish water
-1100 MW (2 units) fossil (gas and coal) plant on brackish water
-700 MW (2 units) fossil (gas) plant on brackish water
-1850 MW (4 units) fossil (coal) plant on saline water.

The exact methodology and scope is not known but a simple comparison is made with estimates for the corresponding plants from the SWEC study in Figure 4-7. The agreement is reasonable with three of the four cases within 20% and the fourth within about 40%. While the results of such a limited sample may be fortuitous, the general agreement between two sets of estimates both of which attempted to factor in site-specific retrofit issues gives further support to the contention that a simple scaling from new facility estimates is inadequate to account for retrofit costs.

[see hard copy for figure]
Figure 4-7

5. COMPARISON OF DATA WITH EPA ESTIMATES

A comparison of EPA cost estimates with either the individual plant cost data (from Section 3) or the results of the three independent cost studies (SWEC, WGI, NETL) is difficult. EPA does not report plant-by-plant estimates. Also they include a number of cost adjustment factors and add-ons in the cost tables and example calculations which make it difficult to generalize or average across the population of plants.

As an alternative for comparison purposes, a likely upper bound of the EPA cost estimates can be established. The costs are based on new facility costs reported in Economic and Engineering Analyses of the Proposed §316(b) New Facility Rule (8). In Table A.5 of that document costs are given for a range of flows for five different materials of tower construction. For cooling water flows grater that 10,000 gpm, the highest cost per gpm is for a concrete tower with a flow rate of 11,000 gpm and equals $76/gpm. Excluding Alaska and Hawaii, the highest regional cost factor is for New Jersey and equals 1.099, bringing the adjusted cost to $83.2/gpm.

In the example calculations given in Technical Development Document for Proposed Section 316(b) Phase II Existing Facility Rule (4), the capital cost of the installed cooling system alone was increased by additional factors for

-Intake and discharge piping modification capital costs
-Cooling water intake technology retrofit capital costs, and
-Condenser upgrade capital costs.

These items added over $12.5 million to a base cooling system costs of $53,550,000 or an increase of about 25%. While these costs are apparently not applied in all cases, they suggest a potential increase in $/gpm factor of 25%, bringing the system cost to $104/gpm for new facility costs.

The authors then developed the retrofit costs by adding a 20% retrofit factor (30% for some elements of the system), a 10% "contingency factor" and a 5% factor "to account for uncertainties inherent in intake modifications at existing facilities." This would result in retrofit costs of $145 to $156/gpm, depending on whether a 20% or a 30% retrofit factor is applied.

Figure 5-1 displays the individual plant retrofit costs from Section 3 plotted as retrofit cost against circulating water flow. The correlation lines for EPA new facilities are shown, along with the adjusted EPA retrofit costs using both a 20% and a 30% retrofit factor.

As was suggested earlier, the "new facility" costs appear to give a reasonable approximation to the lower boundary of the cluster of 50 data points obtained from individual plant studies. This is consistent with the contention that the minimum cost of retrofit is close to the cost for cooling system installation at a new facility. The adjustment factors are seen to account for the additional costs associated with retrofit factors in only a fraction of the cases. The "best fit" linearization of the data points exceeds the EPA new facility costs by a factor of about x 2.3.

[see hard copy for figure]
Figure 5-1

Comparison of aggregated national costs:

SWEC, WGI and EPA each report the total national cost of retrofitting all of the units considered in their particular studies. A direct comparison of these aggregated costs is not completely straightforward, however, for two reasons:

1. The costs are not all reported on the same basis. SWEC and WGI report the sum of the capital costs for each of the units estimated. EPA reports the total as an "annualized, post-tax cost".

2. The number of units included in the estimate is not the same for all the studies.

Capital cost vs. annualized post-tax cost

The annualized, post-tax cost reported by EPA is used to put the one-time, capital cost on a comparable basis with operating costs that are incurred on a yearly basis over the life of the facility. A selected discount rate is applied over the facility life. As described on p. B1-15 of the Economic and Benefits Analysis (2), the annualized cost is defined as

Annualized cost = Capital cost x {[r x (1 + r)n]/ [(1 + r)n – 1]}

where r = discount rate
n = useful life of the equipment
In the analysis, EPA assumes

r= 7%
n = 30 years (for cooling towers)
20 years (for condensers)
10 years (for other equipment)

Rather than attempting to allocate the different cost elements among the three lifetime categories, and since the majority of the costs are for the cooling towers, this comparison uses a 30-year life for the calculated adjustment.

On this basis the annualizing factor is 0.081. (Using 25 years changes the conversion factor by only 6% from 0.081 to 0.086.)

Post-tax cost adjustment:

EPA reduces the costs by an assumed tax rate. The combined Federal and state tax liability is given by

Total tax = Federal tax + state tax – ([Federal tax] x [state tax])

The Federal tax rate is taken as 35%. The state tax rate, which may vary from 0 to 10%, was presumably applied on a state-by-state basis in EPA's estimates but was assumed to be 5% in this comparative analysis. This yields a combined tax rate of

Tax rate = 0.35 + 0.05 – (0.35 x 0.05) = 0.3825

Therefore, the annualized post-tax cost is given by

Annualized, post tax cost = Capital cost x 0.081 x (1 – 0.3825)

= Capital cost x 0.05

Number of units included:

The number of units included in the SWEC and WGI analyses is roughly equal. Both used the UDI database and excluded units currently on recirculated cooling. Both ended up with about 1200 units representing about 250 GW.

The population included in the EPA analysis is stated to be 426 "facilities" representing 353,750 MW of baseline steam capacity. A facility appears to be defined as "units with a common intake structure" and would often, but not always, corresponds to a single plant that might have several units. Therefore, 426 facilities might correspond to 1000 or more units. However, the reported capacity is substantially more than that represented by the units included in the SWEC or WGI study. Furthermore, in the text of the proposed rule (p. 91 of the Prepublication Copy", Ref. 1a) it is stated that there are 539 facilities to which the rule would apply. Of these a number of facilities are deemed to "not require any additional controls" either because they already have recirculated cooling or other forms of adequate impingement control. The remaining facilities for which some sort of additional control would be required total 349. There is no indication of how much generating capacity is represented by these units.

Therefore, the only documentable basis for scaling the reported costs to account for differences in the population of facilities for the estimated costs would be to use the 353 GW figure reported in the Benefits Analysis document. This would require either reducing the EPA estimate by a factor of 0.7 (250GW/353GW) or, alternatively increasing the SWEC and WGI estimates by a factor of 1.4. This is a substantial adjustment to be applied on the basis of such uncertain evidence, so Table 5-1 simply lists the aggregated costs as "National costs of retrofit" as reported with the annotation that they may apply to significantly different populations of facilities.

Table 5-1 Comparison of National Costs for Cooling System Retrofit

Source	National Cost ($ Billions)
EPA	13.7(1)
SWEC	25.0 to 28.0(2)
WGI	22.2(3)

Notes:
(1) Scaled from reported annualized, post-tax capital cost of $684.7 million; reported to represent 353,750 MW at 426 facilities
(2) Sum of capital costs for 1040 units representing approximately 250 GW
(3) Sum of capital costs for 1268 units representing approximately 260 GW.

6. OTHER COSTS

Introduction

The retrofitting of a plant designed for and operating on once-through cooling impose a number of continuing costs on future operations of the plant in addition to the one-time capital cost of retrofit. The most important of these are

-Additional operating power: Recirculated cooling systems will have higher power requirements as compared to once-through systems for the increased head rise required of the circulating water pumps and for the fans to draw air through the tower. The power consumed for parasitic loads cannot be sold to the grid and represents lost revenue.

-Additional maintenance costs: Recirculated systems have additional equipment that requires maintenance labor and specialty chemicals costs for water treatment systems for both the make-up and the blowdown.

-Additional fuel costs: Plant equipped with recirculated cooling systems incur efficiency losses compared with once-through cooled systems due to the higher turbine backpressures imposed on the plant by limitations of the cooling system.

-Potential for output capacity limitations: To the extent that recirculated cooling system may not be able to maintain turbine backpressure below warranty limits during the hottest and most humid hours of the year, the plant maybe forced to reduce output to protect the turbine. While this is normally not the case with an optimized, well designed recirculated cooling system as applied to a new plant, the approach to retrofit which has been used in both the EPA and other cost analyses has chosen to reduce the initial capital costs by keeping the circulating water flow and the condenser the same as for the original once-through system. This results in a system that is far from optimum and may incur capacity limitations in some locations during the summer.

The following paragraphs provide a brief assessment of the possible magnitude of these costs.

Additional operating power:

The major power costs are for the circulating water pumps and the fans. Consistent with the assumption used in the development of the capital costs, the power for pumping is based on the same circulating water flow as was used in the original once-through system. However, the head rise to be delivered by the pumps must be increased to pump the water to the top of the tower, typically 40 to 50 feet. This will increase the pumping power over the once-through system requirements by approximately 5 kW per MW. The fan power for a 170 MW steam cycle was determined in a recent study (M&D) to be approximately 7.5 kW per MW. This gives an additional operating power requirement of 12.5 kW/MW or 1.25% of plant capacity.

Estimates in the SWEC report for a single case study at a large nuclear plant indicated annual power requirements for pumps and fans of about 19,000 kW out of a gross electrical output capacity of 1,123 MW. If the original once-through system pumping power is subtracted the net increase is about 12,000kW or 1.07 kW/MW is essential agreement with the previous analysis. Both of these estimates exceed the allowance reported by EPA of 0.85% of plant capacity (0.85 kW/MW).

Additional maintenance costs:

The major parts of the additional maintenance costs are associated with the water treatment for make-up and discharge required for recirculated operation and, in some cases, the need to rebuild the tower after extended service. Both these costs are highly site and situation specific but some generalized estimates have been made.

1. An estimate of the need for upgraded materials and the costs of clarifiers and specialty chemicals was performed for the various types of make-up water and is included in this report as Appendix B.

2. A common rule of thumb (See, for example, Ref. 10) sets the annual O&M costs at 1% of system capital cost. A case study for a large nuclear plant published in 1995 (11) found O&M costs not including power at about 1.6% of estimated capital costs.

3. EPA reports O&M costs on an annualized post-tax basis at $1,117 million for a capacity of 353,000 MW inclusive of the additional operating power. Using their estimate of 0.85% of plant capacity, the power costs would account for $720 million of that amount, if valued at $0.03/kWh. The remaining annual cost of $397 million is approximately 2.9% of the estimated capital cost.

While these comparisons are necessarily superficial, it appears that the EPA cost development makes adequate allowance for O&M costs exclusive of additional power.

Energy penalty:

The turbine backpressure achievable with a once-through cooling system is nearly always lower than that achievable with a recirculated cooling tower. To supply the condenser with the same flow of cold water at the same temperature as from a once-through system, the tower would have to cool the circulating water to the same temperature as the natural source water. The ambient wet bulb temperature is the lower limit for the achievable return water temperature for the tower. A reasonable tower design will do no better than approximately an 8-10ºF approach {Approach = Tcold water - Twet bulb). In addition, the ambient wet bulb is normally higher than the temperature of water withdrawn from natural sources (rivers, lakes, oceans) for much of the year, especially during the warmer, more humid months. For those times, the condenser inlet temperature and, as a result, the condensing temperature and the turbine backpressure will be higher than would have been the case with the original once-through cooling system. This backpressure elevation is most acute during hot, humid hours, which also correspond to times of peak electricity demand. The effect of increased turbine backpressure on plant performance is shown in Figure 6-1.

[see hard copy for figure]
Figure 6-1 (excerpted from Ref. 9)

Increased heat rate results in higher fuel consumption for a given plant output. An increase in turbine backpressure of only 1 in. Hga would correspond to a fuel cost penalty of $1 million per year. This 1 in. Hga would occur with an ambient wet bulb temperature increase of only 10°F, which is well within the seasonal variability for most parts of the country. This estimate of a 1% energy penalty is in the mid-range of that estimated in a recent NETL study. (17)

If applied to the 350,000MW identified in the EPA cost development analysis and assuming a 50% capacity factor and an average fuel cost of $2.50 per million Btu gives an annual energy penalty cost of approximately $700 million as compared to the EPA estimate of $364 million. However, within the considerable uncertainties and gross approximations that must be made in lieu of a detailed case-by-case analysis, this may be considered reasonable agreement and suggests that the energy penalties have been reasonably accounted for.

Potential capacity limitations:

For older plants with conventional steam turbines, a backpressure of about 5 in. Hga may not be exceeded without risking damage to the turbine and possibly voiding any warranty that might still be in force. If the plant is "cooling system limited" it is possible that it will be unable to maintain acceptable turbine backpressure at full load during hot, humid hours. Therefore, under atmospheric conditions that would lead to higher backpressures, the plant may have to reduce steam flow and hence output to stay within allowable operating limits of the turbine. Since this capacity shortfall comes exactly at the time of peak demand and, in a competitive environment, at the time of highest energy price, the lost revenue can be substantial.

However, for a plant with a retrofitted recirculated cooling system designed to maintain 2.5 in. Hga backpressure at the annual average wet bulb temperature, such an occurrence is unlikely since it would require that the ambient wet bulb temperature rise by 25ºF above the average. An examination of the annual average vs. 1% wet bulb temperatures in climatological data listings such as the

ASHRAE Guide shows that such locations are rare. Therefore, it is reasonable to ignore potential capacity penalties in a generalized analysis although they could occur on rare occasions in a few locations.

7. ENVIRONMENTAL COMPARISONS

As summarized by EPA in the Fact Sheet on the Proposed Rule, the regulation is "designed to protect fish, shellfish and other aquatic life from being killed or injured by cooling water intake structures". The degree of the environmental harm resulting from the intake of cooling water from natural waterways has been the subject of a vast number of general analyses and site-specific studies over decades. It is not a primary topic to be addressed by this report. However, while it is unquestioned that the use of recirculated cooling at a power generation plant will substantially reduce the amount of cooling water draw into the plant, it should be recognized that recirculated cooling systems are not without environmental impacts of their own, some of which are not present with once-through cooling systems.

Brief mention will be made of seven issues to be considered in comparing the environmental effects of recirculated and once-through cooling systems. These are:

-Intake losses
-Water consumption
-Water and waste discharge and disposal
-Drift and plumes from cooling towers
-Other air emissions
-Noise
-Aesthetics.

Intake losses

As shown in Figure 2-3, the cooling water flows for once-through systems range typically from 400 to 700 gpm per MW and occasionally higher. Cooling water intake for recirculated cooling systems using mechanical draft cooing towers typically ranges from 12 to 20 gpm/MW and occasionally higher depending primarily on the cycles of concentration at which the tower is operated. While this represents a twenty- to fifty-fold reduction in the water taken into the system, it may not represent a similar reduction in the degree to which "fish, shellfish and other aquatic life are killed or injured". The survival rate of organisms entrained or impinged in once-through systems has been studied and debated extensively but is not normally assumed to be zero. It is, however, extremely unlikely that entrained organisms will survive passage through a recirculated cooling system with a cooling tower.

Water consumption

While once-through systems, as noted above, withdraw large quantities of water, they return all of the withdrawn water back to the source (or at least to nearby natural waterbodies). A recirculated cooling system, while withdrawing far less water, is designed to cool by evaporating a portion of the circulating water flow in order to cool the remainder. A typical evaporation rate for mechanical draft cooling towers is 10 gpm/MW representing 50 to 80% of the intake flow, again depending on the cycles of concentration. This loss of water to the source waterbody will exceed losses associated with increased evaporation rate from the receiving waters of a once-through cooling system. There are also cases, such as on the Potomac River, where any additional consumptive water uses can no longer be permitted.

Water and waste discharge and disposal

Recirculated cooling systems require the discharge of cooling tower blowdown, which, while regulated, may result in some water quality impact. Regulatory constraints such as pertain in California where the State Implementation Policy for implementing the receiving water standards in USEPA's California Toxics Rule allow a discharger who takes water from an impaired water body to discharge back to that water body only if the concentration of the pollutants has not been increased. This offers relief to once-through cooling, but at plants that use cooling towers blowdown treatment will be required. This will require consideration of the disposal of solid waste, such as basin sludge or water treatment system sludges from evaporation ponds, brine concentrators, side-stream softeners or other blowdown reduction processes.
Plumes and drift:

Visible plumes----On cold days, wet towers can produce a large visible plume as the warm saturated air leaving the tower mixes with the cold ambient air and water vapor condenses. In some locations, these plumes may obscure visibility, creating dangerous conditions on roadways or lead to local icing on neighboring roads or structures.

In some instances, plume abatement capability may be required on a retrofitted recirculated cooling system with the potential for increasing the cost of the tower by a factor of 2 or more.

Drift----Drift rates from modern, well designed cooling towers can be held to quite low levels. New installations have been quoted at less than 0.0005% of the circulating water flow rate. However, even that low rate will result in a total drift of nearly 2000 gallons per day from a 500 MW steam plant circulating 250,000 gpm. The environmental issues normally raised in connection with cooling tower drift are PM10 emissions, bacterial or pathogenic emissions and damage to local crops.

-PM10: The source of concern over PM10 is the fact that as the drift droplets evaporate so that the dissolved and suspended solids in the circulating water are released as air-borne particles. PM10 emissions are usually estimated (conservatively) as 100% of the TSS and TDS in the estimated drift. A recent study by Reisman and Frisbie (18) suggests that only a fraction of the solids in the drift are formed as PM10. However, this may still be a consideration in some areas.

-Infectious species: The most frequently cited public health issue in the context of cooling towers is the possibility of Legionnaire's Disease, so-called because of an outbreak at an American Legion convention in Philadelphia in 1976 attributed to pathogens (legionella pneumophilia) in the cooling tower for the HVAC system in the hotel. While the frequency of occurrence of Legionnaire's Disease is small (approximately 1400 cases reported to the Center for Disease Control annually) and the number of these attributable to cooling towers (at power plants or anywhere else) is even fewer, the question has been investigated extensively in the US and abroad. Treatments of the issue are found in the CTI and ASHRAE literature and references therein.

While the consequences of exposure can be very severe and even fatal particularly to at-risk (elderly, smokers, individuals with chronic respiratory problems or with suppressed immune systems) populations, the evidence of harm is sparse and largely anecdotal. Cooling towers are a common element of our industrial, commercial and residential scenes in high-density population areas in all climates. No compelling epidemiology has established a significant threat.

-Deleterious impacts of power plant cooling systems on surrounding agriculture have not been an issue except in a few special circumstances. One notable study was conducted in the mid-1970's at the Potomac Electric Power Company's Chalk Point Station in Maryland. In that case, the towers were run on brackish make-up water with a circulating water salinity comparable to sea water (35,000 ppm TDS); the towers were hyperbolic natural draft towers with a plume exit plane elevation of about 400 feet; and the plant was located in a tobacco-growing region with a specialty crop of leaves intended for use as the outer wrappers of cigars. High salinity droplet deposition on the leaves could create small, discolored spots making the leaf unusable without in any way affecting the health of the plant or the quality of the soil. Even under these conditions, the risk was eventually determined to be negligibly small, and the plant and towers continued to operate with no special controls and no adverse impact on the region's agricultural activity.

These issues are noted not to suggest the presence or potential of serious environmental harm from recirculated cooling systems but to note that environmental impacts are associated with such system that do not occur with once-through cooling and that should be balanced against the benefits to be derived from reducing the cooling water intake flow. It is certainly the case that these issues are the subject of concern to the public in some instances and can prolong permitting processes seeking approval for retrofit, adding to the duration and cost of the project.

Other air emissions

The primary air emissions from fossil plants are, of course, from the combustion of the fuel. As has been noted, the choice of cooling system can reduce the overall plant efficiency and capacity. Therefore, to meet a given total system load, more fuel must be burned with a corresponding increase in emissions of NOx, particulate matter, SO2 and CO2 in amounts and proportions which depend on where and in what equipment the additional fuel is used.

For recirculated cooling systems in most locations, the effect is small. On the other hand, for site-specific considerations, a case-by-case analysis of these emissions would be needed to determine what the local environmental impact of each cooling option.

Noise

Cooling tower operation is noisier than once-through cooling operation. The primary noise from cooling facilities is fan noise and "fill" noise caused by the flow of water down over the tower fill. While fan noise can be reduced through the choice of low noise fans, the water noise is less amenable to reduction and some sort of sound barrier may be required to comply with local ordinances. Here again, the issue may simply add to the difficulty of obtaining a permit, add to the cost and duration of the project and warrant consideration in the larger context of balancing the overall benefits to the environment and society of a given decision affecting the choice of cooling systems at power plants.

Aesthetics

In some cases, where plants may be sited in a scenic or urban area, cooling towers may be deemed as a significant impact on the aesthetics of the locality. This issue is also very site specific, but could result in delays or even denial of permits.

8. SUMMARY AND CONCLUSIONS

This study provides estimates and analyses of the costs of retrofitting electric power generating plants, designed for and operating on once-through cooling systems, with recirculated cooling systems using mechanical draft cooling towers. A brief discussion of the environmental impacts of recirculated cooling in comparison to those of once-through cooling is also included.

The approach to the analysis of the retrofit costs involved:

1. The gathering of data from utility sources of cost estimates made for retrofits at individual plants

2. A review and analysis of cost estimating methodologies by the Environmental Protection agency, Stone & Webster Engineering Company, the Washington Group and the National Energy Technology Laboratory, and

3. A comparison of the results of the several estimates with the individual plant data.

The conclusions of the analysis were:

1. Retrofit costs are highly variable from plant to plant. The results of this study support EPA's assertion that the costs to retrofit recirculated cooling will vary dramatically from site to site. As described in Chapter 3, the retrofit costs at each of the plants for which we have detailed data were dominated by site-specific adjustments rather than by simple scale factors based on size or flow rate.

2. This variability cannot be well accounted for by correlating factors such as $/kW or $/gpm of circulating water flow normally found to be satisfactory for new plant cost correlations

3. Differences in individual plant costs cannot be accounted for by differences in plant type (fossil vs. nuclear) or by cooling water source type (fresh, brackish, saline)

4. The variability is the result of site-specific factors associated with difficulties particularly related to the fact that retrofits present special constraints to on-site construction projects

5. Plant retrofits can be roughly assigned a "degree of difficulty classification" as "easy', "average" or "difficult" retrofits.

i. The costs for the easiest of the projects (lower bound of the individual plant data) are roughly consistent with the costs estimated for cooling system construction at new facilities and fall in the range of $125/gpm.

ii. The average difficulty projects costs cluster around $200/gpm +/- 20%

iii. The more difficult projects range from $250 to $300/gpm with a few ranging as high as $700 to $900/gpm

6. Significant costs, in addition to the initial capital costs, result from cooling system retrofits including

i. Additional requirements for operating power in the range of 1 to 1.5% of plant capacity

ii. Additional maintenance costs, primarily associated with water treatment requirements in the range of 1 to 3% of system capital costs annually.

iii. Additional fuel costs resulting from efficiency reductions imposed on the plant by the inherent limitations of recirculated cooling systems in the range of 1% on an annual average basis.

7. Recirculated cooling, while reducing water withdrawals for natural waterbodies relative to once-through cooling, has environmental impacts associated with evaporation losses, discharge of blowdown, discharge and disposal of waste water and solid waste, emissions of drift, visible plumes, additional air emissions from increased fuel consumption and noise, that are not present with once-through systems.

EPA Response

Many commenters to the proposal and the NODA assert that EPA has underestimated the costs, technical feasibility, potential energy impacts, and possible non-aquatic impacts for recirculating wet cooling tower retrofit projects. In response to the comments received, the Agency changed its methodology from proposal to NODA to include estimates of peak-summer energy penalties and to extend the net construction downtimes of nuclear plants from 1 month to 7 months. However, the Agency did not revise its estimates of the capital costs for cooling tower retrofits, which is a primary area of criticism from the adverse comments. The Agency addresses capital cost comments in the following paragraphs. In addition, commenters assert that the Agency overlooked or did not fully consider possible air emissions increases due to the energy losses associated with recirculating wet cooling. Even though the Agency conducted a national-level air emissions analysis for the proposal, commenters assert that local air emissions impacts could be a critical element of the non-aquatic environmental impacts. The Agency concedes that it did not conduct local air emission impact analyses for the engineering analysis supporting the proposal or NODA. The Agency agrees that local air emissions could be a significant concern for retrofitting very large power plants with recirculating wet cooling in urban environments and agrees with the commenters that this aspect of cooling tower retrofits should be analyzed on a site- or region-specific basis. Further, commenter assert that the Agency did not fully consider the implications of land availability (and a lack thereof) for some cooling tower retrofit scenarios. The Agency agrees that this point could be a critical element in the analysis of a site-specific cooling tower retrofit project, especially in and around metropolitan areas. The Agency agrees that a lack of available land could be a critical feasibility issue for some cooling tower projects and could greatly increase costs (due to land acquisition costs or very long piping extensions and subsequent pumping requirements).

Many of the above points are addressed in this comment, but the Agency also references comments

316b.EFR.041.021 through 316b.EFR.041.030, 316b.EFR.041.032, 316b.EFR.041.351 through 316b.EFR.041.353, 316b.EFR.041.751, 316b.EFR.072.061, 316b.EFR.074.021, 316b.EFR.075.057, and 316b.EFR.207.101. In addition, the Agency references the study from the Department of Energy titled "An Investigation Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants," dated January 22, 2003.

The Agency concludes after reviewing the comments referenced and the DOE study that installed cooling tower costs can exceed those considered by the Agency for the NODA and proposal analysis. The Agency notes that a wide range of estimates exist, many of which are conceptual estimates in nature with an extremely high degree of uncertainty. However, for a number of studies, the cost estimates approach and exceed the requirements of budget estimation requirements, indicating a relatively narrow range of confidence in the final estimates. The Agency concludes, as does this comment that a variety of site-specific factors can influence the costs of cooling tower retrofit installations, many of which the Agency may not have considered in its analysis of the NODA and proposal.

Generally, the Agency notes that this comment summarizes the findings of several often referred to studies of cooling tower retrofit projects and adds to the studies some new analysis and summary. The Agency observes that the commenter apparently researched at great lengths construction projects that it found "similar in nature" to cooling system retrofits and conferred with plants that have estimated costs and construction schedules for potential retrofit projects. However, it is notable that the commenter does not discuss or address the set of cases where cooling tower retrofits have actually occurred (i.e., cooling tower retrofit projects that have been physically built and paid for). The Agency compared the proposal and NODA methodology for estimating cooling tower retrofit costs versus the empirical costs for the set of actual cooling tower retrofits cases and found the two cost sets comparable. The Agency readily acknowledges that this cost comparison is not a robust empirical derivation of a cost curve that could apply to a wide range of complicated projects. However, the fact remains that the commenter has ignored the only real-life empirical examples of cooling tower retrofits in its otherwise exhaustive analysis, and yet out of hand dismisses the estimated retrofit factor utilized in the Agency's methodology.

Nonetheless, the Agency finds the general theorem of the comment to be reasonable, as stated in the following paragraphs:

"-Site-specific retrofit costs studies show a high degree of variability from costs based on commonly accepted scaling methods. Cooling tower cost estimating methods are often based on the use of a $/gpm rule of thumb. This is approach is used by tower vendors, A&E firms and experienced users and is based almost entirely on the field's experience with tower construction at new sites. EPA used this approach as well. It can, therefore, be reasonably assumed that the variability in careful engineering estimates of site-specific retrofit costs, which will be documented for about 50 cases in Section 3, is due to differences in the degree of difficulty associated with the retrofit aspects of each project.

-It is also reasonable to assume that the lower bound of these costs is associated with the "easiest" retrofit cases, which would correspond most closely to a new facility project free of the interferences encountered at most existing facilities. As will be seen, the lower bound of the case data corresponds reasonably well with the "greenfield" cost estimating rules proposed by EPA, while the mid-range of the data is 40 to 60% higher with many cases ranging to a factor of 2 to 4 times more expensive."

The Agency notes that cooling tower technology retrofits do not form the basis of the final rule, due in part to concerns outlined above (see the preamble to the final rule).

Commenters generally challenged EPA's assumptions regarding costs associated with retrofitting existing facilities to install cooling towers. While all commenters agreed with EPA that existing facilities would incur higher costs to retrofit their plants for cooling towers than new facilities would incur, most disagreed with the Agency's estimates of the degree to which costs would exceed those of new facilities. Commenters correctly pointed out that the Agency's analysis did not consider a variety of factors (such as potential for plume abatement, variable distances for recirculating piping distances, the potential for land acquisition or the unavailability of sufficient land area, and local air emissions concerns) that many facilities could reasonably expect to incur in making the transition. Based on a survey conducted by one industry commenter, EPA learned that 31 out of 56 plants surveyed said that they would need to acquire additional property to accommodate cooling towers, if required by today's rule. EPA recognizes that this could be a significant cost. EPA also recognizes that there may be impediments, irrespective of costs, to acquire land for cooling towers. Land upon which to construct cooling towers may be difficult or impossible to obtain, especially in urban areas; some facilities might even turn to displacement of wetlands as a solution. The Agency did not include these potential costs in its analysis for the NODA or proposal. In contrast to new facilities, which can take into account the Phase I requirements when choosing where to situate their structures (including cooling towers), existing facilities have far less flexibility and incur far greater costs. EPA believes that this is a special problem for existing facilities that is relevant to determining whether, as a national categorical matter, closed-cycle cooling is the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. EPA received retrofit cost estimates from number of commenters that indicate that such costs could be at least twice those projected by EPA.

Some commenters also assert that EPA underestimated the down time that the facility would experience as it converts to cooling towers. This, again, is not an impact that would be experienced by new facilities. EPA agrees that such down time can be significant. Indeed, one of the four retrofit case studies EPA developed indicated a down time of 10 months, and EPA believes it is reasonable to infer that many other facilities would experience the same loss.

EPA also agrees with the commenters who assert that the empirical data base of four retrofit cases to which EPA compared cooling tower retrofit costs and engineering characteristics is not representative of the broader population of facilities and could be too narrow a set from which to develop site-specific national costs. Of the four retrofits EPA studied, two were in a single state (South Carolina), none were located along a coast, and only one generated more than 500 MW of electricity. EPA also recognizes that all of these conversions were performed before 1992. While it is true that the vast majority of the new, greenfield utility and non-utility combined cycle plants built in the past 20 years have wet cooling towers, EPA believes that it is significant that so few existing facilities retrofitted to the technology during the same period. The rarity of this technology as a retrofit further indicates that it may not be economically practicable for the vast majority of existing facilities.

Another issue concerns the energy penalty. EPA examined the information it received after publication of the proposed rule and NODA, and agrees that the energy penalty associated with cooling towers, together with other factors, indicates that that technology is not the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. In reaching this conclusion, EPA relied on information on energy penalties provided by the U.S. Department of Energy. EPA worked closely with the U.S. Department of Energy in preparing today's rule because of their expertise in connection with power plant operation and engineering. The U.S. Department of Energy pointed out to EPA that existing fossil-fuel facilities converting from once-through cooling water systems to wet-cooling towers would produce 2.4 percent to 4.0 percent less electricity even while burning the same amount of coal. For at least one nuclear power plant, which provides 78% of the electricity consumed by the State of Vermont, the energy penalty associated with converting to cooling towers was estimated to be 5.3 percent. Expressed differently, DOE estimated that, nationally,19 additional 400-MW plants might have to be built to replace the generating capacity lost by replacing once-through cooling systems with wet cooling towers if such towers were required of all Phase II facilities.

This energy penalty leads to other negative consequences. Because this deficit is predicted to occur during the summer months (when energy demand is highest), the net effect would be more consumption of fossil fuel, which in turn increases the emission of sulfur dioxide, NOx, particulate matter, mercury and carbon dioxide. Increasing fuel consumption at existing coal power plants yields the largest increase in air emissions because existing systems are less efficient at producing power (and therefore burn more coal) and because they generally have less air pollution control equipment in place. EPA believes that it is reasonable to consider these non-water quality environmental impacts and the additional costs associated with controlling these increased emissions in making today's decision. EPA further believes that it is authorized to do so because of the links between § 316(b) and sections 301 and 306, which require EPA to consider both the energy impacts and the air pollution impacts of technologies when identifying technologies in the effluent guidelines context. See CWA section 304(b)(2)(B) (cross-referenced in § 301); CWA section 306(b)(1)(B) (new source performance standards).

Each of these factors has a cost and an economic impact that EPA believes is appropriate to consider when evaluating whether cooling towers are the best technology available for existing facilities for minimizing adverse environmental impacts associated with cooling water intake structures. The capital costs estimated by EPA at proposal are already very high; when costs reflecting reasonable changes to EPA's assumptions are added to them, the total capital cost investment and associated economic impact is simply too high at this time for EPA to be able to justify selecting cooling towers as a required technology for all existing Phase II facilities.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

David E. Bailey

On Behalf Of:

Hunton & Williams obo Utility Water Act Group

Author ID Number:

316bEFR.209

Comment ID 316bEFR.209.001

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 1.01

Comment period

Authority to Submit Additional Comments

Upon examination of the materials in the rulemaking record, UWAG discovered that it was difficult or impossible to understand some of EPA's analysis, particularly its "case studies" that were used to estimate the fish, eggs, and larvae lost to cooling water intake structures at certain facilities and its economic analysis of the costs and benefits of various rulemaking alternatives. UWAG therefore asked EPA for additional explanation of the reasoning underlying the proposed rule. EPA attempted to respond to UWAG's requests for information and made its consultants available for a number of telephone conference calls during which UWAG's consultants asked questions about EPA's analyses. UWAG also submitted lists of written questions to EPA, and EPA supplied some materials in response. Some of the documents from EPA arrived too late, however, to be of use in writing comments for the August 7 deadline.

Accordingly, UWAG requested an extension of the filing deadline to address certain issues. EPA responded by saying that EPA would use its best efforts to consider additional comments submitted on or before August 21 , 2002, that addressed the following issues:

-UWAG's assessment of EPA's case studies, EPA's estimate of biological losses associated with case study facilities, and the Agency's estimate of the economic or other values associated with those losses UWAG s assessment may include existing or new data for case study facilities and/or other facilities in the same area as a case study facility.

-UWAG's assessment of the data and methods EPA used to develop estimates of baseline economic losses, and to develop estimates of the benefits of various regulatory alternatives.

-Based on the above, supplementary comments on the appropriateness of using various methods and data to estimate biological and economic losses and benefits during implementation of any Section 316(b) rules.

Letter, Geoffrey H. Grubbs, Director, EPA Office of Science and Technology, to Kristy A.N. Bulleit, UWAG counsel, July 12, 2002.

EPA Response

EPA accepted and considered all comments. EPA considered those that were submitted after the official close of the comment period to the extent it was able. Those comments were included in the public rulemaking record.

Comment ID 316bEFR.209.002

Subject Matter Code	1.01
	Comment period

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

UWAG Reserves the Right to Assert that EPA's Reasoning was Inadequately Explained

Despite EPA's efforts to explain the basis for its proposed rule UWAG has found it frustrating to try to understand the sometimes cryptic documents that EPA used. Some of the questions raised in the conference calls were not answered. Several of EPA's consultants' studies, especially those on the case studies and those underlying the analysis of costs and benefits are not understandable. UWAG has done the best it could in the time available for comments, but we still believe that EPA has not entirely articulated the reasoning and basis for its proposed rule and that this falling might, depending upon the outcome of this rulemaking, rise to the level of a legal deficiency.

That said, UWAG has the following limited comments on the materials most recently received from EPA.

EPA Response

EPA has made substantial efforts to help explain the complex issues involved with 316(b), and done a great amount of public outreach, including responding to comments, creating a publicly available record and hosting conference calls. EPA notes that no specific questions were identified by the commenter. The basis for today's final rule in explained in detail in the preamble, and in the supporting records and documents.

Comment ID 316bEFR.209.003

Subject Matter Code 10.03.03

Tampa Bay

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

The Tampa Bay Case Study Results are Biased High

As a part of our August 7 filing, UWAG's consultant Dr. Kyle Hartman, of West Virginia University, prepared an assessment of the biological validity of EPA's methods for producing case study estimates and extrapolating those estimates to the national level. See UWAG Phase II Comments Appendix 10. As noted in his assessment, available data suggest that there are lower levels of dissolved oxygen in upper Hillsborough Bay, where Hooker's Point and the F J Gannon Stations are located, than at Big Bend Station. Therefore, extrapolation of the Big Bend impingement and entrainment data to the other facilities is inappropriate, because Hooker's Point and F J Gannon would be expected to experience less impingement and entrainment due to their location in an area of lower dissolved oxygen. This conclusion is bolstered by a recent report by the Tampa Bay Estuary Program <FN 1> that demonstrates the extent and duration of the low dissolved oxygen problem in the area of the Hillsborough Bay plants.

Clearly, water quality in the Hillsborough Bay area has low dissolved oxygen, and thus extrapolations from areas of better water quality (i.e., the Big Bend area) to the Hillsborough Bay sites will be biased high.

Footnotes

1 Tampa Bay Estuary Program, Final Report, Examination of the Spatial and Temporal Nature of Hypoxia in Tampa Bay, Florida (Technical Report # 09-01 July 2001).

EPA Response

EPA recognizes that there are site-specific details that distinguish the environment surrounding individual facilities. However, the purpose of EPA's regional analysis for the final rule was not to develop precise I&E estimates for individual facilities, but rather to develop estimates of average I&E for entire regions. Please see Chapter A5 of the Regional Analysis Document (DCN # 6-0003) and response to Comment 316bEFR.041.041 for additional information on EPA's extrapolation approach. Instead of the case study of Tampa Bay presented at proposal, EPA expanded its analysis to the Gulf region using facilities in addition to Big Bend as a basis for extrapolation. Details of the Gulf of Mexico regional study are provided in Part F of the Regional Analysis Document.

Comment ID 316bEFR.209.004

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.03

Monitoring requirements

Documents on the Cost of Biological Studies Suggest Inappropriate Year-Round Sampling

UWAG has not had time to adequately review EPA's response to UWAG's consultant Greg Seegert regarding derivation of biological study costs. However, a cursory review of that response indicates that the studies that EPA requested pertain exclusively to the collection of larval fish. Yet EPA's study plan calls for sampling every two weeks, year-round. Year-round sampling is unwarranted because the appearance of larval fish in many waters is a seasonal phenomenon. For example in freshwater systems, larval fish typically are present only during the spring and summer. Larval sampling on a year-round basis for these waterbodies would be a waste of time and money.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Charles G. Valeska

On Behalf Of:

Eastman Kodak Company

Author ID Number:

316bEFR.210

Notes

CWISC (316bEFR.035)

Comment ID 316bEFR.210.001

Author Name Charles G. Valeska
Organization Eastman Kodak Company

Subject Matter Code 3.06.01
Withdrawal threshold of 50 MGD

125.91(a)(4)

Subpart J should apply to existing facilities that actually withdraw 50 million gallons per day (MGD) or more. It should not apply to facilities that have a design capacity of 50 MGD withdrawal capacity but in actuality withdraw much less than that due to their own water conservation efforts. We believe that the EPA's intention is to regulate facilities that withdraw a large amount of water that could impact the environment. Through this regulation, the EPA could encourage water conservation, not discourage it. A similar logic used in the proposed rule in subdivision 125.91 (d) could be applied to 125.91 (a) (4) to determine applicability based on the quantity of water actually withdrawn.

Suggested language

125.91 (a) (4): "Withdraws an average of 50 million gallons per day (MGD) or more. Whether or not 50 MGD is withdrawn must be measured on an average monthly basis. The 50 MGD threshold is met if any monthly average withdrawal is 50 MGD or more and occurs during the 12 months preceding the SPDES permit application due date."

EPA Response

Please see response to comment 316bEFR.019.003.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Debra Littleton

On Behalf Of:

Dept of Energy

Author ID Number:

316bEFR.211

Comment ID 316bEFR.211.001

Author Name Debra Littleton

Organization Dept of Energy

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants

October 8, 2002

Prepared for:
The United States Department of Energy
National Energy Technology Center
Contract No. DE-AM26-99FT40465, Task 50802

By: Parsons Infrastructure and Technology Group Inc.

1. INTRODUCTION

The protection of aquatic organisms found in the water bodies of the United States has been an important focus of environmental regulations in the United States. In 1972, Congress enacted section 316(b) of the Clean Water Act addressing the withdrawal of cooling water from surface water bodies. The congressional language mandated that:

“Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.”

The U.S. Environmental Protection Agency (EPA) promulgated final section 316(b) regulations in 1976. However, in 1979, EPA formally withdrew its section 316(b) regulations as a result of a successful Federal court challenge initiated by a consortium of 58 utilities. Over the past 20 years, in the absence of Federal guidelines, many States have adopted their own regulations with respect to the implementation of section 316(b) requirements regarding cooling water intake structures. In many cases, the States had adopted a site-specific approach to determine what constitutes best technology available for minimizing adverse environmental impact.

The regulatory environment had changed by 1995 when the U.S. District Court, Southern District of New York, entered a Consent Decree between the EPA and the Hudson Riverkeeper that obligated the Agency to issue cooling water intake structure regulations within 7 years. The Consent Decree was modified on November 21, 2000 to: a) finalize new facility regulations by November 9, 2001 (Phase I); b) propose existing source large utility and non-utility power producer regulations by February 28, 2002 and issue final regulations by August 28, 2003 (Phase II); and c) propose regulations by June 15, 2003 and issue final regulations by December 15, 2004 for other existing facilities not covered in b) above (Phase III).

EPA’s Phase II proposal addressing existing facilities has been released and can be found at http://www.epa.gov/waterscience/316b/. As currently written, the proposal presents several options under consideration for the final rule. One of the options suggests that existing, once-through cooled facilities be required – based on water body type and intake flow capacity – to retrofit with recirculating wet cooling towers as a method to meet reductions in organism impingement and entrainment. EPA estimates that this option would affect 50 to 60 existing steam-condensing power generation facilities.

When considering a recirculating wet cooling tower retrofit to an existing once-through cooled facility, there are several significant site-specific issues and assumptions that must be fully analyzed a priori. Among these issues are effect on turbine performance, increased plant parasitic power losses, land space consideration, tower size and type, permitting restrictions, tower plume and noise abatement, and tower drift loss control, just to name a few. The purpose of this report is to evaluate the feasibility of a wet recirculating cooling tower retrofit at four existing steam-condensing power plants with respect to the aforementioned issues. The plants that were evaluated are the Surry Power Station (nuclear, Units 1 and 2), Hudson Generating Station (Unit 1/gas, Unit 2/coal), Barney M. Davis Power Station (natural gas, Units 1 and 2), and Big Bend Station (coal, Units 1, 2, 3, and 4). These plants were studied because of their representative fuel type and their geographic location, which underscored the very site-specific nature of the wet recirculating cooling tower retrofit option.

2. SITE DESCRIPTIONS

The four plants selected for evaluation of a potential evaporative cooling tower retrofit are briefly described below. These sites were chosen because they represent the class of power plants that could be candidates for cooling tower retrofits and encompass the range of site specific issues that may need to be addressed. They represent all fuel types and have significantly different geographic locations. An aerial photograph and map of the surrounding area for each site are included in the back of this section of the report (Figure 2-1 through Figure 2-8). The selected plants are:

-Surry Power Station (Surry County, Virginia), Units 1 and 2
-Hudson Generating Station (Jersey City, New Jersey), Units 1 and 2
-Barney M. Davis Power Station (Corpus Christi, Texas), Units 1 and 2
-Big Bend Station (Tampa Bay, Florida), Units 1, 2, 3, and 4

A sketch of a proposed cooling tower arrangement has been prepared for each site, and is superimposed on the aerial photograph for each site. The site descriptions make reference to nearby facilities such as airports, highways, tourist attractions, etc. The presence of these site-specific features must be taken into account when considering the siting of evaporative cooling towers, since these towers can cause local fogging, icing, deposition of droplets containing dissolved solids, or have other impacts such as noise, or interpose high structures in the path of an approach to an airport. It is important to recognize the inextricable tie between these cooling tower siting challenges and the potential for increased capital/operating costs to overcome them.

Surry Power Station, Units 1 and 2

Surry Unit 1 and Unit 2 are identical nuclear power plants, based on Westinghouse pressurized water reactors generating a nominal 848 MWe each. Each turbine generator has two double-flow low-pressure (LP) cylinders with 44-inch last-stage blades. Unit 1 was placed in service in December 1972 and Unit 2 in May 1973.

The site is on a point of land called Gravel Neck, which projects into the James River in Surry County, Virginia. The river is brackish. Both units share a common cooling water intake canal that is approximately 2 miles long. The cooling water is pumped from the James River into the intake canal, and a common discharge canal returns the water from the plant.

The immediate area around the plant power block is surrounded by structures or the cooling water intake and discharge canals. The most likely available vacant space for siting cooling towers that is accessible to both cooling water canals is southeast of the plant.

The Surry site is approximately 6 miles south and across the James River from the Jamestown National Historic Site. The Williamsburg Jamestown airport is 8 miles north of the site, and the Felker Army Airfield is 6 miles southeast. State parks and wetland areas surround the site. Based on this preliminary analysis, it appears as though cooling tower plume abatement design measures may not be a requirement at the Surry site.

Hudson Generating Station, Units 1 and 2

Hudson Station comprises two fossil-fuel-fired units. Hudson Unit 1 has a nominal 455 MW gas-fired supercritical steam generator with a turbine generator that has two double-flow LP cylinders with 28-inch last-stage blades. Hudson Unit 2, rated at a nominal 660 MW, has a coal-fired supercritical steam generator and a turbine with three double-flow LP cylinders with 28-inch last-stage blades. Unit 1 was placed in service in December 1964 and Unit 2 in December 1968.
The site is on the east shore of the Hackensack River on the outskirts of Jersey City, New Jersey. The river is brackish. There is an intake canal for the cooling water. The cooling water discharge appears to be on the river's edge downstream of the plant.

The immediate area around the power blocks for the two units is surrounded by the river on one side, the coal handling and storage facilities below, the substation above, and fuel oil storage facilities on the other side. The most likely large vacant area that can accommodate all the cooling towers in the same location is north of the plant across the railroad tracks.

The Hudson site is approximately ½ mile south of the New Jersey Turnpike, ¾ mile south of the Secaucus Railroad Station and ½ mile south of Amtrak tracks. Various Conrail tracks are immediately adjacent to the site on three sides. The plant is ½ mile north of Newark Avenue and the Pulaski Skyway (Route 9) and has warehouse storage sites on its immediate southern end. The Hudson plant was deemed to require plume abatement design measures, based on its proximity to roads and its general location in a heavily urban setting.

Barney M. Davis Power Station, Units 1 and 2

Barney Davis Station comprises two natural-gas-fired steam plants. Unit 1 has a nominal 353 MW gas-fired subcritical steam generator with a turbine generator that has one double-flow LP cylinder with 28-inch last-stage blades. Unit 2 has a nominal 351 MW gas-fired steam generator with a turbine that has one double-flow LP cylinder with 30-inch last-stage blades. Unit 1 was placed in service in May 1974 and Unit 2 in June 1976.

The site is approximately 1 mile inland from upper Laguna Madre, which is on the Gulf coast of Texas, just south of Corpus Christi. The seawater intake is at the end of the 1-mile-long canal to Laguna Madre. The plant discharges into the Oso Bay, which is attached to Corpus Christi Bay.

The power blocks are fairly unencumbered by surrounding facilities. The best choice for the cooling towers appears to be along the intake canal since this affords the efficient use of the existing intake canal for returning the water to the existing circulating water pumps.

The Barney Davis site is approximately 1.5 miles south of Waldron U.S. Navy Airfield, 5.5 miles south of Corpus Christi Naval Air Station, 5 miles south of State Route 358, and 15 miles south of Interstate Route 37. The area surrounding the site appears not to be heavily populated, with fish hatcheries on the northwest being one of the closest identifiable features. Based on this preliminary analysis, it appears as though cooling tower plume abatement design measures may not be a requirement at the Barney Davis site.

Big Bend Station, Units 1, 2, 3, and 4

Big Bend Station comprises four coal-fired steam plants. Units 1, 2, and 3 each have nominal 446 MW coal-fired subcritical steam generators. Units 1 and 2 each have a turbine generator with one double-flow LP cylinder with 31-inch last-stage blades. Unit 3 has a turbine with one double-flow LP cylinder with 33.5-inch last-stage blades. Unit 4 has a nominal 486 MW coal-fired steam generator with a turbine that has two double-flow LP cylinders with 26-inch last-stage blades. Unit 1 was placed in service in October 1970, Unit 2 in April 1973, Unit 3 in June 1976, and Unit 4 in February 1985.

The site is located on the lower Hillsborough Bay near Tampa Bay, Florida. The four units appear to share a common seawater intake canal north of the plants and discharge back into the bay south of the plants.

The power blocks are surrounded by the intake canal and bay on the north and south, the coal handling and storage facilities on the west, and other support facilities on the east side so that there is virtually no vacant area immediately adjacent to the power blocks. The best available vacant space appears to be on the strip of land on the north side of the intake canal. The length of this strip of land appears to be sufficient to accommodate the use of inline towers for all four units without having to place any in parallel rows.

The Big Bend site is approximately 1.5 miles north of the Apollo Beach marina, 6 miles southeast of McDill Air Force Base, 1 mile west of the Tamlani Trail highway, and 3 miles west of Interstate Route 75. Based on this preliminary analysis, it appears as though cooling tower plume abatement design measures may not be a requirement at the Big Bend site.

[see hard copy for figure]
Figure 2-1 Aerial Photograph, Vicinity of Surry Site, with Proposed Cooling Towers Superimposed

[see hard copy for figure]
Figure 2-2 Map, Vicinity of Surry Site

[see hard copy for figure]
Figure 2-3 Aerial Photograph, Vicinity of Hudson Site, with Proposed Cooling Towers Superimposed

[see hard copy for figure]
Figure 2-4 Map, Vicinity of Hudson Site

[see hard copy for figure]
Figure 2-5 Aerial Photograph, Vicinity of Barney Davis Site, with Proposed Cooling Towers Superimposed

[see hard copy for figure]
Figure 2-6 Map, Vicinity of Barney Davis Site

[see hard copy for figure]
Figure 2-7 Aerial Photograph, Vicinity of Big Bend Site, with Proposed Cooling Towers Superimposed

[see hard copy for figure]
Figure 2-8 Map, Vicinity of Big Bend Site

3. METHODOLOGY

3.1 TECHNICAL CONSIDERATIONS

Evaluation of the retrofit of evaporative cooling towers to existing power plants was based on certain assumptions. For this study, the retrofit design was configured to minimize the impact on the existing steam turbine and condenser. This minimizes capital costs and the potential for lengthy plant outages, both of which would add a significant cost penalty to the retrofit. The design approach taken maintains intact the major part of the plant circulating water system, including the circulating water pumps and intake structure, piping from the pumps to the condenser, the condenser itself, and much of the discharge piping from the condenser.

If new pumps with higher discharge pressure were employed to replace the existing circulating water pumps, the system pressure might be higher than the pressure capability of the condenser, which would necessitate expensive modifications or replacement of the condenser. The original circulating water flow and condenser range (temperature rise) were maintained to keep tube velocity at the original design value to minimize fouling. This has the added effect of minimizing the impact of the cooling tower retrofit on condensing backpressure, and thus on turbine generator output. The penalty in added auxiliary load caused by higher than optimum circulating water flow rate is minimized by the fact that modern cooling tower designs have a spray deck height that is significantly lower than previous generations of cooling tower designs. Typical once-through circulating water system designs utilize a condenser temperature rise of between 12 °F and 15 °F, whereas cooling-tower-based systems use a temperature rise of about 20 °F or higher.

The modifications to the plant involve interception of the condenser discharge piping at an appropriate location and installation of a wet pit with vertical booster pumps. These booster pumps provide the added head required to lift the water up to the cooling tower spray deck, and to compensate for added piping pressure losses and for any differential in elevation between the new pumping station and the cooling towers. Two schematic diagrams showing a typical plant configuration pre- and post-retrofit are presented as Figure 3-1 and Figure 3-2.

The retrofit design is based on the use of mechanical draft evaporative cooling towers of modern counter flow design, using film type fill. The cooling tower for each plant is comprised of a series of cells constructed of pultruded fiberglass for the linear arrays used at Hudson, Barney Davis, and Big Bend. Each cell is 66 feet square, with a deck height of 40 feet, and equipped with a 250 hp 1,800 rpm totally enclosed, fan cooled, motor driving the fan through a speed-reducing gearbox. Each cell is equipped with high-efficiency drift eliminators, to limit drift to 0.0005 percent or less. The clustered cell arrangement used at Surry utilizes a concrete structure. Cell dimensions, fan horsepower, and other details of construction are similar to those in the fiberglass cells used at the other sites.

Figure 3-3 provides an illustration (plan view) of the cooling tower cell arrays for each of the four sites evaluated. These cell arrays were chosen to efficiently use available land. The tower views are all presented at the same scale.

[see hard copy for figure]
Figure 3-1 Existing Once-Through Cooling Schematic

[see hard copy for figure]
Figure 3-2 Proposed Retrofit Cooling Tower Schematic

[see hard copy for figure]
Figure 3-3 Cooling Tower Cell Arrays (Plan View)

The need for plume abatement was evaluated for each of the four plants evaluated herein. Of the four plants, only the Hudson plant was deemed to require plume abatement design measures, based on its proximity to a road and its general location in a heavily urban setting.

The cooling tower for the Hudson plant application is equipped with a plume abatement feature, which comprises a finned tube coil mounted on top of the fan deck. The hot circulating water returning from the condenser passes through the coils first, and is cooled approximately 4 °F before exiting the coil and being routed to the spray nozzles above the fill. The fin tube coils are mounted to provide a parallel flow path with respect to the air that flows through the fill. The air streams mix in the fan exhaust; the mixed dry and humid air has a lower dewpoint, resulting in reduction in visibility of the plume and mitigation of the potential for local fogging and icing of nearby surfaces and structures. The other three plants evaluated in this study are not provided with plume abatement design features, based on the specific layout and location of each plant. If cooling tower retrofit becomes a reality for any of these plants, a more detailed study must be undertaken to thoroughly evaluate local conditions. The plume abatement feature is regulated by valves and dampers, and is only used when ambient conditions warrant. This type of plume abatement feature adds significantly to the cost of a cooling tower, potentially doubling the cost of the tower.

To accommodate the short time period available to perform the study and the lack of detailed information regarding the plant design conditions, the following simplifications or assumptions were made:

-The circulating water (CW) temperature rise across the condenser was assumed to be 15 °F. From our experience, this value is typical for many of the plants. Since the condenser temperature rise is equal to the range for the cooling tower, the cooling tower range is thus also set at 15 °F.

-Where plant data on the circulating water flow to the condenser was not available (only Surry data were), the flow was calculated using the assumed condenser rise of 15 °F, an assumed steam flow to the condenser of approximately 65 percent of the plant rated steam flow at the throttle, and a steam condensing enthalpy of 1000 Btu/lb. The percentage (65 percent) of plant rated steam flow to the condenser is based on previous experience with steam cycles using regenerative feedwater heating. The other 35 percent of the throttle steam flow is extracted from the steam turbine at various locations for feedwater heating and deaeration.

-The condenser backpressure was determined by using an assumed terminal temperature difference of 5 °F for the nuclear unit and 8 °F for the fossil units. The assumed terminal temperature differences were considered from experience to be typical values for condenser design.

-Seasonal average temperatures (cooling water and ambient wet bulb) were used to evaluate the impact of differences in condenser backpressure due to the introduction of a cooling tower into the circulating water system. Cooling water temperatures were based on available data from observation and recording stations for sites close to the plants. Likewise, the mean ambient wet bulb temperature data came from airports near the sites that record annual weather data. Monthly averages for at least the last 5 years of data were calculated and then combined into spring, summer, fall, and winter seasonal averages. Time did not permit a more detailed or exhaustive study of this type of data.

-The return cooling water temperatures from the cooling towers at various seasonal average mean wet bulb temperatures were estimated using a tower manufacturer's performance curve for the specified design duty and range. Although the sites had different design wet bulb temperatures (74, 77, 78, and 79 °F), a performance curve based on a design wet bulb temperature of 77 °F was used for all sites in determining the return water temperatures for the various seasonal temperature conditions. This approach was suggested by the tower manufacturer since the effect of the tower design wet bulb temperature is minimal. The site design wet bulb temperature was selected using standard air conditioning design values for temperatures that are exceeded no more than 2 percent of the total hours during a normal summer.

-Curves for LP turbine exhaust pressure correction to the plant output or heat rate were matched to turbines with a similar number of LP flow paths and last-stage blade length, as listed later in Table 3-2 (page 3-7). However, because of the lack of plant data for each unit, predictions of the loss of generation capability due to variations in condenser backpressure (due to the introduction of cooling towers) may not be exact, but are typical for plants with a similar type of LP turbine.

-The cooling towers were located on the best available vacant area on each site and as close as possible to the power blocks. Vacant areas were determined from USGS site aerial maps that were not necessarily current nor detailed enough to verify all obstacles to installation of towers or piping. Piping lengths were estimated using the assumed tower locations and routings that avoided existing facilities as best as could be determined from the aerial maps.

-Cooling tower blowdown is required to maintain the required quality of the recirculated water and was assumed to be at a flow that would result in a doubling of the concentration of total dissolved solids in the original feedwater. Blowdown containing twice the amount of total dissolved solids of the makeup water is considered typical for seawater cooling tower applications. Based on experience at other sites, treatment of blowdown, other than addition of chemicals to remove chlorine (if used for biological growth control), is not required. Therefore, no treatment plant or extensive equipment is expected for processing the cooling tower blowdown before discharge. Specific site conditions or local restrictions may require more extensive treatment.

A summary of cooling water temperatures (pre- and post-retrofit) is presented in Table 3-1. Although cooling water temperatures increase by 10 °F to 20 °F by adding the cooling towers, this increase does not appear to impact electricity generation to a significant extent (i.e., the annual energy penalty is less than 2 percent) at three of the four plant sites evaluated. Cooling tower retrofit impacts on steam cycle performance, such as reduced generating output, were estimated by using manufacturer's steam turbine performance characteristics for machines that have the same configuration as found in each of the cases evaluated.

Table 3-1
Seasonal Average Temperatures

	Surry	Hudson	Barney Davis	Big Bend
Seasonal Avg. Ambient Mean Wet Bulb Temp, ºF				
Spring	58	46	65	65
Summer	77	66	77	76
Fall	62	52	68	69
Winter	42	31	54	56
Seasonal Avg. River/Bay Water Temp, ºF				
Spring	60	51	74	75
Summer	83	75	86	84
Fall	67	58	74	78
Winter	41	36	56	66
Seasonal Avg. CT Return Cold Water Temp, ºF				
Spring	72	65	77	77
Summer	85	77	85	84
Fall	75	68	78	79
Winter	62	58	70	71

Based on available data, it was judged that the steam turbines installed in three of the plants evaluated (Surry, Barney Davis, and Big Bend) do not have sufficiently large last-stage blading to effectively expand the steam to backpressures consistent with condensing temperatures typically achieved with once-through cooling. In theory, reducing cooling water temperature reduces condensing backpressure and increases power output. However, in three of the specific cases evaluated here, the steam turbine generator cannot effectively utilize the reduced condensing backpressure. Only one of the four plants evaluated, Hudson Generating Station, appears to use a turbine design that can effectively utilize lower cooling water temperatures achieved with once-through cooling. A cooling tower retrofit at this plant would increase condensing backpressure (relative to once-through cooling), and thus reduce generation output. This is discussed further in Section 4.1, Discussion of Technical

Results.

Principal design parameters for each plant evaluated are summarized in Table 3-2. The condenser and cooling tower design parameters selected for each plant evaluated in this study are presented in Table 3-3.

[see hard copy for figure]
Table 3-2 Plant Design Bases

[see hard copy for figure]
Table 3-3 Condenser and Cooling Tower Design Parameters

3.2 COST ESTIMATING AND ECONOMIC CONSIDERATIONS

3.2.1 COST ESTIMATING

Separate cost estimates have been developed for each power plant unit and with total costs calculated for each site. The cost estimates are for a completed retrofit for each facility, with all-new construction and normally supplied services, including indirect costs and contingencies.

The format of each estimate has been arranged to show major cost components and their relative importance. Cost components are not arranged in any particular order of importance. Equipment costs are broken out separately and contain bulk material items. Labor costs cover site craft personnel and associated contractor markups, employee benefits, and supporting supervision, administration, and home office support. Union labor or equivalent prevailing wage rates are implied. No attempt has been made to convert or adjust labor costs for particular areas of the country.

Vendor quotes have been incorporated for major items such as cooling towers, circulating water pipes, and cooling tower pumps on a generic basis due to the lack of specific site design information. Lengths of circulating water piping were scaled from the design sketches superimposed on the aerial photos presented in Section 2. Labor costs associated with these items have been made based on experience with similar items at other sites. Allowances for costs of other items such as demolition, foundations and structures, instruments and controls, electrical, and chemical treatment were made from prior similar estimates.

Allowances for indirect costs have been included in each of the estimates based upon percentage factors. These include temporary construction services and facilities, engineering, construction management, and other professional services, owner costs, and a contingency. An allowance of 20 percent for contingencies has been included since these are existing sites and many interferences are expected. No allowances for escalation or for funds used during construction (AFDC) have been included, as there are no schedule dates considered in this study.

Costs are presented at 2002 levels in thousands of dollars for each category and also dollars per kilowatt. The overall accuracy of the estimates is expected to be ±40 percent due to the conceptual nature of the design, in accordance with the Association for the Advancement of Cost Engineering International (AACEI) guidelines. Variances beyond these ranges are possible but not likely.

3.2.2 ECONOMIC CONSIDERATIONS

Separate estimates of changes in operating and maintenance (O&M) costs caused by conversion to cooling towers at each plant have been prepared. An attempt has been made to include all major cost components for each plant.

For most of the plants it is expected that existing personnel can absorb some of the added duties that will be required to operate and maintain the new cooling system equipment. The skill level, average salaries, burdens, and overhead rates are used to estimate the cost of additional personnel that would be required (see Appendix B).

Supplies have been estimated mostly for the chemicals required for treatment of the makeup water, treatment of the cooling towers and basins, and treatment of blowdown flows prior to their discharge. The costs are similar to those needed in a new fossil plant on a per kilowatt basis.

Maintenance costs have been estimated on a percentage basis of new construction costs. The percentage chosen is an average of the various components involved. For instance, the cooling towers will have a higher percentage of maintenance than the circulating water piping. The costs will vary by year and thus an average value is shown.

The worksheets in Appendix A show the estimated power quantities and costs of the new cooling tower equipment and related systems. Allowances have been made for motor sizes, capacity factors of the existing plant, and the interchange rate for the region. These are new auxiliary loads for the existing plants.

An additional calculation has been made to account for the expected change in plant efficiency due to different cooling water temperatures during the year and their resulting impact on the condenser and turbine operations. The values shown are the average energy penalty over four different seasons of the year.

O&M costs have been grouped into two categories: fixed and variable annual costs. The way that the O&M costs were assigned to each category is described in the worksheets provided in Appendix B.

4. RESULTS

4.1 DISCUSSION OF RESULTS

The results of the study indicate that cooling tower retrofits are technically feasible at three of the four plants evaluated: Surry Nuclear Power Plant, Big Bend, and Barney Davis. The addition of cooling towers at the Hudson plant is considered feasible on a provisional basis; serious issues remain that require evaluation. These issues relate to availability of land to locate the cooling towers and route the large-diameter circulating water piping. The requirement for plume abatement at this site exacerbates the space issues, since the plume abatement requirement imposes restrictions on the cooling tower cell array configuration. Towers with plume abatement features added cannot be spaced as closely as towers without this feature.

From an economic perspective, the addition of cooling towers to the evaluated plants poses a significant added cost, both as one-time capital costs and an ongoing increase in the cost of production of electricity. The added costs range from an estimated $128/kWe for the Surry plant to $65/kWe at the Hudson plant. The cost of adding cooling towers to nuclear units is significantly higher, on a unit basis, compared to a fossil plant. This is due to the much higher heat rejection to the condenser in a nuclear unit relative to that of a fossil unit, which rejects a significant amount of waste heat to the atmosphere via the stack. Table 4-1 compares the heat rejection at Surry with a typical fossil unit. Note that the heat transfer to the condenser for each of the Surry nuclear units is more than 1½ times greater per kilowatt of electricity produced.

[see hard copy for figure]
Table 4-1 Energy Flow Comparison

The annual energy penalty caused by the installation of cooling towers at these four existing plants (see Table 4-2) is estimated to be between 1.1 and 2.1 percent of the power plant output. This loss in salable power (annual energy penalty) is due to increases in condensing backpressure and auxiliary load (cooling tower boost pumps and fans).

[see hard copy for figure]
Table 4-2 Evaluation Results – Plant Output Effects

The auxiliary power requirements for booster pumps and cooling tower fans associated with the cooling tower retrofits are significant in all four of the cases evaluated accounting for 90 to 100 percent of the estimated annual energy penalty.

In contrast, decreased plant generation output due to condenser/turbine effects of the new cooling systems is smaller than originally anticipated. Surry's capacity decrement due to the new cooling temperatures (and not new plant auxiliary loads) is only 0.002 percent or 200 kW per unit. The losses at Barney Davis and Big Bend are equally small. The Hudson plant can anticipate a loss of almost 0.7 percent, or 7,500 kWe for both units combined. However, the decrease in net plant generation output due to increased auxiliary load is much more significant, and ranges from about 1 percent for the fossil units to about 2 percent for the nuclear units (Surry).

Decreases in the performance of the steam turbines because of the change from once-through cooling to recirculated cooling water were a minor contributor to the overall energy penalty due to the factors listed below.

-First, it appears that most of the plants evaluated (except Hudson) were designed with relatively high turbine exhaust velocities. Operation on a cooling tower would shift the condensing backpressure up, and exhaust velocity down. The reduction in exhaust velocity results in lower exhaust power losses, which tends to mitigate, but not completely compensate for, any reduction in generation output caused by the higher backpressure.

-Second, the cooling tower retrofits were designed with the same condenser temperature rise (nominally 15 °F). This tends to maintain low condensing backpressures, relative to units operating with higher temperature rises.

-Third, the cooling water temperatures for the original once-through cooling water systems tend to be high; cooling water from an evaporative tower designed with a typical design basis approach (difference in temperature between cold water temperature leaving the tower and the ambient wet bulb temperature) was relatively close to the once-through cooling water temperature during the summer months. During winter, spring, and fall the differences in cold water temperatures available to the plant condensers tend to diverge (between once-through vs. cooling tower cases of each plant). However, the Surry, Barney Davis, and Big Bend plants are not significantly impacted by increased cooling water temperatures over the range of temperatures encountered in the study due to turbine characteristics referred to above.

Technical parameters describing the retrofit cooling towers and circulating water piping for each unit that was evaluated are presented in Table 4-3.

4.2 CAPITAL COST AND OPERATING COST RESULTS

From an economic perspective, the retrofit of cooling towers to the evaluated plants poses a significant added cost, both as one-time capital costs and an ongoing increase in the cost of production of electricity.

[see hard copy for figure]
Table 4-3 Evaluation Results – Technical Parameters

A summary of the results of the assessment of capital costs and other economic considerations is shown on Table 4-4.

[see hard copy for figure]
Table 4-4 Summary of Capital and Operating Costs – All Plants

Detailed capital cost estimates for each unit and plant are contained in Appendix A. The total cost per plant ranges from $23 million to $108 million or from $65 per kW to $128 per kW. As expected, the Surry Nuclear Plant has the highest cost due to its large (848 MW) size per unit and high rate of heat rejection. However, two additional factors contributed to the high cost of this plant: the use of clustered cooling towers to minimize the required land space and distance of the towers from the plant, and, secondly, the long runs of circulating water pipes to the available open areas for the towers.

The costs to retrofit cooling towers at the fossil units are relatively close to each other at $65 to $77 per kW. The installed cost of both the cooling towers and the circulating water pipe account for approximately 60 percent of the direct costs. The foundations and structures account for almost another 20 percent of direct costs.

The Hudson site cost estimate includes plume abatement technology and costs due to its location. This factor increases the cost of the towers by about 100 percent or an additional $12 million of direct costs. This had the effect of increasing the total capital cost of the installation by 22.5 percent. The Barney Davis, Surry, and Big Bend sites were not determined to need plume abatement due to their location.

The detailed calculations for annual O&M costs associated with cooling towers for each unit and plant are contained in Appendix B. Operating costs for each of the nuclear units is expected to increase about $5.8 million per year. About 60 percent of this increase is for new auxiliary power requirements to run pumps and fans. The remaining 40 percent is for additional operators and supplies. About 90 percent of the O&M costs are considered variable costs.

Operating costs for each of the fossil units is expected to increase by about $1.5 to $2.0 million per year. About 50 percent of the new costs are for new plant auxiliary loads for fans and pumping. About 90 percent of the fossil O&M costs are for variable costs.

If construction of the retrofit cooling tower system would require an extended outage, costs could increase significantly. However, it is the opinion of the Parsons engineering staff that construction and startup of new cooling tower systems at the Surry and Barney Davis sites would not result in extended outages. With proper planning and coordination with other planned outages, cutover from the older cooling systems to the new cooling towers could be accomplished without loss of generating time. This has been the experience with other plants. Therefore, the analysis shows no cost penalty for extended outages at this time.

The situation is less certain at the Hudson and Big Bend sites. The configuration of the existing site for each of these two cases makes it difficult to assess the need for extended construction outages without more detailed site information and study.

The data presented in Appendix B of this report reflect no outage. However, should it be determined upon further review and a more detailed analysis of system locations, that an extraordinary outage will be required as part of a cooling tower retrofit, the following loss of revenues can be expected per plant (i.e., all units) per month:

-Surry… $30 million per month
-Hudson… $16 million per month
-Barney Davis… $11 million per month
-Big Bend… $28 million per month

To determine these losses in revenues, a conservative assumption of $0.030/kWh was used as the value of the lost power generation each plant would suffer as a result of an extended cooling tower retrofit outage. The calculation was also based on each plant's peak net summer power output.

5. CONCLUSIONS

The conclusions reached from this study based on assumptions about, and analysis of, four "real world" power plants indicate that the retrofit of evaporative cooling towers to an electric generating plant, fossil or nuclear, imposes a significant burden in terms of capital costs ($65 to $128 per kW) and loss of net generation output (1.1 to 2.1 percent of plant electricity generation). The capital cost expenditure reflects the cost of the cooling towers, circulating water piping, and related ancillary items such as added circulating water booster and makeup pumps. The loss of salable power is due to the added auxiliary electrical load, and for certain plants, a decrement in electric generation caused by operation at higher condensing backpressures.

Operating costs are estimated to increase about $5.8 million per year for the nuclear unit studied and about $1.5 to $2.0 million per year for the fossil energy units studied. More than half of the increase in operating costs is for new auxiliary power requirements to run new pumps and cooling tower fans.

The loss of revenue due to an extended outage to accommodate a cooling tower retrofit is a potential issue. In the current study, two plants (Surry and Barney Davis) appear to be able to avoid an extension to a normal annual outage to enable the changeover to be accomplished; the other two plants (Hudson and Big Bend) have more restrictive site arrangements and may require outage extensions.

When considering a recirculating wet cooling tower retrofit to an existing once-through cooled facility, there are several significant site-specific issues and assumptions that must be fully analyzed a priori. Among these issues are effect on turbine performance, increased plant parasitic power losses, land space consideration, tower size and type, permitting restrictions, tower plume and noise abatement, and tower drift loss control.

A series of these assumptions was made to facilitate the analysis of a prospective cooling tower retrofit at the four power plant sites documented in this study. These assumptions were based on the collective experience of the Parsons engineering staff, drawing on a large number of power plant design experiences spanning the last several decades. Changes to these assumptions will affect the detailed performance and cost data presented herein, but will most likely not affect the validity of the conclusions expressed. The effect of deviations from each assumption is briefly discussed below:

Cooling Water Temperature Rise

The assumption made in this study was to maintain the original temperature rise of 15 °F. If the cooling tower retrofit were to be based on a value of 20 °F, for example (a value typically used in new power plant cooling tower installations), the capital cost of the cooling tower might decrease somewhat, but generation output might also be diminished. A more detailed study, beyond the scope of the present effort, is required to select the optimum design value.

Steam Flow to Condenser

A typical value for the fraction of throttle steam flow passed to the condenser after expansion in the steam turbine of 65 percent was assumed. Variations of plus or minus 10 percent in this flow rate are not expected to change any of the results of this study. Larger changes would require evaluation on an individual plant basis.

Seasonal Average Temperatures for Cooling Water and Ambient Wet Bulb Temperatures

The use of seasonal average temperatures instead of monthly averages is not expected to impact the results developed by this study.

Steam Turbine Exhaust Pressure Correction

The steam turbine exhaust physical design parameters coupled with condensing steam flow rates have a significant impact on steam turbine generator electric output and plant efficiency. The estimate of performance impacts due to cooling tower retrofits presented in this report is based on the assumption that the reported turbine configuration is correct for each plant. Changes in turbine configuration used in this study to alternate configurations (number of low-pressure flow paths and/or last-stage blade lengths) could have a significant impact on the predicted change in generation output.

Cooling Tower Siting

For this study, the cooling towers were sited on the closest available open land near the steam turbine generator building. If these lands were not suitable or available, and the towers were located further away, piping costs would increase.

Cooling Tower Blowdown

The report assumes that extensive and/or expensive treatment of cooling tower blowdown is not required. If specific site conditions mandate high degrees of treatment for the blowdown, the capital and operating costs of the retrofit will increase, but are not expected to increase to a level that will compromise the overall economics of the cooling tower retrofit.

Overall, any requirement to retrofit closed circuit cooling towers to plants that now utilize once-through cooling could have significant operational and financial impacts. If the motivation for this change is due to water intake concerns, other engineering solutions that modify the inlet designs should be investigated.

[see hard copy for tables in appendix]
APPENDIX A CAPITAL COST ESTIMATE

[see hard copy for tables in appendix]
APPENDIX B O&M COST ESTIMATE

EPA Response

No response is necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Peter Duncan

On Behalf Of:

NY State Dept of Environmental Conservation, Office of Natural Resources

Author ID Number:

316bEFR.212

Comment ID 316bEFR.212.001

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

FR Page 17146:VI. A.5. What is the Role of Restoration Under Today's Preferred Option

In our experience, the Department has found that restoration efforts can play a limited role as part of achieving best technology available (BTA) requirements. As we have stated in our earlier correspondence, however, restoration should serve only as mitigation after all practicable efforts have been made to first avoid and then minimize aquatic resource impacts. Consistent with the hierarchy advanced by the Council on Environmental Quality, restoration should not be the first consideration in reducing adverse impacts; it should be a supplement to address truly unavoidable impacts.

Some restoration has been utilized at power plants in New York State. For example, there was a substantial effort in producing and stocking striped bass as part of the Hudson River Settlement Agreement. This agreement ended the litigation of the EPA permits issued in 1975 for the Roseton, Bowline and Indian Point Generating Stations requiring installation of closed-cycle condenser cooling at these facilities. However, the NPDES permit requirement to stock striped bass came only after exhaustive consideration of and commitment to reasonable technological and operational methods to avoid, minimize, and mitigate the impacts at these facilities.

Underlying stipulations for the striped bass hatchery restoration effort were that the brood stock be of Hudson River origin, that the fish be raised in New York, and that the fish be released into the Hudson River. The basis for these stipulations was the belief that restoration efforts by facilities impacting the Hudson River ecosystem should be as closely linked to the Hudson River as possible. In the 20-plus years since the signing of the Settlement Agreement, we believe that regulatory and resource management agencies have come to a greater appreciation of their responsibilities to manage ecosystems and that there must be a close physical and biological connection between the restoration effort and the impact. Restoration efforts outside of the watershed fail to support ecosystem management goals on the impacted system.

The striped bass hatchery operated on behalf of the Hudson River utilities underscores an important limitation on this type of restoration: a single species was produced and stocked but studies at the three plants document impacts on more than 100 species. The striped bass hatchery effort addressed a small fraction of the fish community and a small fraction of the mortality imposed on the ecosystem by these three plants. As an example, during the 1986 spawning season, the hatchery produced and stocked 530,000 striped bass into the Hudson River. This stocking contributed an estimated 1.5% to the 1+ striped bass population, as measured about 18 months later.

During the 13 years the hatchery operated (1983 through 1995), the average conditional entrainment mortality rate (the reduction in year class due to entrainment mortality) for striped bass from the Roseton, Bowline, and Indian Point Stations averaged 11% (ignoring any compensation that may have occurred). Even this very substantial hatchery effort, then, only replaced approximately 14% (1.5/11 = 14%) of the mortality imposed on striped bass by these three plants.

The Department supports the requirement in 125.94(d) that, if restoration is included as an element of achieving BTA, the permittee "... must demonstrate to the Director that you are maintaining the fish and shellfish within the waterbody, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures to meet that portion of the requirements of paragraphs (b) or (c) of this section that you are meeting through restoration." This standard is appropriate, but as we learned from our experience with the striped bass hatchery, complete reliance on restoration for the substantial impacts associated with the large stations in the Hudson River would be a daunting undertaking.

The bulleted list of items on Page 17147 regarding the information to be provided to the director to support consideration of restoration measures is adequately comprehensive and we do not recommend streamlining. The Department recommend a provision which would indicate that specific situations may require submission of information supplemental to that required here. It may also be helpful to require periodic comprehensive reports on the progress of the restoration efforts. These reports should include an analysis supporting any assertion that the restoration measures (and the technology plus operational measures) are maintaining the ecosystem at levels comparable to full reliance on technology and operation. EPA should also consider an explicit statement that failure of the restoration efforts to achieve their goals after a reasonable, specified time period would obligate the permittee to expand or otherwise alter their program.

A decision as to whether a permittee has achieved their goals in a restoration program and whether the restoration efforts undertaken have achieved "substantially similar performance" is viewed as a challenging element in your draft regulations. The expertise to address this issue may not be readily available in the delegated states charged with implementing these regulations, and the breadth of information one needs to make this kind of determination could lead to widely varying decisions across the nation. Perhaps EPA could provide foundational materials and relevant technical reports similar to that developed in Technical Guidance Manuals for Section 316(a) decisions to set a baseline for decision makers. EPA is in a unique position to serve as a clearinghouse for acquiring and disseminating information on restoration efforts across the nation and for the information needs and analyses of assessing their success or failure. The Department urges EPA to accept this role.

The Hudson River utilities operated the striped bass hatchery with the concurrence of and oversight from the Department. The stocking effort was conducted with the concurrence of the agency responsible for managing the State's natural resources. Any restoration of a public trust resource must have this approval.

In seeking approval to construct and operate the hatchery and stock striped bass into the Hudson River, the Utilities submitted hatchery plans so that the Department's fish production staff could review and approve the design. Aquatic biologists reviewed and approved proposed marking techniques, location and conditions of stocking, and, so that the contribution of the hatchery produced fish to the Hudson River population could be evaluated, staff also required and approved a recapture program for the marked stocked fish. Annual reports from both the production and marking effort, and from the evaluation of the contribution of the hatchery to the 1+ population were required. Staff conducted both announced and unannounced site visits to insure adherence to agreed upon protocols.

Restoration efforts must recognize that success may not be complete and so restoration should be scaled to reflect possible shortfalls. For example, the Hudson River utilities' striped bass hatchery was required to make a good faith effort to stock 600,000 three-inch fingerlings into the river each year. Intensive culture of striped bass proved to be difficult, however. Despite a very strong effort, the average number of fish stocked for the 13 years that the hatchery operated was just under 300,000 per year. This particular experience supports a 2:1 "margin of error". In the later years of operation, the average production did increase so that one could argue for, perhaps, a 1.5:1 margin. However, as noted in your supporting narrative, restoration involves much uncertainty and so a conservative multiplier is appropriate.

Accrual of ancillary or secondary benefits from restoration efforts is possible, and, on first blush, seems to warrant consideration of a reduced level of required restoration. However, the facilities that will have to implement restoration efforts are those that are using once through condenser cooling; they are discharging enormous quantities of heat into aquatic systems. EPA defines heat as a pollutant, and the excellent work EPA did in developing their Technical Guidance Manual for Section 316(a) notwithstanding, the inability to detect ecological consequences of these discharges should not be taken as proof that they do not exist. Even in the presence of some ancillary benefits of restoration programs, once-through cooling is imposing stresses on ecosystems that are not quantified nor compensated for at this time. It would be very surprising if restoration programs make an affected ecosystem "better", overall, than it would be in the absence of the facility. There may be secondary benefits; there almost certainly are secondary impacts, and therefore New York supports minimal or no credit for secondary benefits.

EPA Response

EPA agrees with the commenter that it is important for there to be a close biological and physical connection between a restoration measure and the ecological entities impacted by impingement and entrainment by a cooling water intake structure. Therefore, EPA requires in the final rule that ecological benefits from a restoration measure accrue within the same waterbody or watershed in which the impacts from a facility occur. For additional discussion of the appropriate spatial scale on which to conduct restoration measures, see the final rule.

For discussions of the consideration of design and construction technologies and operational measures before the use of restoration measures, see EPA's responses to comments 316bEFR.033.005 and 316bEFR.202.029.

Use of restoration measures alone may not be feasible for all permit applicants. The final rule allows use of restoration measures as a supplement to design and construction technologies and operational measures, as well.

The final rule allows permitting authorities the flexibility to request the information necessary for a permit applicant to demonstrate to the permitting authority's satisfaction that a restoration measure is able to meet the requirements of the final rule. EPA has included in the final rule requirements for development of an adaptive management plan and monitoring and reporting requirements. These requirements give flexibility to the permitting authority to determine what is required to ensure satisfactory performance of a particular restoration measure. For a discussion of the roles and responsibilities of the permitting authority and the permit applicant, see EPA's response to comment

316bEFR.060.026.

For a discussion of ancillary benefits associated with restoration, see EPA’s response to comment 316bEFR.032.011.

Comment ID 316bEFR.212.002

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

FR Page 17148, VLA.6.: Impingement and Entrainment Assessment

The Department does not believe that the sampling intensity proposed here is adequate. Included in this attachment are several graphs of both entrainment and impingement data collected at the New York Power Authority's Poletti Generating Station located on the East River in New York City. Figure 1 provides an estimated number impinged for the three year program, by week. Clear seasonality is evident, and it seems obvious that during the months when impingement numbers are at their seasonal low, sampling as infrequently as monthly would probably suffice. Figure 2 provides the detailed information for the peak in impingement for the year 2000, again by week. Here it is evident that, within a month, the week selected for sampling could provide a very distorted view of what was actually happening. The Department believes that, with enough background information, one could stratify the sampling to once per month for time periods when impingement has, historically, been low. However, during periods when impingeable life stages are abundant, sampling is required at least weekly so that one can be reasonably assured of not missing important peaks. One strategy utilized by the Department in responding to requests for reduced sampling when impingement is assumed to be low is to require sampling during the first week of such a month. If estimated numbers impinged during that first sample are below a preselected threshold, further sampling during that month is not needed. If numbers are above the threshold, sampling is required during the next and succeeding weeks of that month until the estimated numbers impinged are below the threshold.

Examination of Figures 3 and 4 reveal the same situation for entrainment at this station: strong seasonality (Figure 3) and, within the seasonal peak, high variability (Figure 4). Again, stratifying the sampling program as described above for impingement, once sufficient background data is available, is a reasonable approach.

The annual variability seen in Figures 1 and 3 support a baseline period of no less than 2 years, as EPA proposes.

EPA has specified that the more intensive period of entrainment sampling occur during "the primary period of reproduction". This approach would likely underestimate the full impact. Most fish are entrainable long after the egg and larval stages, which could be interpreted as the "primary period." Instead, the Department recommends that EPA specify the period for intensified sampling as that time when entrainable life stages are abundant.

Based on our experience with installation and monitoring of mitigative technology and operational changes, the Department believes that monitoring requirements are highly specific to each situation. For example, with the modified Ristroph screens installed at Indian Point Nuclear Station, we concluded that the handling needed to get accurate estimates of impingement abundance post-installation of the upgraded screens would impose enough mortality as to significantly reduce the mitigative benefit of the installation. As a result, the Department no longer requires impingement sampling at that facility. This contrasts with the impingement mitigative barrier net that is installed each fall through spring at the nearby Bowline Generating Station. In spite of the very good job the barrier net has done over the past two decades, this technology is subject to net tearing, lifting off the bottom due to ice or floating debris, or other temporary reductions in effectiveness. As a result, weekly impingement monitoring is required to assure that the barrier net's performance is not compromised, or if it is, to provide that a crew can quickly be deployed to address the problem. One would not expect a traveling screen subject to periodic inspection and adjustment to degrade in mitigative performance overtime, while the barrier net could experience tearing or lift off the bottom, and as a consequence, quite different monitoring programs are required.

[see hard copy for figures]

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.212.003

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

FR Page 17149, VI.A.7: How are Entrainment Mortality and Survival Considered in Determining Compliance With the Proposed Rule?

There has been considerable effort to obtain empirical estimates of post-entrainment mortality in New York, particularly at Hudson River power plants. Over the years as the sampling gear became more refined to reduce stress during the collection process on entrained and control organisms, less water was sampled and therefore fewer animals were collected: some of the data available are based on relatively low numbers of organisms. One conclusion that seems fairly well established is that the physical and thermal stresses imposed on entrained organisms do not work synergistically. What one sees is a species and life stage specific mortality rate due to mechanical stress (contact with surfaces inside the cooling system, possibly shear and hydrostatic effects, etc.) as low as 10 % for robust species such as striped bass post yolk-sac larvae and as high as 100% for species such as bay anchovy larvae. For species that do demonstrate some tolerance to mechanical stress, thermal mortality can go from none to complete as the exposure (i.e. discharge) temperature increases over a narrow range of, say, 3 to 4 degrees C above the temperature at which thermal effects are first noted. Thermal mortality also exhibits a dose-response component wherein at temperatures that cause some mortality, longer exposure to the elevated temperature results in increased mortality.

Extensive post-entrainment and thermal exposure survival studies have been conducted in New York. Excerpts from some of these studies are attached here in response to EPA's request.

There have been criticisms of post-entrainment survival studies on several issues. One is that the holding of entrained organisms in laboratory facilities that allow for latent observations is essentially putting the organisms in a protected environment where they will have respite from predation and other factors. Compared with test organisms held in convalescent facilities, entrained organisms may be less able to survive when they are returned to the natural environment. Another criticism is that, although some latent effects data are based on a 96-hour post-entrainment holding period, that period may not be sufficiently long for some stresses to be manifest. And finally, it is usually impossible to gather test organisms that have experienced the full spectrum of entrainment, especially those organisms that have been returned to the source through a high-speed diffuser. Each of these factors could increase the estimated mortality imposed on entrained organisms. Department staff account for these unknown elements of entrainment by having permit applicants calculate impacts based on both empirical estimates of entrainment mortality and on the assumption of 100% mortality. The resulting estimates likely bracket the actual impact.

EPA also requested survival studies for other technologies to possibly aid in this rulemaking. During the development of the Gunderboom Marine Life Exclusion System, Department staff conducted an assessment of the swim speed of early fish life stages in estimating the possible effects of the through-boom water velocity on early larvae. A Department memorandum entitled Gunderboom File: Impingement on Boom, a Closer Look concludes that impingement of early life stages of fish likely found in the area of the Lovett Generating Station would not be a significant concern. Still, the Hudson RiverKeeper expressed concern for the effect of impingement of eggs and early larvae on the Gunderboom and the ease with which impinged eggs could be dislodged after being impinged. In response to this concern, Department staff conducted experiments with American shad eggs and day-old larvae that are also documented in a memorandum entitled Experiments with exposure of American shad eggs and larvae to the Gunderboom Marine Life Exclusion System, also attached. Those studies concluded that: American shad eggs do not suffer any mortality after being impinged on boom fabric' for up to 4 hours; the eggs are easily dislodged after being impinged; and day-old larvae easily swam well enough to avoid impingement on Gunderboom fabric through which water was flowing at the velocity proposed for the Lovett installation.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.212.004

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Peter Duncan
Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Economic considerations

The Department is encouraged by the discussion and guidance of appropriate methodologies for Benefits Assessment. In general, we agree with what is presented in this section and would encourage EPA to expand this section by including more methodologies and specific guidance on appropriate economic analysis. We have the following specific comments on the discussion appearing in Section VI. 8.

EPA Response

EPA provided a detailed discussion of methodologies and specific guidance on appropriate economic analysis in the context of the Section 316(b) regulation in Part A of the final Regional Study Document for the Phase II rule. See DCN #6-0003 for detail.

EPA will work with states and regions to develop appropriate methodologies for use in permitting determinations.

Comment ID 316bEFR.212.005

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.02.01.01

General/Benefit Transfer

FR Page 17149: VI.8.(a) What Should be the Appropriate Methodology for Benefits Assessment?

The Department encourages EPA to include Benefits Transfer as an appropriate methodology provided that certain criteria are met. Survey work to gather the data needed to build a Random Utility Model can be prohibitively expensive. This is also the case for the survey work for doing Contingent Valuation. It may be possible to save money if the data already exists or the function derived from it is applicable. Given the inelastic demand for electricity, it can be assumed most costs borne by the producers will be passed on to consumers, including costs of compliance, research, and permitting applications.

In those cases where appropriate and meaningful data already exist, the option to use it should exist. Existing data and existing modeling which. has estimated a function can be used to predict a customized value for the new application. This approach is commonly referred to as a “benefit-function transfer.” We propose the EPA draw from its own publication “U.S. Environmental Protection Agency. 2000. Guidelines for Preparing Economic Analyses, EPA 240-R-00-003.” and specifically the criteria for a credible transfer given in Chapter 7, Section 5.4. This document was peer-reviewed by the U.S. EPA’s Science Advisory Board and the Board’s Environmental Economics Advisory Committee (EEAC). The EEAC comprises of some of the best economists in the world. This peer-reviewed synthesis provides a sound basis for evaluating a benefit transfer to determine if it is credible.

EPA Response

EPA agrees that benefits transfer is an appropriate methodology for estimating benefits of the final Section 316(b) Phase II rule. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA, however, has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed principles outlined in the EPA’s Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN #6-1931), and has carefully applied benefit transfer methods. Further information on the benefits transfer method EPA used to estimate recreational fishing benefits for the Inland region is provided in the final Phase II Regional Study Document (DCN #6-0003). See Chapter H4: Recreational Fishing.

Comment ID 316bEFR.212.006

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Narrative benefits assessments to supplement the listed methodologies to account for those benefits which cannot be quantified and monetized.

The Department strongly recommends that the EPA require such supplementation. As stated in the Proposed Rules, recreational fishing is the only loss where data may be available and used in a Random Utility Model. Many other categories of losses may be incurred and should be noted and discussed in order to allow for qualitative adjustments, to fully inform the public, and provide baseline data and information if conditions change in the future. Other losses or potential types of impacts may include critical, sensitive habitats, species that are not presently threatened or endangered but may become so.

The Department recommends EPA provide guidance and a description of the types of information required as content for such narrative benefits assessments. Additionally, such benefits may be identified by the public outside of standard economic and data gathering activities and as such early and significant public participation and input should be sought in order to develop an inclusive and meaningful assessment.

EPA Response

EPA agrees that total benefits include outcomes beyond recreational and commercial fishery impacts, and that these other benefit categories often are very difficult to quantify and monetize. Qualitative assessments are valuable supplements to quantitative benefits studies, and the conduct and high quality of such assessments should be encouraged.

Comment ID 316bEFR.212.007

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

VI.8(a)(1): Baseline Impingement and Entrainment Losses

Habitat-Based Replacement Cost Analyses: (as described in Section IX. Benefit Analysis).

The Department strongly advocates the inclusion of this method as a listed and appropriate methodology for Benefits Assessment.

EPA Response

As noted in response to comment 316EFR.005.035, EPA agrees that the HRC method has value. However, the Agency no longer applies the HRC method as part of its benefits analysis for the 316b rule. The Agency agrees with many comments received that, in general, "costs" should not be confused for "values." However, EPA also notes that there are many instances in which cost-based information can provide useful insights to policy makers, and that under suitable circumstances, costs can be used as a proxy for (i.e., in lieu of) more desirable but less accessible "value" information. For example, cost-based data may be viewed as an indication of “value” where the costs are borne voluntarily by the individuals involved, or in cases where public policies reflect a broad consensus based on continuous input from the general public and the broad array of interested parties (especially where an adaptive management approach enables adjustments over time in what actions are taken and what costs are incurred).

Comment ID 316bEFR.212.008

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Inclusion of Passive or Non-use Values.

The Department strongly recommends that Passive Values be included in any and all estimation of benefits. As discussed above, many benefits cannot be quantified and the exclusion of any category, such as passive values, which can be quantified would result in serious underestimation of total benefits. Additionally, Freeman (1993) points out that passive use values are not dependent upon injuries to unique resources nor irreversible changes in the resource.

The Department agrees that application of a “ratio method” or applying a factor to the amount of use values to approximate non-use values is an efficient and practical method. We urge EPA, however, to allow upward flexibility in the actual factor applied. Site specific considerations’ must be taken into account which may be done by allowing regulators to adjust this factor to more closely approximate what they believe is more in keeping with the public interest. We believe the proposed 50% factor should be the minimum allowed as research shows many studies with much higher ratios of non-use to use benefits. For example, Brown (1993) in his meta-analysis concluded that non-use values averaged to be twice the use values which translates into an adjustment factor of 200%. As discussed in the Proposed Rule [Section 11], EPA recognizes that States assign higher priority to protect some waters over others. In cases where exceptional historic or cultural values may exist, States should be allowed to request a higher factor for the inclusion of passive values. The Department submits that it may be possible to partially address some of the issues attendant with priority watersheds by allowing flexibility in the factor applied to use values to approximate non-use values.

EPA Response

The analyses for the final Section 316(b) Phase II rule does not include estimates of passive use value.

EPA confirms that it is aware of Brown's research and conclusion that non-use values are on average double the level of use values. However, in the analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use a rule-of-thumb approach to estimate non-use benefits. For EPA's response to comments on the use of the 50% rule-of-thumb to estimate non-use benefits, please refer to EPA's response to comment #316bEFR.005.034.

Please also refer to EPA's response to comments on the HRC methods (316bEFR.005.035) and the SRP methods (316bEFR.005.006); the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003); and to EPA’s Guidelines for Preparing Economic Analyses (EPA 240-R-00-003).

Comment ID 316bEFR.212.009

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

NYDEC submitted with its comments (OW-2002-0049, 4-2.12 in the docket or 316bEFR.212 in this database): "Excerpts from Appendix VI-I-A: Entrainment process and sampling."

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.212.010

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

NYDEC submitted with its comments (OW-2002-0049, 4-2.12 in the docket or 316bEFR.212 in this database): “Excerpts from Indian Point Entrainment Survival Study. (1986)”

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.212.011

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

NYDEC submitted with its comments (OW-2002-0049, 4-2.12 in the docket or 316bEFR.212 in this database): "Excerpts from Indian Point Entrainment Survival Study. (1989)"

EPA Response

No response necessary. Please see all comments for this author.

Comment ID 316bEFR.212.012

Author Name Peter Duncan

Organization NY State Dept of Environmental Conservation, Office of Natural Resources

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

NYDEC submitted with its comments (OW-2002-0049, 4-2.12 in the docket or 316bEFR.212 in this database): “Entrainment Survival Studies.”

EPA Response

No response necessary. Please see all comments for this author.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John V. O'Shea

On Behalf Of:

Atlantic States Marine Fisheries
Commission

Author ID Number:

316bEFR.213

Comment ID 316bEFR.213.001

Author Name John V. O'Shea

Organization Atlantic States Marine Fisheries Commission

Subject Matter Code 6.01

Overview of I & E effects on organisms

In a letter dated August 7, 2002, the Atlantic States Marine Fisheries Commission provided comments in response to the proposed Environmental Protection Agency Section 316(b) regulations under the Clean Water Act. In this letter, the Commission expressed concerns regarding the potential impacts of power plant impingement and entrainment that may be misconstrued to imply that the Commission has developed a policy on the magnitude of these impacts. As you may be aware, the Commission is currently conducting a study to evaluate the coastwide cumulative impacts of power plant impingement and entrainment on Atlantic menhaden stocks This study will link impingement and entrainment mortality directly to the Virtual Population Analysis (WA) stock assessment in order to evaluate population level impacts to Atlantic menhaden. We are also conducting a study on multispecies interactions between Atlantic menhaden, striped bass, weakfish, and bluefish which will allow us to evaluate mortality caused by predator/prey effects. In combination, these two studies will provide the Commission and our member states the ability to concurrently evaluate the relative impacts of predator/prey mortality, mortality caused by power plant impingement and entrainment, and fishing mortality.

The Commission continues to be concerned with the potential impacts caused by power plant impingement and entrainment. However, we are very interested in developing a sound scientific basis for any policies the Commission formulates concerning impingement and entrainment mortality. We are hopeful that this study, in conjunction with other studies conducted by state and federal marine fisheries agencies, as well as the power plant industry, will provide the science necessary to more fully understand the potential impacts of impingement and entrainment. The Commission does not currently have any policies concerning the potential destruction caused by impingement and entrainment, and will develop these policies only upon completion of this scientific study

EPA Response

EPA thanks the commenter for this clarification. The study mentioned by the commenter has not been completed to date and could not be used as part of this section 316(b) Phase II rulemaking. Please see the response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts associated with cooling water intake structures.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Debra Littleton

On Behalf Of:

Dept of Energy

Author ID Number:

316bEFR.214

Comment ID 316bEFR.214.001

Author Name Debra Littleton
Organization Dept of Energy

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

An Investigation Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants

January 22, 2003

Prepared by

The United States Department of Energy
National Energy Technology Laboratory

Background

This addendum updates a report prepared by Parsons Corporation (Parsons) for the Department of Energy/Office of Fossil Energy's National Energy Technology Laboratory (DOE/NETL). The purpose of the addendum is to provide further information on the critical role that site-specific factors can have on the cost and feasibility of retrofitting cooling towers on thermoelectric power plants that currently employ once-through cooling.

The Parsons report was commissioned during the relatively brief interagency review period for the Environmental Protection Agency's §316(b) Phase II proposed rule for existing power plants. One of the Agency's regulatory options under consideration at that time was to require that over fifty (50) existing thermoelectric power plants retrofit from once-through cooling systems to wet recirculating towers. The Parsons analysis focused on the feasibility of implementing such a requirement on four existing steam-condensing power plants taking into consideration site-specific factors. DOE/NETL used the results of the analysis to provide input to EPA during the proposal's public comment period on the impacts that site-specific factors could have on retrofitting once-through plants with recirculating cooling towers.

The Parsons report was intended to provide a preliminary assessment -- a "30,000-foot view"-- of how site-specific factors might affect the cost of installation of cooling towers and ancillary equipment and any resultant economic and energy impacts on plant operations. Parsons was tasked with completing the study in four weeks and was instructed not to contact the utilities that owned the four plants since the interagency review process was ongoing. Therefore, Parsons was not able to obtain the requisite plant data from the plant operators that would typically be used to generate a detailed site-specific analysis. Nevertheless, while using only publicly available information and aerial photographs, the Parsons study concluded that the retrofit of closed-loop cooling systems at the four existing power plants would impose significant capital cost burdens and loss of net generation output.

Subsequent to the issuance of the Parsons report, DOE/NETL had discussions with each of the four utilities that own the power plants evaluated in the study. These discussions focused on actual site-specific concerns expressed by these utilities. We also sought comment about design parameters selected in the study and input on other issues that would affect the installation and operation of cooling towers at these and similar plants that DOE/NETL was unable to obtain during the interagency review. The subject addendum summarizes the supplementary information that was provided by the four utilities and presents a discussion of the impact of this new information on the cOst and feasibility of retrofitting wet cooling towers on the four power plants.

The overall conclusion based on DOE/NETL analysis of the supplemental site-specific information is that cooling towers can be more difficult, and more costly, to retrofit than one would assume based solely on publicly available information. Based on this additional information, we believe that it is critical that EPA recognizes in its rulemaking process that the cost and operational impacts of retrofitting once-through cooling systems must be evaluated on a case-by-case basis. The additional site-specific information also makes it clear that adverse environmental impacts (AEI) beyond those associated with impingement and entrainment and beyond water quality in general, would be caused by a requirement to retrofit to wet cooling towers. The other AEI include endangered species issues, visibility issues, noise pollution, salt corrosion, increased air emissions, and increased waste, and would impact cooling tower retrofit options.

General Issues

Siting

Parsons utilized publicly available aerial photographs to recommend locations for the installation of cooling towers at each of the plants. Additional site-specific information provided by the utilities has shown that most of the locations suggested in the report would not be feasible due to factors unknown at the time of the Parson's study. These factors include the presence of existing landfills, desalinization plants, railroad tracks, and other facilities, as well as commitments to use the targeted location for other purposes. The result of the actual site-specific information is that three of the four sites would require a more remote placement of the towers that would result in higher costs and possibly longer outage times.

Plume Abatement

One of the four plants investigated by the Parsons report was deemed to require plume abatement. Additional information provided by the utilities indicates that at least three of the four plants would likely require plume abatement due to local factors that were not known at the time of the Parsons study. Plume abatement measures would double the capital cost of the resulting cooling tower and result in other AEI.

Salt Drift

Even with optimum drift control there will be particulate emissions of salt from cooling towers employing salt water. These will have corrosive impacts within the power plant and may have adverse environmental impacts outside the plant boundaries. The consequences of adequately addressing salt emissions from the cooling towers include adding additional cost for salt drift reduction at three of the four plants and recognition of other AEI. At one of the plants it is likely that the State and Federal air quality standards for particulate emissions would be exceeded and a variance for the wet tower would be extremely unlikely.

Due to the need to re-site several of the wet towers based on new actual plant-specific information, the new locations close to urban areas would require some amount of noise abatement technologies. These would both increase the original Parsons' cost estimates and create additional AEI.

Local Uses Related to Cooling Water Intake and Discharge

At the nuclear facility that was evaluated the intake canal and pumps are also used for emergency cooling. In addition, at one of the fossil-fuel-fired plants, the discharge canal is used to dilute brine discharge from a desalination plant as well as to provide a warm water sanctuary for manatees, an endangered species. While these site-specific considerations were not included in the initial Parsons study they clearly would limit the practicality of reducing cooling water flow rates at these plants that would result from the installation of a closed-loop system.

Outage Times

The Parsons study assumed conservatively that all of the construction required for retrofitting the cooling tower systems could be performed while the plant is on line, thereby minimizing cost and energy impacts due to plant outages. Based on the input provided by the site operators, it appears that an extended outage would be required by two of the four plants resulting in losses in revenue. The impact of the loss of generating capacity - aside from the loss of revenue attributable to the plant - from these units during retrofit would need to be evaluated based on the historical records and projections of future dispatch for each plant.

Energy Penalty

The Parsons study used nearby wet bulb temperatures that were lower than temperatures actually experienced at some plant sites. This would result in an increase in actual energy penalty. Furthermore, the Parsons study is based on a 2 percentile of maximum wet-bulb incidence rather than the 1 percentile normally used to calculate the impacts on electricity generation during the times of peak summer demand. The 1 percentile of maximum wet-bulb temperature is typically a few degrees higher than the 2 percentile. For a given cooling tower design, an increase in wet-bulb temperature translates directly to increases in condenser temperature, with corresponding increases in turbine back pressure and the resultant energy penalty.

Revenue Loss

In terms of lost revenues, Parsons assumed a conservative replacement cost of electricity based on the average annual price of electricity of $0.03/kWh. However, the greatest loss in energy output from plants with cooling towers would be on the hottest, most humid days of the year when market prices for electricity are far greater than $0.03/kWh. The value of lost revenue could be calculated more accurately by looking at historical records of each plant and the specific price of power in each region, a level of detail that was neither feasible, nor in the scope of the Parsons study. Nevertheless, this lost revenue could be significant in some cases.

General Conclusions

The Parsons report highlighted the critical importance of site-specific factors such as those discussed above in the final determination of the costs and impacts of retrofitting to recirculating cooling towers in existing power plants. At the plants considered in this study, the incorporation of additional actual and more detailed site-specific information had the impact of increasing cooling tower capital cost estimates by as much as 100 percent. More importantly, other uses or beneficial impacts of the existing cooling water systems suggest that some cooling tower projects that seem workable as a general proposition are impractical at any cost when these site-specific uses are considered.

The opportunity to consult with the utility companies has demonstrated that the issue of retrofitting cooling towers is even more complex than shown in the report. Therefore, DOE/NETL reiterates its strong preference for a site-specific approach to implementation of §316b regulations. In addition, the finding that non-water related adverse environmental impacts will almost certainly result from installation of cooling towers at some, if not most, sites leads us to conclude that all AEI should be considered in a regulation that contemplates measures such as retrofitting cooling towers.

Plant Specific Issues and Responses

Subsequent to the issuance of the Parsons report, DOE/NETL obtained site-specific information from the electric-utility companies that operated the four plants included in the Parsons report that was not available at the time the report was prepared. Input was provided from America Electric Power (AEP) Company Inc., owner of the Barney M. Davis plant, Tampa Electric Company (TECO) Inc., owner of the Big Bend Station, PSEG Fossil LLC, owners of the Hudson Generating Station, and Dominion Virginia Power Inc., owner of the Surry Power Station.

The following presents a discussion of the comments received and DOE/NETL's assessment of those comments that would significantly impact the general conclusions reached in the Parsons report.

Big Bend Station

Siting Issues

The Parsons report sited the "conceptual" cooling tower on land that is unavailable. Part of the "conceptual" cooling tower is located on land that is occupied by a 25 million gallon per day seawater desalination plant that is under construction at the Big Bend power station.

An alternative possibility would be to construct a cooling tower south of the plant at a site currently used for byproduct management operations (beneficial use of waste to produce gypsum). The land is adjacent to the Apollo Beach residential community and proximate to an undeveloped coastal area covered with sensitive vegetation. Major modifications to the design of the cooling tower system, if sited at this location, would likely be required to minimize adverse environmental impacts and accommodate local permitting requirements. These modifications would require significantly higher costs. Furthermore, the existing byproduct management activities would have to be relocated and changed, thus requiring a detailed alternative analysis to minimize the impact on byproduct handling.

Plume Abatement Issues

The Parsons report does not include plume abatement technology in the cost estimate for the closed-loop, wet cooling tower retrofit at the Big Bend Station site. However, the Big Bend site is located adjacent to the Apollo Beach residential community. Although the need for plume abatement technology at the Big Bend Station site would not be determined until the actual permitting process was completed, the inclusion of such technology would likely be needed and would double the cooling towers' capital costs and significantly increase their annual operating and maintenance costs.

Adverse Environmental Impact Issues

The Parsons report does not include several potential adverse environmental impact issues associated with installation of a cooling tower system as defined in their conceptual study. The adverse environmental impacts that would need to be considered, and potential remedies sought include: (1) impact on endangered species such as the manatee that live in warmer waters created from the Big Bend discharge during the winter months; (2) increased air pollution emissions from power production due to loss in power plant efficiency; (3) visibility concerns from cooling tower plume; and (4) increased particulate emissions from cooling tower exhaust.

The Big Bend Station cooling water discharge provides a warm water refuge for manatees in the winter season and the discharge canal has been designated by the State of Florida as a Manatee Sanctuary. This benefit would be lost if the Big Bend Station were to retrofit their once-through cooling system with a recirculating cooling tower system.

The best available location for siting a cooling tower requires relocation of gypsum handling and raises the potential for salt contamination. A careful analysis and design would be required to determine if saleable gypsum can still be produced or if alternative disposition would be required.

Remedies to mitigate or avoid these potential adverse environmental impacts are site-specific and would require a detailed assessment of alternative measures.

Big Bend Station currently has a salable byproduct, gypsum, with annual revenue of $2 million. If the chloride level of the gypsum were raised above acceptable limits from exposure to salt drift, these revenues would be lost. Alternative utilization paths for the gypsum would have to be explored. Soil stabilization and trail construction are two potential uses. If alternative beneficial uses cannot be found, gypsum disposal costs would likely be an order of magnitude higher than current gypsum sales resulting in a total annual net revenue loss of about $20 million.

Outage Time

It is likely that tie-in of a cooling tower system would be scheduled concurrent with a major outage for the power plant. Since the cooling tower tie-in would need to accommodate connections with the condenser and the desalination plant, it is likely that the cooling tower tie-in outage would significantly exceed a scheduled outage. Given the substantial congestion amongst above and underground facilities and the complexities associated with new lines and sumps for the desalination plant at the Big Bend Station, DOE/NETL believes that the cooling tower tie-in outage time would require a detailed engineering analysis estimate.

Energy Penalty

The energy penalty estimated in the study for the cooling tower retrofit probably underestimated the actual energy penalty for the following reasons: (1) the temperature rise across the condensers is designed for a 17 degree rise rather than the 15 degree rise assumed in the Parsons report; (2) Big Bend Station rejects 70 percent of the rated steam flow rather than the 65 percent rejection rate assumed in the Parsons report; (3) turbine configurations for 2 of the 4 units at Big Bend Power Station were different than assumed in the Parsons report; and (4) the wet bulb temperature and summer average water temperature at the Big Bend Station are higher than estimated in the Parsons report.

The steam turbine exhaust physical design parameters coupled with condensing steam flow rates have a significant impact on steam turbine generator electric output and plant efficiency. Changes in turbine configuration from those used in the Parsons study could have a significant impact on the predicted change in generation output. Seasonal average values for cooling water and ambient wet bulb temperature do not reflect the extreme hot summer weather, which is coincident with highest demand for power and the highest cost for replacement power. The combination of factors listed above will increase the energy penalty estimated in the Parsons report. A more detailed study, beyond the scope of the “conceptual” estimate, is required to provide a more accurate estimate of energy penalty.

Economic Issues

The desalination plant begins operation this year and was not pictured on the aerial photo used by Parsons. Neglecting the existence of the desalination plant significantly reduces plant cost associated with installation of a cooling tower at the Big Bend Station. The desalination plant is currently configured to dilute brine discharge with water discharged from the once through cooling system. The reduced water discharge associated with a cooling tower would require an alternative strategy to be developed for the disposal of brine concentrate. Tampa Electric Company considered one other option that entailed discharging the brine concentrate via pipeline into the center of Tampa Bay. That study indicated that the plant would not be economically feasible if a mid-bay discharge were included. Since the current rulemaking could result in installation of such a discharge system 5 or more years after the desalination system is in operation and when it’s capacity will be more than four times the initial capacity, DOE/NETL is unable to determine the magnitude of the potential cost impact on this project.

In addition to cost increases related to providing dilution for the desalination brine, siting issues associated with the cooling tower in a less convenient location than assumed in the Parsons report would significantly increase capital and operating. costs at the power plant. There is also a potential annual loss in revenue of $20 million if gypsum byproduct sales are lost due to higher chloride content of the gypsum from salt drift deposition and more difficult management of gypsum because of encroachment of the cooling tower at the gypsum treatment area.

Revenues lost from extended outage time to tie-in the cooling tower system are expected to be significant. It is not possible to quantify lost revenues without a detailed engineering study.

The capital cost of the cooling tower situated on available land is estimated to be twice the capital cost estimated in the Parsons conceptual estimate. The major reason for this cost increase is the likely need to install plume abatement technology. If a cooling tower system were to be installed at Big Bend Station there would also likely be a need to have an extensive review of adverse environmental impacts that would increase the normal time needed to secure local, State, and Federal permits.

Hudson Generating Station

Siting Issues

Due to local sensitivity to a fatal Conrail train accident that occurred several years ago, it would be politically unacceptable to locate the cooling towers in proximity to the railroad tracks as they are shown in the Parsons design. That is, even a plume abated cooling tower under some conditions of weather could produce a low hanging plume that would obscure the visibility of any trains and its drift could ice the tracks.

In addition, planned modifications to the New Jersey Turnpike will physically interfere with the cooling tower location as proposed in the Parsons report. The SCRs and scrubbers that PSEG is obligated to regulatory agencies to install in 2006 and 2007 would prevent location closer to the powerhouse.

A more suitable location, further away from the power house, would entail considerably higher construction costs and pumping power requirements. This location, toward the North, would be on the other side of the Conrail railroad tracks and in the case of Unit 2, also across Penhorn Creek.

In that location, a full evaluation of the capital costs would require adding expensive bridging and tunneling of large diameter pipes to and from the towers to traverse these barriers. The stream crossings would also be subject to large permitting costs because of the environmental issues involved. This difference is reflected in the site-specific cost estimate PSEG prepared in 1997 (see below), which budgets $35,067,804 for pumps and piping systems, versus the total cost of $11,918,000 estimated for the same items in the Parsons report.

Noise Issues

Because the design is very open, noise abatement features on a wet-dry tower are generally a necessity, particularly if the tower is to be located near an urban environment, as would be the case at Hudson. The capital costs of noise abatement attenuation on cooling towers are usually very significant. The resulting operating costs can also be much greater. This aspect of the application of a wet-dry cooling tower design is neglected in total and thus these costs are not reflected in the Parsons report.

Energy Penalty Issues

PSEG identified several assumptions in the Parsons report that would tend to underestimate the energy penalty associated with the installation of wet-dry cooling towers at the Hudson site.

-The study is based on a circulating cooling water flow that is 20,000 gallons per minute lower than the actual value. This means that the tower size and pumping power needed may have been underestimated by approximately 9 percent in the report.

-The study is based on a 2 percentile of maximum wet bulb incidence rather than the 1 normally used.

This means that the lower corresponding wet-bulb temperature (74°F) selected in the study instead of the higher 1 percentile wet bulb of 76°F. This change would mean a 2 degrees F increase in condenser temperature, with corresponding increases in turbine back pressure and associated energy penalty.

-The adverse impacts of using brackish water in a cooling tower, as regards lower evaporation potential, lower thermodynamic properties, and extra pumping power requirements due to greater density were not included in the Parsons report.

Salt Drift Issues

Compliance with State and Federal air quality regulations would likely not be possible for particulate emissions (PM) from mechanical draft cooling towers at Hudson Generation Station. Predicted PM emissions due to salt drift from the mechanical draft tower on Unit No. 2 exceed the maximum allowable rate of 30 pounds per hour and thus a variance from these regulations would be required. Due to the urban setting of the site, PSEG believes that obtaining this variance would be difficult or impossible.

Cooling Tower Blowdown Issues

Water quality regulations are strict in New Jersey and require treating the cooling tower blowdown water. Both the temperature and pollutant levels of any returning water must achieve regulatory permit compliance.

PSEG's detailed site-specific study, made in 1997 (see below), estimates that treating the cooling tower blowdown water at Hudson to meet these regulatory requirements would require a $5,508,000 treatment facility. This treatment facility was not included in the Parsons estimate.

Outage Issues

The Parsons report assumes that retrofit work would fit into the normal spring or fall outage timeframe. However, a more likely scenario is that an extended scheduled outage would be required for the final tie-ins, intake modifications, existing CW piping modifications, services, start-up and testing. This outage construction period was estimated by the PSEG engineering study to be from 2 to 3 months for Hudson Station.

Permitting Issues

PSEG has recently obtained licenses and permits for the installation of a new, combined cycle unit with recirculating cooling towers at its Linden Generating Station. Based on this experience, PSEG estimates that it would take at least one year to acquire the four Federal, eight State, one county, and four municipal permits required for the retrofit of Hudson station with closed cycle cooling. This significant permitting effort was not included in the Parsons estimate for the proposed conversion.

Differences in Construction Cost Estimates

In 1997 PSEG obtained turnkey budget pricing from three respected cooling tower manufacturers based on a specification derived from a detailed site-specific engineering study defining the requirements for the potential conversion of Hudson Station to closed-cycle cooling.

-Based on the lowest of those vendor quotes, that turnkey tower cost of $48,580,000 (in 1997 dollars) was approximately twice the corresponding $24,800,000 (in 2002

-The total estimated project cost for the conversion of Hudson units 1 and 2 to wet-dry towers was $168,250,250 (in 1997 dollars), and was more than double the corresponding $73,524,000 (in 2002 dollars) total project cost estimated by Parsons.

-The significant difference in costs between the vendor quotes and PSEG's estimated project cost and the costs estimated by Parsons further highlights the need for site-specific information in determining the economic feasibility of retrofitting once-through power plants with closed-loop systems.

Surry Power Station

Plume Abatement Issues

The Parsons report did not include plume abatement technology in the cost estimate for the closed-loop wet cooling tower retrofit at the Surry Power Station site. However, based on the relatively close proximity of Colonial Williamsburg (8 miles) and Busch Gardens (7.5 miles) to the Surry Power Station, plume abatement technology could be required. Although the need for plume abatement technology at the Surry Power Station site would not be determined until the actual permitting process was completed, the inclusion of such technology would double the cooling towers' capital costs and significantly increase their annual operating and maintenance costs.

Emergency Services Issues

Dominion expressed concern with respect to maintaining the integrity of operation of the Surry Power Station's Emergency Service Water pumps under the proposed wet cooling tower retrofit design. Preserving the integrity and operation of the Surry Power Station's Emergency Service Water pumps is a significant safety issue. Dominion's concern is valid and serves to underscore how the understanding of truly site-specific issues is critically important to the retrofit design process.

Lost Revenue Issues

The Parsons report assumed that lost power could be replaced at an average annual electricity cost of $0.03/kWh. The greatest loss in energy output from plants with cooling towers would be on the hottest, most humid days of the year when market prices are far greater than $0.03/kWh. The value of lost revenue could be calculated more accurately by looking at historical records of each plant and the specific price of power in each region, a level of detail that was neither feasible, nor in the scope of the Parsons study. Nevertheless, this lost revenue could be significant in some cases and also serves to underscore the site-specific nature of retrofitting with cooling towers.

Dominion Virginia Power presents data in support of their position that the Parsons study may underestimate the energy penalty that is attributable to the warmer cooling water temperatures associated with the installation of cooling towers at the Surry Power Station site. The issue of lost revenue, from the preceding paragraph, becomes more significant as the actual energy penalty becomes larger.

Barney M. Davis

Salt Drift

There are several research facilities that lease space on the Barney M. Davis property. These facilities are located between 500 to 1000 feet downwind from the site of the proposed cooling towers. Based on this information and considering the corrosivity of the drift, some type of drift abatement might be required. Salt drift control is a site-specific issue and if it should be required at the Barney M. Davis site, it would increase the proposed cooling towers' capital and annual operating and maintenance costs over that which was reported in the Parsons study and cause other AEI.

Capital Cost Issues

AEP Inc. secured a cooling tower budget estimate, using actual Barney M. Davis plant operating conditions, from the Marley Cooling Technologies Company. AEP's cooling tower material and labor costs, using a wet-bulb temperature of 77°F, an 8 °F approach temperature, an 180,000 gallon per minute flow rate, and a 20°F condenser range, was between $5.2 and $5.5 million per tower. The Parsons material and labor estimate using the same wet-bulb and approach temperatures, but with a 215,000 gallon per minute flow rate and a 15 °F condenser range, was $4.8 million. In this manner, the Parsons report may have underestimated the material and labor costs for a wet cooling tower retrofit at the Barney M. Davis plant by between 8 and 15 percent. Cooling water flow rate and the coolant temperature range through the condenser are two site-specific operating parameters that directly affect the proposed cooling towers' costs and the potential energy penalties associated with their retrofit to once-through cooled facilities.

The city of Corpus Christi, Texas commissioned a desalinization plant feasibility study, sited at the Barney M. Davis plant, which concluded that the total dissolved solids (TDS) in the desalinization plant's brine discharge would necessitate the construction of a 10 mile long pipeline across the sea grass beds of the Laguna Madre, across Padre Island, and extend out 30 feet of water into the Gulf of Mexico. Regardless of the eventual outcome of the desalinization plant, the TDS in the blowdown of the proposed cooling towers would require that it be disposed in an identical manner. Engineers at AEP Inc. were able to use the desalinization plant feasibility study to extrapolate a capital cost of presented in the Parsons report. There would also be increased costs to perform an environmental assessment and mitigation of the sea grass beds.

EPA Response

No response necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Robert N. Stavins

On Behalf Of:

John F. Kennedy School of
Government Harvard Univ

Author ID Number:

316bEFR.301

Comment ID 316bEFR.301.001

Subject Matter Code MISC
Miscellaneous comment

Author Name Robert N. Stavins
Organization John F. Kennedy School of Government
Harvard Univ

To place this letter in context, I should first note that on July 19, 2002, I submitted comments on the proposed regulations. <FN 2> My comments focused on the economic analysis that EPA prepared to support the above proposed rule under Section 316(b)of the Clean Water Act, which directs EPA to identify “cooling water intake structures” (“CWIS”) that “reflect the best technology available for minimizing adverse environmental impact,” including impingement and entrainment ("I&E”) of aquatic organisms at plants’ water intake structures.

In those comments, I stated that I found EPA’s economic analysis offered in support of the rule to be severely flawed, biased, and misleading. I noted that some of the methodologies employed were neither recommended nor endorsed by EPA’s own Guidelines for Preparing Economic Analyses or by the U.S. Office of Management and Budget’s guidelines under Executive Order 12866. <FN 3>

My comments were especially critical of the methods used by EPA to estimate the economic benefits of the proposed regulations. In particular, I found that a number of the methods used by EPA to estimate benefits, including its Habitat Replacement Cost (“HRC”) and Societal Revealed Preference (“SRP”) methods, were inconsistent with the most basic principles of economics. Consequently, the benefit estimates derived from them could neither be considered reliable nor defensible. In addition to critiquing those methods, I noted specific alternative approaches that EPA could employ to provide valid estimates of the benefits it seeks to measure.

On August 1, 2002, Dr. Ackerman submitted comments on the proposed regulations on behalf of Riverkeeper. <FN 4> To a significant degree, the Ackerman comments attempt to rebut my July 19th comments.

The arguments presented in the Ackerman comments do not withstand scrutiny. <FN 5> My previous comments focused on issues related to the objective implementation of benefit-cost analysis, based on established economic theory and empirical research. Unfortunately, the Ackerman comments intermix and thereby confuse those issues with personal value judgments about the benefits of environmental resources and the usefulness of benefit-cost analysis in environmental decision making. In Section I of these comments, I discuss this problem. In Section II, I assess the Ackerman comments’ contention that EPA has underestimated total benefits due to omissions of various types of benefits. I find these claims unconvincing and lacking in any rigorous proof. Moreover, the Ackerman comments fail to take note of the numerous other flaws in EPA’s existing estimates that others and I have identified in previous comments. Considering the fact that these flaws introduce significant upward bias to EPA’s estimates, the argument in the Ackerman comments that EPA underestimates actual benefits is even less convincing.

In Section III, I examine the specific adjustments that the Ackerman comments propose to make to EPA’s benefit estimates. These adjustments are best characterized as essentially arbitrary. The adjustment that the Ackerman comments would make to EPA’s non-use value estimates based on the unfounded claim that significant non-use values must be associated with the proposed regulations because previous research has found non-use values for other, unrelated environmental improvements, including improvements in air quality and visibility at the Grand Canyon and prevention of regional extinction of the bald eagle. The Ackerman comments provide no evidence of why, given the specific environmental improvements associated with the proposed regulations, non-use value should be of any specific magnitude. A second adjustment that the Ackerman comments propose relates to the value of increases in the population of recreationally and commercially valuable fish that are not caught. This proposed adjustment may introduce double-counting, and it highlights an important flaw in EPA's analysis that may have caused its estimates to overstate, rather than understate, benefits.

In Section IV examine the case that the Ackerman comments make for the HRC and SRP methods. Here and elsewhere, the Ackerman comments mischaracterize the state of modern economics. The Ackerman comments incorrectly suggest that there is no consensus among economists on the basic economic principles that make the HRC and SRP methods fundamentally flawed.

The Ackerman comments fail to address my fundamental critique of the HRC method: benefits and costs bear no systematic relationship to each other; and the cost of a good or service cannot be used as a proxy for its respective benefits except in those situations where individuals (or groups) have been observed to voluntarily purchase the good or service. Hence, the cost of habitat replacement provides no information about the benefit of that replacement or of any other means to achieve the same outcome, such as the technological requirements considered in the proposed regulations. The HRC method is based upon a simple yet profound confusion of benefits with costs.

In defense of the similarly flawed SRP method, the Ackerman comments confound objective questions about the implementation of benefit-cost analysis with normative questions about its use in decision-making; and the Ackerman comments inaccurately characterize the state of knowledge regarding the economics of public goods and environmental protection. Overall, the Ackerman comments fail to offer any rigorous or meaningful response to the critique I offered in my previous comments of the SRP method, namely that this approach, like the HRC method, is premised upon a confusion of benefits with costs.

The Ackerman comments conclude with what is described as an assessment of the merits of the "All Cooling Tower" option that EPA has considered in its proposed regulations. As I explain in Section V, below, the Ackerman comments present a one-sided description of the tradeoff between benefits and costs, including a dramatically incomplete accounting of costs, as estimated by EPA. The attempted assessment is therefore misleading.

The Ackerman comments suggest throughout that I am hostile to methodological innovations in environmental economics, particularly with regard to methods of estimating the economic benefits of environmental policies. To the contrary, I believe it is clear from my criticisms of EPA's analysis that my motive (which, in any event, is irrelevant) is to improve the rigor of EPA's economic analysis in order to ensure that it can withstand close scrutiny. For close to two decades, through my research, teaching, and outreach activities, I have worked relentlessly to develop innovative environmental policies, and new and improved methods of estimating the benefits and the costs of such public policies. The driving force behind my previous comments on EPA's economic analysis was the same concern that led me to devote considerable time to serving as a Member and Chairman of the Environmental Economics Advisory Committee of EPA's Science Advisory Board. By providing comments, I hope to help EPA employ an improved economic analysis in its rulemaking that will provide an accurate, objective, and hence ultimately useful assessment of the proposed regulations' benefits and costs.

Footnotes

2 See: Stavins, Robert N. Letter to Proposed Rule Comment Clerk-W-00-32, Re: Comments on Proposed Rule, RIN 2040-AD62 Clean Water Act Section 3 16(b) -National Pollutant Discharge Elimination System -Proposed Regulations for Cooling Water Intake Structures at Phase II Existing Facilities, EPA ICR no. 2060.01. July 19, 2002.

3 See: US Environmental Protection Agency. Guidelines for Preparing Econoinic Analyses. Office of the Administrator, EPA 240-R-00-003. Washington, D.C., September 2000; US. Office of Management and Budget. Economic Analysis of Federal Regulations Under Executive Order 12866. Washington, D.C., January 1996.

4 See: Ackerman, Frank. Letter to Proposed Rule Comment Clerk -W-00-32, Re: Comments on Proposed Rule, RIN 2040-AD62 Clean Water Act Section 316(b) -National Pollutant Discharge Elimination System -Proposed Regulations for Cooling Water Intake Structures at Phase II Existing Facilities, EPA ICR no. 2060.01. August 1, 2002.

5 Although I critique many elements of the Ackerman comments in this letter, my failure to comment on any specific aspect of those comments should not be taken as an indication that I find the underlying assumptions, methodologies, or empirical applications therein to be valid.

EPA Response

This comment largely is a reply to a comment by another individual, made regarding EPA's proposed rule. Therefore, many of the points made are no longer relevant or are not relevant to EPA's analysis.

EPA has responded to specific concerns raised by Dr. Stavins regarding Dr. Ackerman's comments in responses to a number of comments. See EPA's response to comment # 316bEFR.301.002 regarding normative vs. positive economics issues; see EPA's response to comment 316bEFR.301.003 regarding the types of benefits that are omitted from EPA's analysis; see EPA's response to comment # 316bEFR.301.004 regarding the adjustments to EPA's benefit estimates proposed by Dr.Ackerman; see EPA's response to comment # 316bEFR.301.006 regarding the habitat replacement cost (HRC) method; See EPA's response to comment # 316bEFR.301.007 regarding the societal revealed preference (SRP) approach; see EPA's response to comment # 316bEFR.301.008 regarding evaluating the benefits and costs of the "AI1 Cooling Tower" option.

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02
Benefit Estimation Methodology

Confusion of Positive and Normative Economic Issues

Clearly, the Ackerman comments reflect strong philosophical views regarding the use of benefit-cost analysis in environmental policymaking. Philosophically or ethically based opposition to the use of benefit-cost analysis surely ought not to disqualify someone from commenting on a proposed rule. In this case, however, the Ackerman Comments intermix and thereby confuse questions regarding the appropriate role of benefit-cost analysis in policymaking with questions regarding the correct implementation of such analytical methods.<FN 6>For example, in an effort to provide support for arguments on behalf of EPA's SRP method, the Ackerman comments invoke Kenneth Arrow's impossibility theorem. <FN 7>While Professor Arrow's significant contribution to economic thought has enriched debate about how benefit-cost analysis can or ought to be used in public policymaking, it does not inform questions about the correct measurement of benefits and costs. For that matter, Professor Arrow has written elsewhere of the significant value that properly executed benefit-cost analysis can bring to public decision making.<FN 8>

In contributing to public policy debates, the economics profession has long since established clear distinctions between "positive" and "nonnative" economics. 'While the former deals with questions for which objective and rigorously proven answers can be provided, the latter deals with questions that inevitably involve opinions informed by individual values. The proper implementation of benefit-cost analysis falls squarely within the arena of positive economics. Rigorously established methods that are firmly rooted in widely-accepted economic theory can provide objective information on whether a regulation is economically efficient, that is, whether the amount that all those benefiting from a regulation would be willing to pay for those benefits exceeds the total amount that would need to be paid to individuals burdened by the regulation to ensure that no one is made worse off. In contrast, questions about the appropriate use of the efficiency criterion and the role of benefit-cost analysis in policymaking are distinctly in the realm of normative economics.

The Ackerman comments confuse these two distinct questions, letting philosophical views about the use of benefit-cost analysis in decision making lead to statements on objective issues of benefit valuation that contradict the basic principles of economics. In contrast, in the comments I offered, I focused on objectively assessing the valuation methods used by EPA, using as a guide the foundations of economic thought that have been developed over centuries and which enjoy broad acceptance.

Footnotes

6 EPA invited comments on normative as well as positive issues in its proposed 31G(b) rule, and in my previous comments, I addressed both dimensions. In section 1of my July 19,2002 comments, I examined alternative decision criteria being considered by EPA; in sections 2, I examined the concept and measure of economic practicability; in sections 3 and 4, I commented on EPA's methodology of benefit analysis and its application; and in section 5, I commented on EPA's proposed trading program. The critical issue is that normative and positive dimensions should not be intermixed and confused.

7 See: Arrow, K. J. Social choice and individual values. New York Wiley, 1951.

8 In the one article of which I am aware in which Professor Arrow has directly considered practical questions regarding the

potential use of benefit-cost analysis in environmental policymaking, he -along with me and his other co-authors -had this to say: “Benefit-cost analysis can play an important role in legislative and regulatory policy debates onprotecting and improving health, safety, and the natural environment.” He and his co-authors concluded, “If properly done, benefit-cost analysis can be of great help to agencies participating in the development of environmental, health, and safety regulations, and it can likewise be useful in evaluating agency decision-making and in shaping statutes.” Arrow, K. J., M. L. Cropper, G. C. Eads, R. W. Hahn, L. B. Lave, R. G. Noll, P. R. Portney, M. Russell, R. Schmalensee, V. K. Smith, and R. N. Stavins. “Is There a Role for Benefit-Cost Analysis in Environmental, Health, and Safety Regulation?” Science, April 12, 1996,Volume 272, pp. 221-222.

EPA Response

The comments presented here regarding normative vs. positive economics are philosophical in nature. While the issues raised are certainly valid, they are more properly argued in the political arena, at the level where the procedures for regulatory analysis are determined. However, EPA points out that benefit-related considerations are not the only issues EPA must consider in making regulatory decisions, and that other factors should also be weighed. No methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis. EPA’s approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA’s Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003).

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

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Benefit Estimation Methodology

The Implications of Additional Benefit Categories

The first section of the Ackerman comments focuses on the “incomplete” nature of EPA’s benefit estimates as evidence that EPA has substantially underestimated the benefits of the proposed regulations. The Ackerman comments devote so much attention to enumerating the types of benefits that are supposedly omitted that they fail to establish the second argument that is essential for their criticism: that, in the context of the benefits and costs that are measured, the magnitude of the supposedly omitted benefits is sufficiently large to affect conclusions comparing benefits and costs.

The analogy offered by the Ackerman comments of recent corporate governance issues illustrates the shortcoming of the comments’ focus on the number (rather than the magnitude) of omitted benefits. Investors were not harmed by revelations about the financial condition of firms simply because those firms’ balance sheets had omitted particular items. Rather, investors were harmed because those items, if included, would have significantly altered perceptions of the firms’ financial condition. Yet, in arguing that EPA has substantially underestimated benefits of the proposed regulations, the Ackerman comments rely on the number of omitted benefit categories, rather than their magnitude.

It should be noted that any omitted benefits must overcome two hurdles in terms of magnitude for their inclusion to increase EPA’s existing benefit estimate. Not only must the omitted benefits be large enough to lead to non-trivial changes in annual benefits (which EPA’s estimates suggest are on the order of hundreds of millions of dollars). More importantly, as others and I have pointed out in previous comments, many of those benefits that are already quantified in EPA’s analysis are themselves substantially overstated, due to numerous significant flaws in EPA’s estimation methods.<FN 9> These flaws extend well beyond the use of the HRC and SRP methods, which the Ackerman comments support and I address in Section IV, below.<FN 10> Therefore, to bring about a valid increase in estimated benefits, the omitted benefits must be of sufficient magnitude to more than offset the substantial reduction in benefits that would result from correcting the flaws in EPA’s previous analysis.

In a few areas, such as those I consider below in Section III, the Ackerman comments do offer quantitative estimates. For example, drawing from an EPA analysis of a different proposed rulemaking, the Ackerman comments suggest that EPA’s omission of particular types of recreational benefits may have caused recreational benefits to be understated by a factor of four or more.<FN 11> To justify this assertion, the comments point out that the analysis for the other rulemaking, which established effluent guidelines for metal product and machinery facilities (“the MP&M rule”), estimated benefits from types of recreational activities omitted from EPA’s economic analysis of the proposed regulations: non-fishing-related recreational boating, near-water activities, and wildlife viewing. But the Ackerman comments do not address whether the nature and magnitude of environmental improvements expected from the MP&M rule are sufficiently similar to those anticipated from the proposed regulations to lend credibility to the comments’ assessment of recreational benefits. In fact, they are not similar at all.

In the preamble to the notice of proposed rulemaking for the proposed regulations, EPA states that "the majority of environmental impacts associated with intake structures are caused by water withdrawals that ultimately result in aquatic organism losses."<FN 12> EPA goes on to state that these population losses may lead to general ecosystem effects (such as those cited by the Ackerman comments). In stark contrast, EPA expects the MP&M rule to reduce pollution loading in the nation's surface waters by millions of pounds. EPA found that "10,443 stream reaches exceed chronic or acute aquatic life ambient water quality criteria ("AWQC") and/or human health AWQC values at the baseline discharge levels. The proposed rule is expected to eliminate exceedences on 1,185 of these discharge reaches ... 1,837 reaches will experience partial water quality improvements from reduced occurrence of some pollutant concentrations in excess of AWQC "limits." <FN 13> Such environmental improvements go well beyond affecting only the population of aquatic organisms in the affected streams. EPA also expects that this rule will improve the health of fish, general water quality, and presumably the willingness of people to use affected streams. There may be good reasons why non-fishing recreational benefits were worthwhile to consider in the MP&M rule, but were sensibly omitted in the economic analysis of the proposed 316(b) regulations. At best, the calculations in the Ackerman comments represent a crude and inappropriate "benefit transfer."

Three general conclusions can be reached in regard to the contention in the Ackerman comments that the omitted benefits are significant in magnitude because of the number of benefit categories that have been omitted. First, it is reasonable to assume that EPA would focus on analyzing those benefit categories that it anticipated would have the greatest impact on its total benefit estimates. Second, some of the "omitted benefits" cited in the Ackerman comments are trivial or non-existent. For example, the Ackerman comments suggest that benefits are underestimated because secondary economic impacts on property values have not been considered.<FN 14> While economic research has found that property values can be adversely affected by some undesirable environmental conditions, such as those resulting from proximity to landfills, there is no evidence that the value of property is appreciably affected by the population, or even species composition, of fish in water adjacent to it.<FN 15> Indeed, it is far more likely that property values may be negatively affected by conditions associated with some of the technologies that EPA has considered for reducing I&E impacts, such as noise and vapor plumes that are typically associated with cooling towers.

Third, some of the arguments in the Ackerman comments that benefits were undercounted actually highlight reasons why benefits may have been overstated. For example, the Ackerman comments cite EPA's caveat that "monitoring data often pertain to conditions existing many years ago, before the Clean Water Act had improved aquatic conditions; if the numbers and diversity fish were depressed by degraded water quality, estimates of I&E losses would be similarly low."<FN 16> But, the opposite would be true in places where fish populations have decreased during the intervening years, due to overfishing. In such places, the use of historic data will overestimate the population of fish potentially susceptible to I&E, because fishing has depleted the stock of affected fish in the intervening years.

Footnotes

9 Along with my previous comments, those by Triangle Economic Research, National Economic Research Associates, and Professor Ivar Strand all addressed these flaws.

10 To name just a few, the flaws include: failure to take into account the timing with which benefits will be realized; the assumption that the fishing industry will enjoy economic profits well above those enjoyed by other competitive industries; and the assumption that unrealistically high economic profits will also be enjoyed by industries down the production chain

from the fishing industry.

11 Ackerman (2002), p. 6.

12 67 Fed. Reg. 17,136 (April 9,2002).

13 66 Fed. Reg. 504 (January 3,2001).

14 Ackerman (2002), p. 4.

15 Furthermore, it would be gross double-counting to estimate economic damages to commercial and recreational fish populations and then add property-value impacts. Onlyif there are other impacts not reflected in the impacts on the fish populations (such as rendering the water more swimmable) would capitalization of impacts into property-value changes reflect anything other than what was already estimated. Note that property-value capitalizes use values, not non-use values.

16 Ackerman(2002), p. 4.

EPA Response

The comment implies that EPA has omitted no significant benefits, and states that EPA's benefit analysis overstates benefits that are included. EPA disagrees. EPA believes that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. This is supported by the fact that, for the 316(b) Phase II regulation, the Agency was not able monetize benefits for 98.2% of the age 1 equivalent losses of all commercial, recreational, and forage species. (The percentages by region are as follows: California 95.2%, North Atlantic 99.0%, Mid Atlantic 98.4%, South Atlantic 98.1%, Gulf of Mexico 95.8%, Great Lakes 99.8%, and Inland 99.9%.) This means that the benefit analysis represents the benefits associated with less than 2% of the total age 1 equivalents lost due to impingement and entrainment by cooling water intake structures (CWISs).

As stated in the NODA, EPA attempted to include non-use benefits categories for the final Section 316(b) Phase II rule analysis. However, given the unavoidable uncertainties in estimating non-use benefits at the national level, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. The Agency has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment

#316bEFR.306.106.

This comment states, in response to a comment submitted by Dr. Ackerman, that Dr. Ackerman failed to consider the magnitude of possible omitted benefits, and therefore Dr. Ackerman's comments are unfounded. These comments based on responding to another comment are not based on EPA's actual analysis. EPA has not applied analysis from the MP&M rule to the 316b benefits analysis, so comments regarding this topic are not relevant.

EPA interpreted Dr. Ackerman's comments to mean that the Agency should have estimated non-fishing related recreational boating and near water activities for the 316(b) regulation. EPA agrees that a complete assessment of benefits for the regulation would include these benefit categories, but data limitations prevented it.

The comment suggests that, in places where overfishing has occurred, benefits may be overstated, as smaller stocks of fish are available to be harmed by I&E. However, it is not clear whether reductions in stocks over time are a result of overfishing, or of cumulative I&E and thermal affects from facilities included in the 316b regulation. Without empirical evidence to support this comment, this point is not relevant.

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

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Benefit Estimation Methodology

Proposed Adjustments to EPA's Benefit Estimates

Two adjustments to EPA's benefit estimates are presented in the Ackerman comments, and these are central to the argument that EPA has undercounted benefits. First, the Ackerman comments make an adjustment to EPA's estimate of non-use benefits. But, in so doing, they fail to consider those factors that affect the magnitude of non-use benefits, the most important of which is the nature and magnitude of the environmental improvement of concern. In my previous comments, I presented a number of criticisms of EPA's use of the "50% rule" in estimating non-use benefits. First, no economic basis exists for believing that the ratio of non-use to use benefits from previous research could be applied to the environmental improvement being considered by EPA without any consideration for how that improvement differed from those examined in the research on which EPA relied. This is a particularly significant flaw, given that the literature review on which the 50% rule is based did not include any studies that addressed non-use values associated with reducing I&E impacts. More generally, some of the water quality improvements examined in the literature review are of afar greater magnitude and a different nature than those expected from the proposed regulations.<FN 17>

Focusing only on the dated nature (approximately twenty years old) of the literature review used by EPA to justify the 50% rule, the Ackerman comments present adjustments to the ratio of non-use to use values. These adjustments, however, are no less flawed than EPA's original estimates, because they fail to take into account the nature and magnitude of the respective environmental improvements. The Ackerman comments suggest a new "200% rule"! This suggestion is based on a literature review performed by Thomas Brown ten years ago that considered 31 contingent valuation studies. The proposed "200% rule" comes from the median non-use to use value ratio found in Brown's literature review.

Economic research has clearly identified factors that bring about very different ratios of use to non-use values among environmental improvements, including: the magnitude and nature of the improvements; the uniqueness of the resources affected; the degree of public familiarity with the resources; and the extent to which there are opportunities for use of the resources.<FN 18>The Ackerman comments fail to note that the ratios of non-use to use values in the studies examined by Brown range from 0.1 to nearly 11.0, and include studies of the value of preventing deterioration in air quality at the Grand Canyon and preventing extinction of the bald eagle in New England, both of which are clearly inappropriate to consider in estimating the non-use value arising from the proposed regulations. <FN 19>Moreover, Brown himself recognizes that there is reason to believe that the ratio would vary across environmental improvements.<FN 20>

The implausibility of the Ackerman comments' estimates of non-use value is revealed by the arguments in the comments themselves. The comments' estimated benefits for EPA's option 5-which would entail reductions in I&E at all affected facilities commensurate with the use of dry cooling-imply that the non-use value associated with such an option would exceed $6.2 billion annually.<FN

21> Note, however, that the Ackerman comments also highlight one of the studies reviewed by Brown, which “found a nationwide non-user willingness to pay ... for improving water quality in all U.S. rivers and lakes to a fishable level -implying a nationwide total value of more than $11 billion in 1981 dollars, or closer to $ 20 billion in today’s dollars."< FN 22>Thus, the adjustments proposed by the Ackerman comments imply that the non-use value that society places on eliminating I&E impacts on aquatic populations located in the immediate vicinity of just 550 facilities is filly one-third of the non-use value society places on substantially reducing pollutants and thereby improving water quality in 3.7 million miles of rivers and streams and 40.6 million acres of lakes nationwide. <FN 23>

To support their own estimates and to call into question my earlier criticisms of EPA’s nonuse value estimates, the Ackerman comments conclude:

Dr. Stavins’ casual and undocumented suggestion that non-use values might be close to zero for this case appears to be quite at odds with the evidence of substantial nonuser willingness to pay for improved water quality. Other studies routinely find vast existence values for endangered species, for clean air in national parks, and other environmental resources and amenities. The surprising value, the figure that is out of line with the recent literature, is the very low estimate of non-use value found in (EPA’s analysis). <FN 24>

My suggestion in my previous comments that-in this specific context-non-use value could be very small (if measurable at all) was neither casual nor undocumented. In contrast with the estimate of non-use value in the Ackerman comments, which is based on non-use values from different and vastly more significant environmental improvements, my earlier conclusion was based on consideration of the specific environmental improvement anticipated from the proposed regulations. Significant non-use benefits may be derived from the existence of endangered species, and clean air in national treasures such as the Grand Canyon. But the proposed regulations are expected to bring about largely incremental changes in the populations of various aquatic species. No case has been made that the regulation will affect the very existence of unique resources with high public awareness levels. Hence, the Ackerman comments have no basis for asserting that EPA’s existing estimate of non-use value is significantly below (“out of line with”) the recent literature. In fact, as I have explained in detail in my original comments, it is biased upward, indeed dramatically upward.

The second adjustment that the Ackerman comments seek to make to EPA’s benefit estimate is linked with the value of the share of the increased fish population that is commercially or recreationally valuable, but not caught. For such an increment to represent a valid economic benefit, this portion of the fish population must yield either use or non-use benefits (or both) not already counted by EPA. Clearly, EPA has incorporated an estimate of non-use benefits from reduced I&E in its analysis. Even if Dr. Ackerman disagrees with that estimate, there is no basis for arguing that EPA’s estimate fails to include the non-use benefits of the entire increase in fish populations, including those that are not caught. Therefore, for the Ackerman comments to avoid double-counting in making this adjustment, the benefit of these commercially and recreationally valuable fish that are not caught must arise from use value. Indeed, the Ackerman comments support the adjustment on the basis of use value associated with these fish. Yet, in so doing, the comments highlight another aspect of EPA’s analysis that may have contributed to overestimated benefits.

The argument made by the Ackerman comments is that even if certain commercially and recreationally valuable fish are not caught, their offspring may be, and therefore use value should be assigned to those fish that are not caught to account for the use value of their offspring.<FN 25> This argument highlights a flaw in EPA's benefits assessment, but contrary to the contention in the Ackerman comments, we cannot assume that this flaw will cause the benefits of the rule to be underestimated. Rather than estimating changes in the total population of commercially and recreationally valuable fish (and hence fish catch) due to reduced I&E, EPA estimates the number of fish that have historically been impinged or entrained each year, and estimates the share of those fish that would have been caught if they were not subjected to impingement or entrainment. While the former approach would account for increased catch of the offspring of fish that would have been impinged or entrained in the absence of the proposed regulations, the latter approach does not. However, the Ackerman comments fail to note that the approach chosen by EPA also ignores the mitigation of the impact of existing I&E on fish populations and catch levels resulting from compensatory effects.

Mitigation of population impacts by compensatory effects is perfectly consistent with commonly accepted density-dependent population models that EPA discusses but chooses not to employ in its analysis. While the failure to consider increases in catch attributable to offspring of those fish that avoid I&E would tend to bias downward EPA's estimate of the increased fish catch, EPA's decision not to account for compensatory effects would lead to an upward bias in that estimate. Taking into account these opposing effects, ecological expertise is required to come to the judgment made in the Ackerman comments that the net effect on benefit estimates would be negative. In summary, economic theory and empirical research do not support either of the adjustments proposed by the Ackerman comments.

Footnotes

I7 For example, one of the studies examined in the literature review estimated the non-use value associated with reductions in pollution that would bring surface waters nationwide from being so polluted as to be unusable for any recreation, to being boatable and even swimmable.

18 See: Freeman, A. Myrick. The Measurement of Environmental and Resource Values: Theory and Methods. Second Edition. Washington, D.C.: Resources for the Future, 2003.

19 The prevention of air quality deterioration in the Grand Canyon and of the extinction of the bald eagle in New England differ significantly from reductions in I&E in several respects that would make their ratio of non-use value to use value inapplicable to that for reductions in I&E. These include the uniqueness and familiarity of the affected resource as well as the nature and extent of the environmental improvements in question. For example, one would expect the non-use value of preventing a species' extinction to be vastly greaterthan that for preventing marginal changes in its population.

20 It is also worth noting that the Ackerman comments apply the 200% rule to EPA's estimates of commercial, recreational, and forage fish use benefits, despite the fact that the literature review on which this adjustment is based solely considers the ratio between recreational use and non-use benefits. In addition, as it is unlikely that researchers would examine non-use values for environmental improvements that are not expected to have significant values, the lower bound of 0.1 in the range of ratios likely overstates the actual lower bound across all environmental improvements.

21 This non-use value in excess of $6.2 billion can be derived from a comparison of the Ackerman comments' estimated benefits for option 5 under scenario B and C presented in Table 1 of Ackerman (2002). In scenario B, the Ackerman comments adjust EPA's existing estimate to create a value for the increase in fish populations that are not caught by fishermen. In scenario C, the Ackerman comments add the adjustment for non-use value to the existing adjustment for those fish that are not caught. The differencein the two estimates, $6.2 billion, is therefore solely attributable to non-use value.

22 Ackerman (2002), p. 13.

23 See U.S. Environmental Protection Agency. National Water Quality Inventory: 2000 Report. at <http://www.epa.gov/305b/2000report/>visited January 26,2003.

24 Ackerman (2002), p. 13.

25 Ackerman (2002), p. 7.

EPA Response

This comment largely is a reply to a comment by another individual, made regarding EPA's proposed rule. Therefore, many of the points made are no longer relevant or are not relevant to EPA's analysis.

As stated in the NODA, the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Given the unavoidable uncertainties in estimating non-use benefits, the Agency presented a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. The Agency has provided several measures that indicate the potential magnitude of non-use values for this rule, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services.

With respect to complaints concerning EPA's use of mean ratios from the studies referenced in the Akerman comments, EPA has the following responses. Calculating an arithmetic mean is a simple, accepted method of considering a number of different results in combination. Using an arithmetic mean of non-use to use value ratios from the 8 studies that were consulted can be viewed as a simple version of a "meta-analysis" of surface water improvement valuation studies. Use of an arithmetic mean in this context can be reasonable.

That being said, EPA agrees with the commenter that the calculation of mean ratios does not account for differences in resource characteristics and the magnitude of environmental improvements between the study areas and the sites considered in the original studies. In other words, an arithmetic mean is not capable of teasing out the possible effect of various specific factors in the studies (e.g., geographic scale of environmental improvements) that might influence non-use values. While this does not render the approach "completely inappropriate" or unreasonable, it is a shortcoming. EPA believes, however, that this shortcoming can be overcome by a meta-analysis approach. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis.
For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The comment implies that non-use values are unlikely to exist except for unique resources whose existence is threatened. The comment provides no evidence that the fish affected by I&E are both easily replaceable and non-unique. For EPA's response to comments regarding evidence of non-use values for temporary losses to common species please see the response to comment #316bEFR.306.302.

Comment ID 316bEFR.301.005

Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's Flawed Benefit Estimation Methods

One of the most troubling aspects of EPA's economic analysis, which I addressed in detail in my July 2002 comments, is its use of two fundamentally flawed methods to estimate benefits, the Habitat Replacement Cost method and the Societal Revealed Preference method. The Ackerman comments seek to promote these methods and attempt to rebut my criticism of them. In so doing, however, the comments: mischaracterize my criticism; incorrectly suggest that there is disagreement among economists regarding the basic economic principles that are relevant for judging the validity of these methods; offer a flawed and misleading description of economic principles; and employ inconsistent logic. In the end, the Ackerman comments offer no insights or valid arguments that in any way diminish my original conclusion that these two methods are fundamentally flawed and provide highly biased "benefit estimates.''

The Ackerman comments suggest that my concern regarding EPA's methods of analysis is predominantly that they are not recommended in EPA's Guidelines for Preparing Economic Analyses. This is incorrect. My fundamental point is that the HRC and SRP methods are completely inconsistent with economic theory and empirical practice; both are measures of costs, not of benefits. It is because of this reality that neither is endorsed by EPA's Guidelines. By focusing on the Guidelines, the Ackerman comments ignore my most important criticism of EPA's HRC and SRP methods: they have no foundation whatsoever in economic theory or practice, as they confuse the most basic economic concepts of benefits and costs.<FN 26>

Furthermore, contrary to what is suggested in the Ackerman comments, the fact that EPA's Guidelines are to be updated periodically to reflect any important methodological developments (as I recommended in my letter of transmittal to the EPA Administrator, which the Ackerman comments cite) does not somehow validate the two invalid methods, which are inconsistent with centuries-old economic principles that are found in introductory economic textbooks. While these two methods are certainly not innovative, they also are not new. Both the methods themselves and the flaws that make them invalid for measuring benefits have been considered before.

One of the most misleading parts of the Ackerman comments seeks to establish support for the HRC and SRP methods by misrepresenting what is, in reality, tremendous consensus among economists regarding fundamental theories of economics. Describing the HRC and SRP methods as unorthodox but "innovative," the Ackerman comments attempt to place them in the company of "alternative perspectives that question the textbook wisdom." <FN 27> Incredibly, the Ackerman comments suggest that the economics profession as a whole is exhibiting increased interest in unconventional theories, and by implication HRC and SRP, because recent Nobel laureates-including Joseph Stiglitz, George Akerlof, and Michael Spence-are "famous for their unorthodox views.''<FN 28> This line of reasoning is illogical and fallacious. The ideas and work that won these three individuals the Nobel Prize are broadly accepted in the economics profession. Rather than questioning the textbook wisdom, their ideas are found in virtually all of even the most elementary economics textbooks. Moreover, while many unresolved questions are still actively debated in economics, no economist would question the fundamental difference between benefits and costs, which makes both HRC and SRP completely invalid as benefit estimation methods.

Footnotes

26 I address the flaws associated with these methods in more depth below.

27 Ackerman (2002), p. 11.

28 Ackerman (2002), p. 11.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA’s response to comment #316bEFR.005.035.

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA’s response to comments on the SRP, please see the response to comment #316bEFR.005.006

Please also see Dr. Ackerman's comments: #316bEFR.014.001 through #316bEFR.014.012.

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Habitat Replacement Cost Method

EPA's HRC method, which the Agency claims in its economic analysis is an alternative method for valuing benefits, is actually nothing of the kind. The Habitat Replacement Cost method is-pure and simple-a measure of costs, not benefits. The habitat replacement costs are the design, implementation, administration, maintenance, and monitoring costs of various identified means of restoring aquatic habitats in the hopes of producing the same in situ services and service flows that are associated with the various technological alternatives under consideration. In other words, these are the costs of another alternative-and one that can be very costly-for achieving the same functions as targeted by the proposed regulation. While mitigation, restocking, and/or habitat restoration may be acceptable approaches as alternatives to the installation of specific technologies in order to offset I&E losses, the cost of such alternatives is in no sense whatsoever a reasonable proxy for the value (that is, the benefit) of reducing I&E.

The specific arguments offered by the Ackerman comments in support of EPA's HRC method actually make clear why the method cannot be used to develop reasonable estimates of real benefits. For example, the Ackerman comments state that "restoration cost is used as a measure of damages under CERCLA for Superfund sites, under the National Marine Sanctuaries Act, and under the oil spill provisions of the Clean Water Act." <FN 29> or not restoration cost measures have been employed in retrospective (ex post) natural resource damage assessments is irrelevant for prospective (ex ante) assessments of the benefits and costs of the proposed regulatory changes under the Clean Water Act. Even if restoration costs have been employed in other policy contexts to guide decisions about compensation for environmental damages, this certainly does not indicate that restoration costs are a valid measure of the benefits from avoiding environmental damages or, for that matter, the benefits of the associated restorative action. <FN 30>

To further justify their endorsement of the HRC method, the Ackerman comments contend that it is common practice in economics to value assets at their replacement cost. The very contention made in the Ackerman comments confirms my previous critique of HRC by making clear the specific and limited circumstances in which replacement costs can serve as a valid measure of value: "market value is current replacement cost, for a marketed asset" (emphasis added).<FN 31> It is well known that the replacement cost of an asset can be assumed to be less than or equal to its market value (its benefit) only if that replacement is undertaken voluntarily.<FN 32> This clearly does not apply to habitat restoration activities considered by EPA in its HRC method. As EPA has not indicated that there is evidence of such restoration being undertaken voluntarily by individuals, there is no basis whatsoever for simply asserting that its benefits, and thus the benefits of reducing I&E to achieve the same outcome, are greater than its costs.

The Ackerman comments' characterization of environmental resources as natural capital or natural assets does not change the reality that their real benefits are determined by the value that society places on their contribution to the various ecosystem or other services they provide (whether in terms of use or non-use value), not by their replacement cost. Indeed, this conclusion is reached in the very book that the Ackerman comments themselves cite.<FN 33> There is no basis for asserting that replacement costs are necessarily less than benefits; hence there is surely no basis for using replacement costs as a proxy for real benefits.

As I made clear in my previous comments, the fundamental distinction of whether or not a good or service is marketed differentiates the invalid HRC method from legitimate applications of “defensive expenditure” and “averting behavior” methods to estimate benefits. Those methods are based upon observed actions, that is, individual behavior. In particular, a necessary condition for using defensive expenditures or averting behavior for purposes of benefit estimation is that the researcher observes people revealing their preferences by actually (and voluntarily) incurring costs to avert (or tolerate) the environmental disruption in question.<FN 34> By observing individuals take actions that involve incurring particular costs, one can infer that the individual is taking that action because its benefits to that individual outweigh its costs. Yet, one can only infer this if the individual is voluntarily taking an action, that is, making a choice that is based on his or her own preferences rather than being compelled by an external mandate. This is obviously not the case with the hypothetical habitat replacement activities that EPA uses to develop its cost estimates. Indeed, EPA makes no claims that such activities have actually and voluntarily been carried out by individuals.

It is important to recognize that the HRC method is not merely a flawed approach to estimating benefits; it is not a benefit-estimation method at all. Such “avoided-cost methods benefit estimation” have long been recognized as invalid.<FN 35> Applying these methods will mean that any proposed project (whether the project is good or bad for the environment) can be made to appear desirable. By taking the next most costly approach of achieving an objective and calling that the project’s benefits, one will always find that “benefits”-so measured-exceed costs. This completely faulty reasoning will come back to haunt EPA when others use it to push for actions that are unreasonably expensive or even environmentally harmful.

Footnotes

29 Ackerman (2002), p. 13.

30 While sometimes using restoration costs to assess natural resource damages under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Natural Resource Damage Assessment Models employed for this purpose explicitly differentiate the cost of restoration from the actual benefits associated with that restoration. In determining whether to include active restoration of an impaired natural resource -and the associated cost -in the damage calculation, as opposed to assuming natural restoration, a submodel of the Natural Resource Damage Assessment Models “analyzes the costs and benefits of any possible habitat restoration and restocking actions to determine whether these forms of active restoration or natural recovery shouldbe assumed for purposes of the models’ damage calculations. ... If the costs exceed ten times the measured benefits, then the submodel assumes, for purposes of generating a damage figure, that natural recovery, rather than active restoration, will be used to reestablish baseline conditions.” Natural Resource Damage Assessments -Type A Procedures. 61 Fed. Reg. 20,559-20,614 (May 7,1996) at 20,56520,566.

31 Ackerman (2002), p. 14.

32 See: Freeman (2003).

33 The text to which the Ackerman comments refer states, “Treating natural and environmental resources as assets will be an important element in revisions to the methods for resource evaluation. At a conceptual level this strategy implies that the evaluation of proposed i.e.,public investments) ...allocation decisions that involve services of an environmental resource should be based on their effects on the value of that resource as an asset in relation to their costs.” In other words, habitat restoration (a public investment) should be evaluated by comparing its benefits (effects on the value of that resource as an asset) to the restoration costs. This text clearly does not suggest that restoration costs must be less than the resulting benefits,

or that they are in any way a valid measure of benefits. V. Kerry Smith, Estimating Economic Valuesfor Nature: Methods for Non-Market Valuation. Brookfield, US: Edward Elgar, 1996: p. 8.

34 See: Freeman (2003); and Abdalla, C., B. Roacham, and D. Epp. “Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination.” Land Economics 68,1992: pp. 163-169.

35 Stavins (2002).

EPA Response

EPA agrees with Dr. Stavins' initial statement: "EPA’s HRC method, which the Agency claims in its economic analysis is an alternative method for valuing benefits, is actually nothing of the kind. The Habitat Replacement Cost method is-pure and simple-a measure of costs, not benefits. The habitat replacement costs are the design, implementation, administration, maintenance, and monitoring costs of various identified means of restoring aquatic habitats in the hopes of producing the same in situ services and service flows that are associated with the various technological alternatives under consideration. In other words, these are the costs of another alternative-and one that can be very costly-for achieving the same functions as targeted by the proposed regulation."

EPA also believes that it may be very costly to achieve the same functions as targeted by the regulation as reductions in I&E are likely to be less costly than actions taken to restore the losses after they have occurred.

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. However, as noted in EPA’s response to comment #316bEFR.005.035, EPA does feel the method has value.

Please see EPA's response to comment #316bEFR.005.035. Please also see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method.

On a similar note, please refer to EPA's comments on the societal revealed preference (SRP) methods in the response to comment #316bEFR.005.006.

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02.06.02

Revealed preference

Societal Revealed Preference Method

Related to but distinct from EPA's proposed Habitat Replacement Cost method is a proposed approach for valuing threatened and endangered species. EPA characterizes this approach as "societal revealed preference." The proposed method is not a revealed-preference method, has no foundation in economic theory, and is not accepted by economists as a legitimate empirical method of valuation. Like the HRC method, it is no more or less than a method of cost analysis mistakenly applied to the benefit-side of the ledger. The Ackerman comments applaud this approach, labeling it as innovative!

This "innovative alternative," like the HRC approach, is a totally invalid, non-economic approach for "benefit" estimation. It takes the historical cost to restore particular species under various government mandates (which were themselves adopted without any systematic benefit cost analysis) as an indication of valuation of these species, thus using program costs as a measure of benefits. This is, of course, a complete corruption of the notion of a revealed-preference method, an essential characteristic of which is that the benefit-the willingness to pay-is revealed by those individuals (or groups) who are doing the paying, not by the judgment of others (in this case, legislatures, executive departments and agencies, and/or courts). There is no sound logic behind taking the costs that are incurred in achieving various government programs and policies as being indicative of the true benefits of those programs and policies.

The very purpose of a benefit-cost analysis is to assess projects, programs, and policies by comparing their benefits and their costs. The SRP methodology completely reverses this, and takes the fact that a project, program, or policy exists as evidence that its benefits exceed its costs (and therefore that its benefits can be proxied by its costs, at a minimum). Use of this approach would imply that any project, program, or policy that is approved by a legislature, executive agency, or court has true benefits at least equal to its costs, and-presumably-that failure of the government to carry out any project, program, or policy indicates that its social benefits are less than its costs. This makes a complete sham of the very process in which the proposed 316(b) rule is being considered. It also would render meaningless requirements for benefit/cost analysis, such as those imposed under Executive Order 12866.

In their discussion of EPA's SRP method, the Ackerman comments: (1) confuse questions of positive and normative economics; (2) incorrectly characterize my critique of the SRP method; and (3) reveal a fundamental misconception of the economics of public goods and environmental improvements. The blurring of the difference between positive and normative questions regarding benefit-cost analysis, which I addressed in Section I, is most prevalent in this part of the Ackerman comments. <FN 36>

Moreover, the Ackerman comments misrepresent my critique of EPA's SRP method. They suggest that my critique is focused on nothing more than who makes a choice-an individual, a group, or society at large. The Ackerman comments thereby fail to address the fundamental point that I emphasized in my comments, which renders invalid EPA's attempted extension of revealed preference methods to prior government policies. The central argument in my critique is that in order for revealed preference methods to produce a valid measure of benefits, the individual or group deciding to take an action to achieve some benefits must have demonstrated willingness-to-pay with regard to that action. Only then can we reasonably assume that the (unobserved) benefits of that action are at least as great as the observed costs.

In any context in which the individuals (or groups) making a decision do not bear the full costs of that decision, one cannot assume that the benefits are greater than the costs associated with that decision (which include costs born by those who did not make the decision). This does not refer only to government decisions, but rather to any decisions where costs are not fully born by decision makers.<FN 37> By contesting this conclusion, the Ackerman comments are ignoring decades of research in economics and in political economy regarding the incentives facing -and decisions made by -regulators, and they are likewise ignoring a similarly extensive body of research on corporate governance.

It is because political choices, such as environmental policies, are made by decision-makers who do not bear the full burden of the cost associated with those choices that EPA's SRP method is an invalid attempt to extend the notion of revealed preference methods. Therefore, the Ackerman comments are completely incorrect when they suggest that "the revealed preference procedure employed by EPA would be entirely orthodox and familiar, even qualifying for endorsement by Dr. Stavins and the Guidelines for Preparing Economic Analyses, if it referred to individual rather than social choice." <FN 38> In order to be a valid revealed-preference measure of benefits, a measure must not only be based on individual (or group) choice, it must be based on individual or group choice where the individual or individuals clearly bear the cost associated with the choice.

Although Dr. Ackerman is surely aware of this distinction, the Ackerman comments fail to acknowledge its centrality to my critique of EPA's SRP method, and remarkably, the Ackerman comments claim that it is evidence that I have drifted "out of economic theory and into political debate."<FN 39> To the contrary, rather than making a judgment as to the "arbitrariness and unrepresentativeness of all government actions," as the Ackerman comments contend, my comments simply identify the limited contexts in which individual and collective choices can provide rigorous evidence of social (economic) valuation.

Thus, there is no basis in economics for the assertion in the Ackerman comments that the existence of an environmental policy implies that its benefits exceed its costs. The Ackerman comments use rhetorical questions, rather than economic principles, to support this claim:

Do people feel that the decisions about environmental protection, made on their behalf by their elected representatives, are hopelessly inefficient and expensive? Is there a groundswell of popular demand to save money by eliminating the Clean Air Act, the Clean Water Act, protection for endangered species, and all the rest?<FN 40>

The answers to both questions, of course, are irrelevant to the question of whether the cost of any specific environmental policy or regulation provides a reliable measure of its benefits. The fact that environmental policies in the aggregate may or may not be viewed as hopelessly inefficient and expensive provides no support for the contention that specific policies used by EPA in its SRP method have benefits greater than costs. Indeed, a significant amount of economic research has found strong evidence that specific policies impose costs that are greater than their benefits.<FN 41> Moreover, the question at hand has nothing to do with whether the Clean Air Act should be repealed, an utterly irrelevant straw man set forth in the Ackerman comments. Rather, the relevant question is whether EPA has any basis for asserting-with no supporting evidence-that particular past species preservation efforts yielded benefits greater than costs, simply because those policies exist.

The arguments that the Ackerman comments advance in support of EPA's SRP method also ignore existing economic knowledge regarding public goods.<FN 42> First, the comments state that "as textbooks often point out, there is no such thing as an individual demand curve for national defense."<FN 43> This statement is incontrovertibly incorrect, as can be seen by referring to any introductory economics textbook.<FN44> Indeed, society's willingness to pay for a public good has long been thought of as the sum of the value that each individual places on that good, and can thereby be represented as the vertical sum of each individual's demand for the public good.

The Ackerman comments also confound two distinct concepts, the difference between which is essential for understanding the economics of public goods: the amount that an individual would voluntarily contribute to the provision of a public good; and the value that the same individual places on the provision of that good. The confusion is made evident by the discussion in the Ackerman comments of the free-rider problem and my colleague Amartya Sen's commentary on individuals' willingness to pay for preventing environmental damages. Both the well-known free-rider problem and Sen's commentary deal with the fact that individuals' actual voluntary payments for public goods depart from the values they may place on those public goods, because of nonexcludability. That is, unlike the case of private goods, individuals who do not contribute to the provision of public goods cannot be kept from enjoying the benefits of those goods.

For example, while it is possible to keep an individual out of a concert if she or he does not pay for it, there is no way to prevent any one resident of a county from enjoying the benefits of national defense. As a result, individuals will tend to free-ride, or not contribute voluntarily to the financing of a public good even though they may value it, if they believe that it will be provided even without their contribution. Consequently, the amount that an individual will contribute for the provision of a public good does not provide a reliable indication of the value that the individual places on that good. For the same reason, as Amartya Sen points out, the amount that an individual would contribute to the provision of a public good would certainly depend on what others would contribute. This is not a commentary on peoples' valuation of public goods (indirectly estimated by valid willingness-to-pay or willingness-to-accept measures), but a commentary on actual voluntary payments for the use of public goods. The Ackerman comments have thoroughly confused this literature.

So, both the free-rider problem and Sen's comments provide insight into why public goods are often provided at levels below what is socially desirable. But quite contrary to the impression given by the Ackerman comments, implications for establishing valid measures of the benefits of public goods have been thoroughly considered and addressed by economists. For example, the freerider problem, and its implications for how individuals' preferences are reflected in their choices, is one of the reasons why stated-preference methods of benefit valuation offer the only valid means of measuring the benefits of some public goods. Moreover, the very issue raised by Amartya Sen is one of the many reasons why so much effort has been devoted to establishing appropriate techniques for conducting stated-preference surveys, so that they can yield reliable estimates of the value that individuals, and thus society, place on public goods.<FN 45>

Footnotes

36 In particular, the Ackerman comments confuse legitimate questions of how issues of social choice should influence the policy making process with questions of whether choices made by government can be used objectively, in the same manner as individual choices, to establish valid measures of benefits.

37 It is worth noting that the logic behind this conclusion is the same as that behind the idea of economic externalities, which justify many environmental policies: if an individual does not bear the full cost of her or his actions, she or he may engage in those actions even though the social benefit of them may not exceed their social cost.

38 Ackerman (2002), p. 15.

39 Ackerman (2002), p. 16.

40 Ackerman (2002), p. 16.

41 Numerous regulations enacted to reduce human health risk have been found to impose costs much greater than the estimated benefits of their associated risk-reductions. See, for example, Table 1 of Viscusi, W. K. "Regulating the Regulators." University of Chicago Law Review. 63, 1996: pp. 1423-1461. Reprinted in Stavins, R. (ed.) Economics of the Environment. New York W.W. Norton & Company, 2000: pp. 325-354. Contrary to the claim ofthe Ackerman comments (Ackerman (2002), p. 17), many of the inefficient regulations highlighted in Table 1 of Viscusi (2000) are finalized, implemented rules.

42 Economists consider a good (or service) to be a "public good" if it is impossible to exclude individuals from enjoying the benefits of the good once it is provided (nonexcludability), and the enjoyment of that good by one individual does not diminish the amount of the good available to others (indivisibility). Aside from numerous environmental resourcessuch as clean air, national defense is another example of such a good.

43 Ackerman (2002), p. 16.

44 These textbooks, which are widely used in college economics courses, explicitly state that individuals do have demand curves for public goods such as national defense, and the social demand curve for such a good is simply the vertical sum of each individual's demand curve for that good. That is, because of the nonexcludability of public goods, the social value of a particular amount of such a good can be thought of as the sum of each individuals' willingness to pay for that amount. See: Stiglitz, J. The Economics of the Public Sector. New York W.W. Norton & Company, 2000: Figure 6.7 and the associated text on pp. 142 -146; or Tietenberg, T. Environmental and Natural Resource Economics: Sixth Edition. Boston: Addison Wesley, 2003, Figure 4.6 and text on pp. 72-75.

45 Towards this end, in 1993, a panel of economists and other social scientists appointed by the National Oceanic and Atmospheric Administration, that included Nobel Laureates Kenneth Arrow and Robert Solow, issued guidelines on the appropriate implementation of contingent valuation studies to address concerns about the reliability of estimates derived from such studies. See Arrow, K., R. Solow, P. Portney, E. Learner, R. Radner, and H. Schuman. "Report of the NOM Panel on Contingent Valuation."In 58 Fed. Reg. 10 (January 15, 1993).

EPA Response

The SRP method is not used to estimate benefits for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see comment #316bEFR.005.006. Most of Dr. Stavins' comments are directed at another commenter, and thus require no further response from EPA.

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Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Evaluating the Benefits and Costs of the "AI1 Cooling Tower" Option

Having failed to make a convincing case that EPA has underestimated actual benefits, the Ackerman comments conclude by posing a question about the merits of the "All Cooling Tower" option that EPA has considered for its proposed regulations. In this question, the Ackerman comments introduce an emotional and misleading characterization of the important decision problem faced by the US. Environmental Protection Agency: "If the public was asked, 'Are you willing to pay 28 cents more per month on your electric bill to avoid massive fish mortality and other underwater environmental damages caused by power plants?', I feel confident the answer would be 'Yes.,''<FN 46>

Portraying costs on the basis of cost per household per month has the effect, of course, of making EPA's estimate of billions of dollars in annual cost appear much smaller. More important, the Ackerman comments' qualitative and emotional description of benefits ("massive fish mortality and other underwater environmental damages caused by power plants") exaggerates reality in a completely unqualified and unquantified manner. Why did the comments not offer a more dispassionate and meaningful description of benefits that would be consistent with their description of costs? For example, they could have described the percentage increase in fish populations that could be expected from EPA's "All Cooling Tower" option. More important still, the Ackerman comments' question understates by an order of magnitude the actual cost of the stated option. Multiplying 28 cents by 12 months and approximately 110 million households, one arrives at an annual cost of $370 million, hardly 10 percent of EPA's annual social cost estimate of $3.5 billion, which are presented in Table 2 of the Ackerman comments.

In addition to increased electricity bills, households will face increases in the cost of consumer goods and services as commercial and industrial electricity users pass on higher production costs to their customers. Moreover, because the proposed regulation will reduce the profits of both electricity producers and firms that use electricity, federal and state governments will face reduced tax revenues, which will lead either to cuts in spending or to the need to increase tax rates. In its analysis, EPA estimated the lost tax-revenue associated with the "All Cooling Tower" option at approximately $1.2 billion annually.<FN 47> The Ackerman comments thus conclude by offering a highly biased and incomplete picture of the tradeoffs that must be considered in evaluating the proposed regulations.

Footnotes

46 Ackerman (2002), p. 18.

47 For all but one option, EPA estimated both the associated social cost and the post-tax compliance cost for electricity producers. Lost tax revenue, which is considered in the social cost estimate, explains nearly all of the difference between these two cost estimates. Hence, for its "All Cooling Towers" option, EPA's estimates for the annual social cost, $3.5 billion, and annual private post-tax compliance cost, $2.3 billion, imply $1.2 billion in lost tax revenue annually.

EPA Response

EPA appreciates the insights provided by the continuing discourse amongst commenters with differing points of view. The issue of whether it is more useful to portray impacts on a per household basis or on a national aggregate basis is complex, but both perspectives provide useful insights to the public, stakeholders, and decision-makers.

With respect to benefits, the suitable perspective is whether individuals (or households) have a willingness to pay that exceeds the costs that they would have to bear under the rule. Therefore, the use of per household costs as a benchmark in this instance thus seems wholly appropriate.

In the analysis for the final rule, EPA estimates the overall cost per household to be $1.21. For more detail please see Chapter B2 of the EBA (DCN #6-0002), section B2-2 on costs per household.

Please see EPA's response to comments on the break even analysis in the response to comment #316bEFR.306.106; and on the feasibility of performing original stated preference research in the response to comment #316bEFR.306.105.

Comment ID 316bEFR.301.009

Author Name Robert N. Stavins

Organization John F. Kennedy School of Government
Harvard Univ

Subject Matter Code 10.02

Benefit Estimation Methodology

Conclusions

I conclude that the Ackerman comments on the economic analysis for the proposed regulations add no new insight into appropriate methods for estimating the economic benefits of those regulations. The Ackerman comments do not make substantive contributions to EPA's efforts to measure these benefits objectively. Of greater concern, the comments mix objective questions regarding techniques for measuring benefits with normative questions regarding the role of benefit-cost analysis in environmental policymaking, and incorrectly represent my previous criticisms, the state of consensus among economists on the most basic economic principles, and the nature and meaning of those principles themselves.

Contrary to their claims, the Ackerman comments have provided no compelling evidence whatsoever that "EPA's analysis of the benefits of reducing cooling water intake ... underestimates true, complete benefits by an unknown but large amount." <FN 48> The comments do not even offer evidence that the magnitude of omitted or undercounted benefits is sufficiently large to offset the severe upward bias in EPA's existing estimate, resulting from numerous flaws that other people and I have previously identified. The Ackerman comments' adjustments to EPA's existing benefit estimates are flawed, biased, and fundamentally arbitrary. The arguments in support of EPA's Habitat Replacement Cost and Societal Revealed Preference methods rest on mischaracterizations of prior criticisms, flawed understanding of economic principles, and personal opinions not based on professional expertise.

In closing, I wish to note that I recognize that it was very challenging for EPA to carry out such a large-scale and detailed analysis of the proposed rule. As I indicated in my previous comments, I was disappointed by EPA's initial analysis, but I am hopeful that its revised analysis will be significantly improved, and will be consistent with economic theory and best practice as supported by EPA's Guidelines for Preparing Economic Analyses, OMB's Guidelines, and other sound guides to benefit-cost analysis and environmental economics more broadly.

The comments offered by outside experts can be helpful in this regard. However, I find that the assessment of EPA's economic analysis in the Ackerman comments is not helpful, because it is itself highly biased and misleading. The characterization of economic theory and empirical methods is severely flawed, and the numerical estimates in the Ackerman comments are biased toward greatly exaggerating the proposed rule's implementation benefits relative to its costs. Nevertheless, I remain hopeful that EPA will benefit from other outside comments it has received, and will move forward to produce a sound economic analysis of the proposed regulation and an environmentally and economically sensible rule for implementation of Section 316(b) of the Clean Water Act.

Footnotes

48 Ackerman (2002), p. 17.

EPA Response

This comment largely is a reply to a comment by another individual, made regarding EPA's proposed rule. Therefore, many of the points made are no longer relevant or are not relevant to EPA's analysis.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Keith Nichols

On Behalf Of:

C-K Associates, Inc.

Author ID Number:

316bEFR.302

Comment ID 316bEFR.302.001

Author Name Keith Nichols
Organization C-K Associates, Inc.

Subject Matter Code 7.04
Streamlined Technology Option

The "Streamlined Technology Option for Certain Locations" can offer opportunities as I suggested in the NODA to develop a streamlined Comprehensive Demonstration Study (CDS) and could offer opportunities beyond the current scope of the NODA if allowed by the EPA on a case by case approach. The CDS in the water quality permitting process has proven to be the primary source of information and very comprehensive as in the Bonnet Carre Power, LLC water quality permitting effort. If the selection of certain technologies can meet the performance standards (which some can in combination with other components) and reduce the need for a comprehensive CDS, this would offer a wider range of options for industry.

The CDS as defined in 125.95(b) is comprehensive in regards to extensive data collection. Water quality permitting is no longer just effluent characterization and discharge limits, but also aquatic collection, and identification and numeration. It is possible to streamline the CDS process beyond the "Streamlined Technology Option for Certain Locations" by substituting species profiling within the habitats of the surface water in place of a large aquatic sampling regime. This would reduce a burden on permit applicants. The purpose of this approach is to reduce the need for a population study for the aquatic species. This consideration could simplify the CDS efforts. A representation of this approach is as follows:

- The initial step of the CDS is to determine the fish species associated with the surface water. This would be accomplished through a review of current and historical reference material and actual studies collected within 5-years. For example, it has been determined for the Lower Mississippi River that there are 133 fish species for consideration.

- In order to determine the geographical reach of these fish species in the surface water, specifically in the location of the CWIS, preferred habitats would be identified for each fish species. For example, there are 13 aquatic habitats for the Lower Mississippi River (Baker et. a!. 1991).

- The preferred habitats associated with the CWIS are defined by the habitat zones (cross-section of the surface water at the CWIS location) and the distribution ranges (water column depths for each habitat zone including the CWIS location). The fish species would be mapped in egg, larval, and adult stages within each habitat zone and distribution range to assist in the evaluation of impacts for the CWIS. This is accomplished through life cycle and behavior pattern information/data. For example, one would ascertain that only a portion of the 133 fish species on the Lower Mississippi River would be associated with the habitat of the CWIS. Additionally, the design features of the CWIS and the sweeping velocity and/or other characteristics of the surface water can later be taken under considerations.

- The CWIS locations would be identified for the Baseline, Track I, and current design of the CWIS as specified within the limitations of the 316(b) Rule and correlated to the fish species (including egg and larval) based on preferred habitats. This also includes determining the zone of influence for the CWIS.

- Technology options would then be applied to enhance protection of egg, larval, and fish species for I&E (i.e. wedge-wire screens or other) to reach the desired performance standards.

- The "Adaptive Management" approach combined with the regulatory monitoring for I&E would allow a facility to make adjustments to the CWIS if needed.

This approach to a streamlined CDS is to focus on the diversity of aquatic species within the surface water; the life cycles, behavior patterns, preferred habitat, and characteristics of the surface water combined with technology rather than a population study of aquatic species. The premise of this approach is if the species are protected from potential impacts the population and the relative abundance of those species are protected for that geographical reach. Additionally, the streamlined CDS could be defined for specific surface waters such as the Lower Mississippi, Ohio and Missouri Rivers were flows larger and many intakes are well below the 5% annual mean.

EPA Response

As part of the Impingement Mortality and Entrainment Characterization Study (§125.95(b)3)), EPA states that it will accept historical studies review as long as the data is still representative of current conditions at the facility. EPA also will accept well-documented general information, such as preferred habitat, as part of the submittal of existing data. The critical factor for EPA is that any information submitted must be representative of the current conditions at the site. It is the burden of the applicants to prove that studies submitted to EPA represent current biological conditions at their facilities. EPA disagrees, however, that it should substitute the species categorization component of the Comprehensive Demonstration Study with generalized study of the ambient conditions of an entire waterbody or segment of a waterbody, primarily because such generalized data may not be representative of the conditions at the site. For example, the intake may be located near a unique microhabitat and have species assemblages that a waterbody-scale general study would not capture. EPA believes that it has greatly streamlined the Comprehensive Demonstration Study requirements and thereby reduced burden for permit applicants. For details on EPA's streamlining efforts please refer to EPA's response to comment 316bEFR.034.005.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Robert Stavins

On Behalf Of:

Environmental Economics Program,
John F. Kennedy School of
Government, Harvard University

Author ID Number:

316bEFR.303

Comment ID 316bEFR.303.001

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

During the first comment period, EPA's estimates of the cost of retrofitting existing facilities with cooling towers received significant criticism. Reliable cost estimates for this technology are essential for a reasonable evaluation of the WBC option, which is the only alternative to the preferred option for which cost estimates are presented in the NODA. in the NODA. EPA discusses two studies performed by the U.S. Department of Energy (DOE) that estimate the capital costs of installing cooling towers at four existing facilities. As EPA notes, DOE's initial study, which involved a limited, site-specific investigation of these facilities, led to capital cost estimates that are higher than those that would be produced by EPA's 316(b) Phase II costing methodology. In fact, my analysis indicates that DOE's estimates are 65 to 104 percent greater than those that would be produced by EPA's methodology. A follow-up study by DOE, involving discussions with the plants' operators and more detailed investigations of site-specific conditions, suggested that more reliable cost estimates might be 230 to nearly 310 percent greater than those produced by EPA's methodology. Moreover, site-specific capital cost estimates that I used in my economic analysis of retrofitting Brayton Point Station with cooling towers raise additional concerns about EPA's methodology. In that case, a site-specific analysis led to capital cost estimates that were 150 percent higher than would result from EPA's methodology.

DOE's study and the analysis at Brayton Point Station suggest that EPA's methodology may systematically underestimate costs, and also makes clear that site-specific factors can cause costs to deviate dramatically from those estimated by EPA's method. In addition, EPA's analysis indicates that the requirement for certain facilities to install cooling towers is the primary factor differentiating the WBC option from EPA's current preferred regulatory option. As a result, revisions to the cost estimates for retrofitting facilities with cooling towers in line with the information presented above could perhaps more than double the added cost associated with the WBC option, which is currently estimated to be in excess of $850 million.

EPA Response

The Agency has reviewed the study (An Investigation Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants, January 22, 2003)prepared on behalf of the Department of Energy and finds the principles and concepts behind the analysis to be sound.

Comment ID 316bEFR.303.002

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Another significant contributor to the cost of retrofitting a facility with cooling towers is the opportunity cost of generation outages during the installation period. The NODA raises new questions about the length of such outages. While the NODA indicates that adjustments have been made to outage assumptions for nuclear facilities, comments are requested on the duration of outages at non-nuclear facilities. The DOE study cited by EPA in the NODA offers important insights. The ultimate conclusion of that study is that necessary outages can last well beyond the duration of routine scheduled outages, but that a site-specific engineering assessment is necessary to estimate accurately the length of such outages. Here again, detailed analysis of the cost of retrofitting Brayton Point Station with cooling towers confirms DOE's conclusions. In that case, because of particular aspects of the facility's design, each unit would have to undergo an eight month outage to install cooling towers, seven months longer than a typical scheduled outage. Given that site-specific factors are clearly a critical determinant of outage duration, EPA should carefully consider the evidence provided to it in evaluating the reasonableness of its existing assumption for the average outage duration. This assumption is an essential element of EPA's analysis because, for some facilities, the opportunity cost of a month-long outage could be on the order of $10 million per 1,000 megawatts of capacity.

EPA Response

The final rule is not based on cooling tower technologies, in part, due to the uncertainty inherent in construction downtimes. Therefore, the commenters concerns have been met.

Comment ID 316bEFR.303.003

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

The NODA indicates that EPA has substantially revised its benefit estimates. Unfortunately, on net, the revisions have left EPA's estimates no less flawed than those produced by the original analysis. Nonetheless, prior to addressing the most problematic aspect of these revisions, it is worthwhile addressing the improvements that EPA has also made. Primary among them is that EPA appears to have recognized flaws in its original analysis of non-use values. To estimate non-use values, EPA had relied on three methods that are variations on fundamentally flawed "avoided cost measures of benefits." The habitat replacement cost method and forage fish replacement cost method both involved labeling as a "benefit" the cost of a hypothetical alternative to reductions in I&E that would purportedly achieve the same regulatory objective (at greater cost). The societal revealed preference approach entailed labeling as a "benefit" the historical cost to comply with previous regulations or other government initiatives that have achieved objectives that were similar to those of the proposed rule. A review of the NODA leaves the impression that EPA now judges those methods to be unreliable and invalid means of benefit estimation. Yet, given that some of the methods are currently being employed by EPA's regional offices in analyses supporting on-going regulatory proceedings, EPA should make clear its conclusion that these methods are invalid.

EPA Response

EPA agrees that the Habitat-based Replacement Cost (HRC) method provides estimates of costs rather than benefits, but disagrees with the comment that it is an invalid method. HRC is closely related to approaches such as Habitat Equivalency Analysis used by federal and state agencies to monetize damages in cases where physical impacts are otherwise difficult to value. EPA believes that the analysis of replacement costs is a valuable tool for regulators to use in evaluating I&E losses.

However, EPA does not use the HRC method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-0003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

Comment ID 316bEFR.303.004

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02

Benefit Estimation Methodology

In addition to removing the flawed "avoided cost measures of benefits," EPA also made important revisions to its existing analysis of recreational and commercial fishing benefits. Among these are: its introduction of discounting in estimating future recreational and commercial fishing benefits; replacement of flawed benefit transfer methods for estimating recreational fishing benefits in favor of a greater use of random utility models; and the elimination of a previous assumption that total economic surplus resulting from increased commercial fish catch is 4.5 times that enjoyed by fishermen alone. Together, these revisions would make EPA's benefit estimates more reliable, but they are overshadowed by the introduction of a new, severely flawed and invalid measure of non-use values.

EPA Response

The commenter notes EPA's revisions to benefits assessment methodologies presented in the NODA. The commenter states that these revisions "would make EPA's benefit estimates more reliable." The commenter, however, questions the validity of EPA's approach to measuring non-use benefits presented in the NODA.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to uncertainty in monetizing national benefits associated with non-use values for the final rule. The Agency, however, has explored several approaches that indicate the potential significance of non-use values. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.303.005

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

While EPA should be commended for ceasing to rely on "avoided cost measures of benefits,' it has replaced those methods with another fundamentally flawed method for estimating non-use value. Indeed, the new analysis cannot be considered any less flawed or any more reliable than those previously employed by EPA. It seeks to estimate the non-use value of reductions in I&E by using a benefit transfer method, but the analysis attempts to transfer estimates from a stated preference study of the total value that individuals place on restoration and preservation of wetlands and eelgrass. EPA's analysis fails to meet both the soundness and similarity criteria essential to benefit transfer, thereby leading to results that are invalid and misleading.

Given the selection of individuals surveyed in the original study on which EPA relies, and the fact that they were given no information about the magnitude of ecological impacts associated with the restoration they were valuing, the original study provides no basis for EPA to estimate non-use values estimated, let alone to determine non-use values attributable to particular ecological services, such as fish production. Even if one were to set aside these concerns about the soundness of the original study for the analysis that EPA employs, the differences between the resource valued in the study and those that EPA seeks to value are insurmountable. And in the process of attempting the transfer, EPA ignores basic economic theory regarding non-use values and makes adjustments to the original values that are unsupported by the studies on which it relies. This valuation method is invalid and unreliable, and should not be incorporated in EPA's final analysis of the proposed regulation.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values in the benefits analysis due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.303.006

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

In summary, the Notice of Data Availability includes significant changes to and information regarding EPA's economic analysis for the proposed 316(b) Phase II rule. Important new information is presented regarding both the capital costs of retrofitting existing facilities with cooling towers and outages that will be required while those retrofits are conducted. When combined with evidence from an analysis of the cost of installing cooling towers at Brayton Point Station, it is clear that more reliable estimates of capital costs may be more than 100 percent greater than those estimated by EPA. This information lends further support to existing criticisms of EPA's capital cost estimates. It also makes clear that the added costs that would be imposed by the waterbody/capacity-based option, relative to EPA's preferred option, are likely to be much greater than EPA has acknowledged.

EPA Response

The Agency has not included cooling towers as a basis for the final rule.

Comment ID 316bEFR.303.007

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA has also made revisions to its benefit analysis, addressing some of the flaws that I identified in my previous comments. But due to its pursuit of a new non-use value analysis that is conceptually flawed and impossible to implement reliably, the overall analysis and the estimates it produces are no more reliable or valid than the “avoided cost measures of benefits” that this new analysis has replaced. As I stated in my prior comments, if EPA believes there are legitimate and significant non-use values, they should be estimated with original applications of the best stated preference methods. The possible existence of excluded use values or unassessed non-use values does not justify the employment of conceptually flawed approaches.

EPA Response

EPA does not agree that the only acceptable method of estimating non-use benefits would be to conduct an original stated preference study. Many resource economists support the idea that benefits transfer analyses, properly conducted, can be used as an alternative to a primary research survey in order to estimate non-use benefits. While it might be preferable to conduct such research in an ideal world, EPA did not deem it feasible as a matter of cost or timing to conduct such a primary study here. EPA also notes that failing to assess non-use values would only tend to make the qualitative assessment of ecological benefits all the more important.

For EPA’s response to the issue of conducting an original stated preference survey, please see response to comment number #316bEFR.306.106.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.303.008

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The Cost of Retrofitting Existing Facilities with Cooling Towers

The NODA's discussion of EPA's cost estimates for retrofitting existing facilities with cooling towers contains new evidence that supports existing concerns about the validity of those estimates. Of course, these estimates, which EPA has not yet revised, have a critical impact on the cost of the WBC option. There are two important elements of the cost of retrofitting facilities with cooling towers that are discussed in the NODA: the capital cost of installing and connecting cooling towers, and the duration of outages required to facilitate that installation.

A. Capital Cost Estimates for Retrofitting Facilities with Cooling Towers

For its analysis of the cost of the WBC option, EPA modified the costing methodology that it developed for its 316(b) Phase I rule for new facilities.<FN 7> It should be noted that this modified methodology was heavily criticized for producing unreasonably low estimates.<FN 8> The method assumes that the cost of a mechanical draft wet cooling tower is affected only by cooling water flow, the type of material used to build the tower, the type of fill media used in the tower, and the potential need for noise reduction. To modify a cost estimate to apply it to an existing facility, EPA multiplies the estimate by a "retrofit factor" to account for the increased cost associated with retrofitting a facility, compared to incorporating cooling towers into the facility's original design and construction. In an attempt to adjust for regional differences in construction costs, EPA also applies a "State-Specific Capital Cost Factor" to the capital cost estimate.<FN 9>

In the NODA, EPA presents new information that further supports previous criticism of the methodology. EPA describes a study performed by the U.S. Department of Energy (DOE) that examines the cost of retrofitting four facilities with cooling towers, which "found costs at these facilities would be higher than EPA estimated for similar facilities in its proposed record."<FN 10> For the four facilities studied by DOE, a comparison of DOE's capital cost estimates with those derived from the EPA methodology reveals that DOE's site-specific study led to increases in cost estimates, relative to EPA's method, ranging from 65 percent to 104 percent (see Exhibits 1-5). Moreover, after producing these initial estimates, DOE conducted a more detailed analysis of the facilities, which included conversations with the facilities' operators. This further analysis led DOE to the conclusion that its initial estimates, which were based on limited site-specific information, had to be increased by "as much as 100 percent."<FN 11> This implies that actual costs may be 230 to nearly 310 percent greater than those produced by the EPA methodology.

Footnotes

7 U.S. Environmental Protection Agency (EPA). Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule. EPA 821-R-02-003. April 2002, p. 2.19.

8 These criticisms were set forth in comments on the proposed Phase II rule by the Utility Water Act Group ("UWAG") in a report titled "Analysis of Cooling Tower Retrofit Costs."

9 U.S. EPA, 2002, p. 2.28.

10 68 Fed. Reg. 13,527.

11 U.S. Department of Energy (DOE). Addendum to Report: "An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants." January 22, 2003, p. 4.

EPA Response

The Agency has reviewed the study (An Investigation Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants, January 22, 2003)prepared on behalf of the Department of Energy and finds the principles and concepts behind the analysis to be sound.

Comment ID 316bEFR.303.009

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The on-going permitting of Brayton Point Station offers another comparison of estimates derived from the EPA methodology with those developed by a site-specific investigation. While EPA makes clear in the NODA that it anticipates costs at specific sites may differ significantly from those estimated using its costing methodology,<FN 12> EPA - Region 1 adopted that methodology to estimate the cost of retrofitting Brayton Point Station with cooling towers. While Region 1 made limited modifications to EPA's costing methodology, a site-specific analysis led to cost estimates that were 150 percent greater than those produced by the strict application of EPA's methodology (see Exhibit 6). In summary, the total capital cost estimate for retrofitting all five facilities that results from site-specific analyses is 96 percent greater than EPA's estimate.<FN 13> This difference is far greater than the 25 percent error margins that EPA implied may be associated with its costing methodology in the analysis of the proposed rule.<FN 14> Indeed, absent any other evidence to the contrary, detailed estimates from these five facilities suggest that EPA's methodology for estimating capital cost may lead to severely downward biased estimates.

Given the magnitude of the differences in estimates described above, and the number of facilities examined in those estimates, EPA should reevaluate its estimates of the cost of retrofitting facilities with cooling towers. This is particularly important, as it appears that errors in EPA's methodology for estimating the cost of retrofitting facilities with cooling towers will translate into errors of nearly equal size in its estimate of the incremental cost of the WBC option relative to its current preferred option. Table A1-1 of EPA's 316(b) Phase II Economic and Benefits Analysis suggests that the primary, if not the only, difference between the WBC option and the preferred option is that certain facilities that would have only installed impingement and entrainment controls under the latter option would be required to install cooling towers under the former option.<FN 15> As a result, the added cost of the WBC option, which EPA currently estimates to be in excess of $850 million, would be determined largely by the cost of installing cooling towers.<FN 16> The incorporation of cost estimates consistent with those reported by DOE could perhaps more than double this estimate of the WBC option's added cost. The potential for such a significant increase in the added cost of the waterbody/capacity-based option underscores the need for EPA to reconsider its cost analysis in light of the DOE studies.

Footnotes

12 In discussing its revisions to cost estimates for other technologies, EPA states that "compliance costs for a particular facility [may] significantly exceed those estimated in the analysis for the ... rule." 68 Fed. Reg. 13,525.

13 It should be noted that this comparison relies on estimates from DOE's original study, estimates that DOE later suggested may need to be increased by as much as 100 percent.

14 U.S. EPA, 2002, p. 2.23.

15 U.S. EPA. Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule. February 28, 2002. p. A1-9. (Hereafter U.S. EPA, 2002b)

16 See Exhibit 7, 68 Fed. Reg. 13,535.

EPA Response

The Agency has not included cooling towers as a basis for the final rule.

The Agency notes that for the final permit analysis that EPA Region I utilized a different methodology than that described by the commenter for estimating the potential costs of implementing cooling tower retrofits for the Brayton Point plant.

Comment ID 316bEFR.303.010

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Assumptions Regarding the Duration of Generation Outages

In addition to introducing information that calls into question the reliability of its methodology for estimating the capital cost of retrofitting existing facilities with cooling towers, the NODA also introduces new information regarding the duration of outages associated with cooling tower installations. In the NODA, EPA reveals that it is revising its assumption regarding the duration of outages at nuclear plants associated with installing cooling towers from four weeks to seven months.<FN 17> In addition, EPA is requesting additional comment on whether site-specific factors may cause outages at non-nuclear power plants to exceed EPA's existing assumption of four weeks, and whether it should revise that assumption in its analysis. Such a request for comments is especially warranted given information presented in the DOE studies described above. In the addendum to its initial study, DOE found that conditions at two of the four plants would result in "extended outage[s]" during the installation of the cooling towers that would "significantly exceed a scheduled outage."<FN 18> In particular, DOE emphasized that a reliable estimate of outage durations "would require a detailed engineering analysis estimate."<FN 19>

Here again, the on-going permitting process at Brayton Point Station provides additional insight on this matter. In the context of that process, Stone and Webster, Inc., a firm with decades of experience planning and executing power plant improvements and intimate knowledge of Brayton Point Station, found that generation outages would be required for seven months beyond the length of scheduled outages. While site-specific factors are clearly a critical determinant of outage duration, EPA should carefully consider the evidence provided to it in evaluating the reasonableness of its existing assumption for the average, nationwide outage duration at non-nuclear facilities. This is particularly important, give the magnitude of costs associated with these outages. Many of the facilities that would be required to install cooling towers offer baseload generation that is often significantly less costly than electricity generation by the marginal generating units. It is not unreasonable to assume that, in some cases, the cost to society of a month-long outage could be on the order of $10 million per 1,000 megawatts of capacity.

Footnotes

17 68 Fed. Reg. 13,525.

18 U.S. DOE, 2003, p. 3 and 6.

19 Id., p. 6.

EPA Response

The final rule is not based on cooling tower technologies, in part, due to the uncertainty inherent in construction downtimes. Therefore, the commenters concerns have been met.

Comment ID 316bEFR.303.011

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Conclusions Regarding Cost Analysis

In summary, the NODA presents significant new information regarding both the capital costs of retrofitting existing facilities with cooling towers and the outages that will be required while those retrofits are conducted. Both assumptions have substantial effects on estimates of the absolute and incremental cost of the WBC option. As a result, EPA's current cost analysis, which fails to address the implications of this new information in any meaningful way, may underestimate the total and incremental cost associated with this option by a significant margin.

EPA Response

See responses to comments 316b.EFR.303.001, 316b.EFR.303.006, 316b.EFR.303.008, 316b.EFR.303.009, and 316b.EFR.303.010.

Comment ID 316bEFR.303.012

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02

Benefit Estimation Methodology

II. Changes to EPA's Original Benefits Analysis

In my previous comments on the proposed rule, I reached the following conclusions, among others, regarding EPA's original benefits analysis: (1) EPA's estimates of commercial fishery impacts were severely flawed, due in part to a lack of reliance on standard and accepted bioeconomic models, and adoption of approaches which lack foundation in the scientific literature; (2) EPA's analysis of recreational fishery benefits was likewise flawed, because of reliance on problematic applications of benefit transfer methods; (3) the habitat replacement cost method used by EPA commits one of the gravest of errors in economics, actually confusing benefits and costs, and -as such- this method is a completely invalid approach to identifying benefits; and (4) the "societal revealed preference" approach employed by EPA has no foundation in economic theory, is not accepted by economists as a legitimate empirical method of valuation, and -like the HRC method- is no more than a method of cost analysis mistakenly applied to the benefit-side of the ledger.<FN 20>

The NODA presents significant revisions to EPA's original benefits analysis. Some of these revisions have corrected the serious flaws that I described above. Yet, one of the most significant changes is a new method that EPA has introduced for estimating non-use value. This method involves flaws that are different from those of the "avoided cost measures of benefits" previously employed by EPA, but are no less severe. Indeed, when one considers all of the revisions that EPA has made, the net result is an analysis whose benefit estimates are no more reliable or valid than those that EPA presented with the proposed rulemaking. After commenting briefly on those revisions that have improved EPA's analysis in this section, I turn to EPA's new non-use value analysis.

Footnotes

20 See Stavins, 2002, pp. 14-15

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to uncertainty in monetizing national benefits associated with non-use values for the final rule. The Agency, however, has explored several approaches that indicate the potential significance of non-use values. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers;

and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.303.013

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Removal of “Avoided Cost Measures of Benefits”

Primary among the improvements that EPA has made to its benefit estimates is its apparent decision to no longer rely on “avoided cost measures” for estimating certain components of benefits. To estimate non-use values, EPA had relied on three methods that are variations on the fundamentally flawed avoided cost measures.<FN 21> The habitat replacement cost method and forage fish replacement cost method both involved labeling as a “benefit” the cost of a hypothetical alternative to reductions in I&E that would purportedly achieve the same regulatory objective as the proposed rule (at greater cost). The societal revealed preference approach entailed labeling as a “benefit” the historical cost to comply with previous regulations or initiatives that have achieved similar objectives to those of the proposed rule.

Numerous individuals, including myself, submitted comments addressing the severe problems associated with these methods. Most prominent among these problems is the fact that they are not merely flawed approaches to estimating benefits; rather they are not benefit-estimation methods at all.<FN 22> By employing these methods, EPA committed a fundamental error by confusing benefits and costs.

Footnotes

21 It is very important that the approach taken by EPA with its completely invalid HRC method not be confused with legitimate applications of “defensive expenditure” or “averting behavior” methods of estimating benefits. Those methods are based upon observed actions, that is, individual behavior. In particular, a necessary condition for using defensive expenditures or averting behavior for purposes of benefit estimation is that the researcher observes people revealing their preferences by actually (and voluntarily) incurring costs to avert (or tolerate) the environmental disruption in question. See Freeman, A. Myrick. The Measurement of Environmental and Resource Values: Theory and Methods. Washington, D.C.: Resources for the Future, Second Edition, 2003; and Abdalla, C., B. Roacham, and D. Epp. “Valuing Environmental Quality Changes Using Averting Expenditures: An Application to Groundwater Contamination.” Land Economics 68(1992): 163-169.

22 Stavins, 2002, 24-28

EPA Response

EPA agrees with the comment that Region 1 used a revised version of the HRC methods in its permitting materials. The description of the methods used by Region 1 makes clear that EPA understands that the costs estimated are costs and not benefits.

EPA disagrees with the commenter that the HRC is an invalid measure - and only agrees that HRC results are a measure of benefits. EPA believes that analysis of replacement costs are a valuable tool for regulators to use in evaluating I&E entrainment losses.

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-0003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.303.014

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

In light of EPA's decision to introduce a new non-use value analysis, and the lack of any mention of these avoided cost methods in the NODA, despite the severe criticism that they received during the previous comment period, it appears that EPA has recognized that these methods are fundamentally flawed and produce invalid and unreliable benefit estimates. But the methods continue to be used by EPA's regional offices to support on-going permitting decisions. For
example, Region 1 issued its draft permit for Brayton Point Station near the end of the comment period on EPA's proposed rule. Perhaps aware of the criticisms that had already been made of the habitat replacement cost method that it used in its analysis of the draft permit, Region 1 included in its determination documents a revised version of the chapter on the habitat replacement cost method that originally appeared in Part A of EPA's Case Study Analysis.<FN 23> Given the potential for this method to continue to be applied inappropriately in the future, EPA should state clearly that "avoided cost measures of benefits" are not valid measures of true benefits.

Footnotes

23 See U.S. EPA. Chapter A11: Habitat-Based Replacement Cost Method. Updated "with Agency assistance." May 23, 2002. in U.S. EPA - New England. Selected Reports Prepared for or by U.S. EPA as part of the Administrative Record for the National Pollutant Discharge Elimination System (NPDES) Draft Permit for Brayton Point Station Somerset, MA. July 22, 2002.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

In the analyses for the NODA and the final rule, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.303.015

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02

Benefit Estimation Methodology

Improvements to Recreational and Commercial Fishing Benefit Estimates

A number of additional flaws that others and I highlighted in previous comments on the proposed rule were corrected by EPA in the NODA. Among those flaws, some of the most significant were: the failure to consider the timing with which benefits from increased fish catch are realized and to discount those benefits accordingly; the failure to conduct appropriate benefit transfer in estimating recreational fishing benefits; and the assumption that total economic surplus resulting from increased commercial fish catch is 4.5 times that enjoyed by fishermen alone. I address each of these below.

Discounting

Once construction commences for any of the technologies considered in EPA's analysis, a period of time will pass before that construction is completed, the technology begins to operate, and I&E reductions can commence. Furthermore, once I&E reductions begin, there is a significant delay- potentially on the order of two decades or more- before a new equilibrium fish stock is achieved and benefits (such as increased fish catch) reach their full annual levels. In a valid economic analysis, such delays are extremely important, and have profound effects on benefit estimates in the presence of appropriate discounting. Yet, in its original benefits analysis, EPA completely failed to consider the timing of benefits, and thereby imparted a very significant upward bias to its benefit estimates. EPA recognizes this shortcoming in the NODA, and revises its method to take into account the timing with which benefits are realized, discounting those benefits accordingly.<FN 24>

Footnotes

24 In the NODA, EPA appears to discount to account for the lag between when a fish avoids I&E due to the implementation of new cooling water intake technologies and when it is eventually caught. Another important lag, particularly for the WBC option, is that between when costs are first incurred to begin building the proposed technologies, and when I&E reductions first occur. For the installation of cooling towers, this period could last as long as four years. See 68 Fed. Reg. 13,548.

EPA Response

The commenter states that EPA corrected a number of methodological flaws highlighted in the public comments on the proposed rule in the NODA. The commenter notes that the Agency "revised its method to take into account the timing with which benefits are realized, discounting those benefits accordingly." For the final Section 316(b) Phase II rule, the Agency followed the methodology outlined in the NODA. See the final Phase II Regional Studies Document (DCN #6-0003) for detail.

Comment ID 316bEFR.303.016

Subject Matter Code 10.02.01.01
General/Benefit Transfer

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Improvements to Recreational and Commercial Fishing Benefit Estimates

A number of additional flaws that others and I highlighted in previous comments on the proposed rule were corrected by EPA in the NODA. Among those flaws, some of the most significant were: the failure to consider the timing with which benefits from increased fish catch are realized and to discount those benefits accordingly; the failure to conduct appropriate benefit transfer in estimating recreational fishing benefits; and the assumption that total economic surplus resulting from increased commercial fish catch is 4.5 times that enjoyed by fishermen alone. I address each of these below.

Inappropriate Benefit Transfer in Estimating Recreational Fishing Benefits

To value impacts on recreational fishing in some of its case study analyses, EPA relied upon the benefit transfer method. This method takes estimates of anticipated increases in recreational fishing catch (due to reductions in I&E) and values this catch. Values per fish are drawn from results of previous studies of recreational benefits from other fisheries in other locations. This method of benefit estimation is described in EPA's Guidelines, which sets out simple and clear conditions that must be met in order to obtain reliable results using such techniques. The two key conditions for a reliable benefit transfer are "soundness" (of the original study) and "similarity" (between the conditions and benefits in the original study and those in the "transfer study" for which benefit estimates are sought). As I describe in my July 19, 2002 comments, at least in the Case Study Analysis of Brayton Point Station, EPA's benefit transfer failed in meeting both conditions.<FN 25>

Possibly in response to my own and others' criticisms of the methods EPA employed in estimating recreational fishing benefits, the NODA indicates that EPA has revised its analysis of recreational fishing benefits by conducting "region-specific models of recreational anglers' behavior."<FN 26> If correctly implemented, the use of these random utility models will lead to more reliable recreational fishing benefit estimates.

Footnotes

25 See Stavins, 2002, pp. 19-22

26 68 Fed. Reg. 13,546

EPA Response

The commenter notes EPA's improvements to recreational and commercial fishing benefit estimates presented in the NODA. The commenter further states that the use of random utility methods could make EPA's estimates of recreational fishing benefits more reliable, if these methods are correctly implemented.

The commenter states that EPA's benefit transfer approach for estimating recreational fishing benefits is inappropriate. EPA disagrees with this comment. For EPA's response to comments on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

For detail on EPA's approach to estimating recreational fishing benefits with a random utility model, see Chapters A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through G in the final Phase II Regional Studies Document (DCN #6-0003).

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Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Improvements to Recreational and Commercial Fishing Benefit Estimates

A number of additional flaws that others and I highlighted in previous comments on the proposed rule were corrected by EPA in the NODA. Among those flaws, some of the most significant were: the failure to consider the timing with which benefits from increased fish catch are realized and to discount those benefits accordingly; the failure to conduct appropriate benefit transfer in estimating recreational fishing benefits; and the assumption that total economic surplus resulting from increased commercial fish catch is 4.5 times that enjoyed by fishermen alone. I address each of these below.

Assumptions About Total Economic Surplus from Commercial Fishing Catch

In its original analysis of commercial fishing benefits, having established an estimate of producer surplus from increased fish catch that was itself subject to criticism and subsequently revised, EPA proceeded to assume that "total economic surplus arising from the increase in commercial fish catch is 4.5 times greater than the producer surplus alone."<FN 27> In making this assumption, EPA contended that benefits of additional catch may accrue not only to the commercial fishing sector, but also to processors and retailers. As I made clear in my previous comments, EPA arrives at this assumption by inappropriately applying findings from other studies to an analysis of the long-run benefits from increased fish catch.<FN 28> EPA's revisions appropriately addressed this criticism. In the NODA, EPA found that the application of this total surplus multiplier was inappropriate because "the magnitude of the changes in commercial catch modeled in the Holt and Bishop paper [from which it drew this multiplier] is, in most cases, larger than the magnitude of the expected changes as a result of the Phase II regulations. Since the magnitude of the change assumed in the Holt and Bishop (2002) paper is much larger, the benefits may be quite different."<FN 29> Together with the changes to its recreational fishing benefit estimates and the introduction of discounting, this revision makes this particular aspect of EPA's benefit analysis more consistent with economic theory and empirical practice.

Footnotes

27 U.S. EPA. Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule. February 2002, p. F4-6.

28 Stavins, 2002, p. 18.

29 U.S. Environmental Protection Agency. "Chapter A13: Methods for Estimating Commercial Fishing Benefits." Introduced in the NODA docket as a new chapter in U.S. EPA. Case Study Analysis. 2002, revised by March 19, 2003 NODA, p. A13-27.

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029. This comment response also addresses the timing and discounting of benefits.

Comment ID 316bEFR.303.018

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04.01

Peconic-based approach

EPA's New Non-Use Value Analysis

The new method proposed by EPA to assess non-use value associated with I&E reductions is severely and fundamentally flawed, and should not be included in the regulatory analysis. Building upon the withdrawn habitat replacement cost method, EPA now proposes to use estimates of benefits (willingness-to-pay) for specific aquatic habitats -wetlands and eelgrass- as proxies for the non-use value of fishery impacts due to impingement and entrainment (I&E).<FN 30> As I explain at length below, this claimed "benefit transfer" violates the most fundamental requirements of such transfers set out in EPA's own Guidelines, in OMB's guidance documents, and in standard scholarly references, and introduces a series of arbitrary judgments that further render the analysis invalid and the results unreliable. It is also worth noting that two of the authors of the original study on which EPA relied for this benefit transfer have submitted comments to the record making clear that their study cannot be used as a basis for a valid or reliable benefit transfer intended to develop estimates of the non-use value of I&E reductions.<FN 31>

EPA's new method is no less flawed than the previously employed "avoided cost measures of benefits." Moreover, the NODA makes the implications of this flawed and biased analysis of non-use value transparent and striking. While EPA does not present revised nationwide benefit estimates, it does produce estimates for the North Atlantic Region. Those estimates indicate that non-use value now makes up 97 percent of EPA's total benefits estimate!<FN 32> Thus, EPA's estimate of total benefits is nearly completely dependent on this new, fundamentally flawed approach. In essence, this new method seeks to salvage the habitat replacement cost analysis by using the results of that analysis regarding the amount of habitat restoration that would be required to offset I&E. But rather than estimating the cost of that restoration, EPA presents estimates of what it claims to be the portion of non-use value of that restoration that is attributable to resulting fish production. In terms of the underlying biological analysis, this method is no less flawed than the habitat replacement cost method in deriving estimates of the habitat restoration required to offset I&E losses. Indeed, EPA appears to have done nothing to address significant criticisms of its biological analysis that were made in comments submitted during the first comment period on the proposed regulations.<FN 33>

EPA attempts to value the fish production associated with this restoration using a benefit transfer approach. In so doing, EPA has failed to such a degree in meeting the soundness and similarity criteria of benefit transfer that its resulting "benefit" estimates provide no useful information as to true non-use benefits of reductions in I&E. Indeed, the only improvement that it has made relative to the habitat replacement cost method is that EPA is at least attempting to measure benefits rather than costs.

While the original study on which EPA relies for its benefit transfer may be sound, given the objectives that it sought to achieve, the design of the original study makes it unsound as a basis for meeting the objectives of EPA's benefit transfer. In addition, even if the original study could be considered a sound basis for EPA's benefit transfer, the differences between the resource being valued in that study and the resource that EPA attempts to value are so great that it is impossible to accomplish a valid and reliable benefit transfer. Finally, putting aside the impossibility of the task that EPA has attempted, fundamental flaws are evident in the few steps that it takes to account for these differences. Before addressing the failure of EPA's benefit transfer to meet the soundness and similarity criteria and the specific flaws associated with each step in that transfer, I briefly describe the analysis that EPA has performed.

Footnotes

30 While the method is briefly described in the Federal Register publication of the NODA, a more detailed description can be found in: Memorandum to the Section 316(b) Record from Lynne Tudor, Elena Besedin, Marisa Mazzotta, Robert Johnston, and Elizabeth Strange, March 12, 2003, titled "Estimating Total and Non-Use Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV)." (Hereafter Tudor et al., 2003)

31 In their comments, James Opaluch, Ph.D., and Thomas Grigalunas, Ph.D., found that: Overall, we believe that the results [of EPA's new non-use value analysis] cannot be used to assess the potential economic benefits for assessing alternative cooling water control technologies, for three principle reasons[.]First, the PES study results were intended to develop priorities for resource preservation and restoration programs, not absolute dollar values. Second, the information provided to respondents to the PES resource survey was inadequate to support a valuation of quantitative changes in fish and shellfish due to changes in eelgrass or wetland resources. Third, even if the dollar results of eelgrass and wetlands from the PES resource study could be relied upon, the transfer of these results from the PES sample studied to other populations, such as those in the North Atlantic Region, would likely overstate values because of the substantial difference in socioeconomic and demographic characteristics which exist between the two areas.

Opaluch, James J., and Thomas A. Grigalunas. Letter to the Proposed Rule Comment Clerk — OW-2002-0049, Re: Comments on Notice of Data Availability, Proposed Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities. June 2, 2003.

32 See Table X-44, 68 Fed. Reg. 13,577.

33 These comments found that EPA's habitat replacement cost analysis failed to identify correctly and evaluate appropriately restoration techniques that would increase the production of species affected by I&E. See French McCay, Deborah. Letter to Proposed Rule Comment Clerk — W-00-32, Re: Comments on Proposed Rule, RIN 2040-AD62 Clean Water Act Section 316(b) — National Pollutant Discharge Elimination System — Proposed Regulations for Cooling Water Intake Structures at Phase II Existing Facilities, EPA ICR no. 2060.01. August 5, 2002.

EPA Response

The commenter's specific objection to the biological analysis is unclear, and therefore EPA cannot respond to the general comment that "this method is no less flawed than the habitat replacement cost method in deriving estimates of the habitat restoration required to offset I&E losses."

For EPA's response to comments on similarity between the study and policy resources, please see the response to comment #316bEFR.307.061.

For EPA's response to comments regarding the allocation of values for various wetland services using the Johnston, et al. study, please see the response to comment #316bEFR.303.021.

Finally, the Agency notes that although two of the authors of the original studies on which EPA relied for this benefits transfer submitted comments on behalf of the regulated industry, two other investigators of the original studies (Dr. Marisa Mazzotta and Dr. Robert Johnston) served as EPA's consultants for the cost benefit analysis of the final Section 316(b) Phase II regulation.

Regardless of the substance of any of the commenter's arguments, the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) rule. Instead, the Agency used this approach to provide useful information for policymakers to consider in determining the final 316(b) Phase II rule.

Comment ID 316bEFR.303.019

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04.01

Peconic-based approach

EPA begins its new non-use value analysis by estimating the quantity of eelgrass and wetland restoration that would be required to offset losses of particular species affected by I&E. To do this, EPA divides the estimated I&E losses of each species (whose production EPA believes can be benefited by the habitat in question) by the measured abundance of the species in that habitat. As EPA believes fish abundance can be used as a proxy for fish production, it uses this exercise to produce an estimate of the number of acres of habitat restoration that would be necessary to offset I&E losses. In the habitat replacement cost analysis, EPA multiplied that number of acres by the per acre cost of restoration to arrive at its estimates of "benefits." In its new analysis, EPA seeks to derive an estimate of the amount that society would be willing to pay for the portion of the habitat restoration's non-use value that is attributable to the resulting fish production.

To develop an estimate of this non-use value, EPA relies on a study that estimates individuals' per-acre willingness-to-pay for the preservation and restoration of eelgrass and wetlands in the Peconic Estuary System in eastern Long Island, New York.<FN 34> Because the values estimated in this study are total values, including use and non-use value, EPA attempts to isolate non-use value by examining the values expressed by individuals that do not fish or shellfish. By assuming that the only users of wetlands and eelgrass are those who fish or shellfish, and thus any households that do not fish or shellfish can only hold non-use values for wetlands and eelgrass, EPA uses the total value expressed by households that do not fish or shellfish as a measure of the per-household non-use value of the habitats.

EPA then seeks to determine what share of this non-use value is attributable to the habitats' impact on fish and shellfish production. In the case of eelgrass, EPA assumes that a household's non-use value for eelgrass is entirely due to its impact on fish and shellfish production, and is unaffected by any other attributes of eelgrass. In the case of wetlands, EPA relies on a study that examines individuals' relative preferences for four different kinds of habitat services that wetlands provide.<FN 35> Based on this study by Johnston et al. (2002), which examines the marginal benefit derived from changes in the impact of wetland restoration on four habitat services, EPA assumes that approximately one-quarter of the non-use value of wetlands is attributable to wetlands' impacts on fish production. EPA thus arrives at estimates of the per-household, non-use value per-acre of wetlands and eelgrass restoration that is attributable to fish production services provided by those habitats. EPA multiplies this by the total number of acres of restoration required, leading to its estimate of non-use value per household for fish production resulting from the habitat restoration that EPA assumes would offset I&E.

The final step in EPA's analysis involves multiplying this per-household value by various populations that EPA assumes would hold these values. The two populations that EPA chooses for its alternative estimates are: all households in counties abutting the water bodies that may be affected by I&E; and all households within 32.4 miles of facilities where I&E may be occurring. For its estimates using the latter population, EPA produces two alternative estimates based on alternative assumptions about the effect of distance from the affected water body on non-use value.

Footnotes

34 See Opaluch, James J., Thomas A. Grigalunas, Marisa J. Mazzotta, Jerry Diamantides, and Robert J. Johnston. "Recreational and Resource Economic Values for the Peconic Estuary System," Report prepared for Peconic Estuary Program, Suffolk County Department of Health Services, Riverhead, NY, by Economic Analysis, Inc., Peace Dale, Rhode Island, 1998.

35 See Johnston, Robert J., Gisele Magnusson, Marisa J. Mazzotta, and James J. Opaluch. "Combining Economic and Ecological Indicators to Prioritize Salt Marsh Restoration Actions." American Journal of Agricultural Economics. 84(5), December 2002: 1362-1370.

EPA Response

This comment is simply a summary of EPA's procedure for estimating non-use values using benefit transfer. No response is necessary. For EPA's responses to specific comments regarding the benefit transfer of non-use values, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services.

Comment ID 316bEFR.303.020

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

Subject Matter Code 10.02.04.01

Peconic-based approach

The first criterion that must be met in order to ensure the reliability of estimates resulting from a benefit transfer is the soundness of the method employed in the original study from which estimates are transferred. While a study may be sound for meeting its own objectives, it may be unsound for meeting the objectives desired by those conducting a benefit transfer. This is clearly the case in EPA's analysis, a point that is not only expanded on below, but was also made by the original study's authors in comments on the NODA that they have submitted to EPA.<FN 36> The original study that EPA uses sought to evaluate the relative values that residents of the towns surrounding the Peconic Estuary System placed on various resources, including wetlands and eelgrass. While the study developed estimates of the values that residents placed on the various resources, the study's authors strongly cautioned that: "we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used ...."<FN 37> EPA ignored this warning and transferred the dollar values for wetlands and eelgrass from this study.

EPA also fails to account for two other factors that significantly affect the soundness of the original study for meeting the objectives sought by EPA. Seeking to compensate for significant differences between the type of value being estimated in the original study and that which EPA seeks to estimate, and between the resources being valued, EPA makes two adjustments in transferring estimates from the original study. First, EPA attempts to develop a non-use value estimate from the original study's estimate of the total value that respondents placed on the resources. Second, EPA attempts to determine what share of the value that individuals hold for wetlands and eelgrass is attributable to those habitats' impacts on fish production. While there are significant conceptual flaws with these steps, which I address below, it is also clear that such adjustments cannot be reliable, given the information contained in the original study.

The original study examined only the total value that residents placed on various resources, including wetlands and eelgrass. There is clear evidence in the study that the vast majority of individuals surveyed were users of the resources, at least in the case of wetlands. The study found that 81 percent of respondents engaged in recreational activities in the Peconic Estuary System that would likely benefit from wetlands and, in some cases, eelgrass.<FN 38> For example, 40 percent fished, 54 percent walked and hiked, and 45 percent boated. Moreover, an even greater percentage of the respondents likely drove by the wetlands, enjoying the use value of scenic views that such resources afford. While the original study did not provide information on this, according to its authors, the average distance of survey respondents' homes to the Peconic Bay was likely eight miles, suggesting that many would often have occasion to see the wetlands.<FN 39> EPA identifies what it considers to be a group of non-users and assumes that their total value is a reliable indication of non-use value. But, as I describe below, it is highly probable that those individuals EPA considered to be non-users were in fact users of the resource. In fact, it is also highly probable that the original study surveyed too few true non-users to provide reliable non-use estimates even if EPA had properly isolated those non-users.

The validity of EPA's analysis also depends on the assumption that the non-use values that individuals place on a habitat such as wetlands are not values for the holistic resource or for intrinsic characteristics of the resource, but rather the sum of separable non-use values for the habitat's various ecological services. In particular, EPA assumes that it can estimate what share of the original study's survey respondents' non-use value for wetlands and eelgrass is attributable to a particular, quantifiable level of fish production associated with increased habitat. In order for EPA to develop an estimate of the share of survey respondents' non-use value that is attributable the habitats' fish production services, two conditions must hold. First, the extent to which those habitats contribute to the various ecological services, including a quantifiable level of fish production, must either have been common knowledge to the survey respondents or it must have been made known to them during the survey. Second, EPA must be able to determine the share of individuals' non-use value that can be attributed to the various ecological services. While the latter is a conceptual issue I address below, the former underscores that the original study cannot be considered a sound basis for the analysis EPA undertakes.

In the NODA, EPA outlines the "best practices" that should be met in designing a reliable stated preference survey, the method employed by the original study on which EPA relies. In so doing, EPA recognizes and summarizes the guidelines set forth in 1992 by a National Oceanic and Atmospheric Administration (NOAA) panel on contingent valuation.<FN 40> In introducing those guidelines, the NOAA panel stated that "any [contingent valuation] study should adhere [to the guidelines] if the study is to produce information useful in [benefit estimation]."<FN 41> One critical guideline that EPA also specifically mentions in the NODA is that "[a]dequate information must be provided to respondents about the environmental program [improvement] that is offered. It must be defined in a way that is relevant to [benefit estimation]."<FN 42> In conducting its new non-use value analysis, EPA completely ignores this guidance. EPA's estimates of the non-use value that individuals place on fish production from wetlands and eelgrass restoration are based on total values for wetlands and eelgrass restoration expressed by survey respondents who were told nothing to help them understand the level of impact that either wetlands or eelgrass habitat might have on fish production.

Much of the other research from which EPA draws in conducting its non-use value analysis makes clear that the validity of EPA's analysis is undermined by the fact that the original study did not provide survey respondents with information about the impact of habitat restoration on ecological services. The central finding of the Johnston et al. (2002) study, which is a critical component of EPA's analysis, is that different types of wetlands restoration can lead to dramatically different impacts on fish production and that the economic benefits from restoration depend on the extent to which restoration affects fish production and other ecological services. Therefore, given that no information on the impact of wetlands on various ecological services was provided to survey respondents in the original study, the variation in survey respondents' willingness-to-pay for wetland restoration may have been largely due to different perceptions about the impact of that restoration on ecological services. EPA's own analysis of the number of acres of restoration required to offset I&E indicates that the level of fish production associated with wetlands and eelgrass habitat could not be common knowledge among survey respondents: "Unfortunately, available quantitative data is not sufficient to estimate reliably the increase in fish production ... from the habitat restoration actions .... There is also limited data available on the production of these species in natural habitats that could be used to estimate production in restored habitats."<FN 43>

Even if the original study had estimated total non-use values for habitat restoration held by survey respondents who had been given clear, quantitative information regarding the impact of restoration on various ecological services, EPA would face an impossible task in seeking to determine the share of that value that is attributable to specific ecological services. The original study on which EPA relied for its benefit transfer simply cannot be considered a sound basis for the transfer that EPA attempts. This alone is sufficient to judge that the method employed by EPA is unsuitable for inclusion in the economic analysis of the proposed rule. Yet, numerous additional flaws in the new analysis lend further support to this conclusion.

Footnotes

36 Opaluch and Grigalunas, 2003.

37 Opaluch et al., 1998, p. 5.

38 Opaluch et al., 1998, p. 109.

39 Personal communication with James Opaluch and Thomas Grigalunas, May 7, 2003.

40 68 Fed. Reg. 13,544.

41 Arrow, K., R. Solow, P. Portney, E. Leamer, R. Radner, and H. Schuman. "Report of the NOAA Panel on Contingent Valuation." In 58 Fed. Reg. 10 (January 15, 1993). Available at <http://www.darp.noaa.gov/pdf/cvblue.pdf>, p. 6.

42 Id., pp. 32 - 33.

43 U.S. EPA, Case Study Analysis, 2002, p. F5-8.

EPA Response

For EPA's response to the first issue addressed in the comment regarding the soundness of estimates for benefit transfer please see comment #316bEFR.307.061.

Second issue – EPA attempts to develop a non-use value estimate from the original study's estimate of total value; 81% of the population engage in recreational activities; even more probably drive by the wetlands and enjoy scenic views; EPA identifies "what it considers to be … non-users" and assumes their total value = nonuse value:

EPA is unaware of any direct uses for eelgrass other than fish and shellfish and possibly bird watching related uses for eelgrass. Eelgrass beds can be a detriment to recreational boating, as the grasses foul boats' rudders and propellers. They are not visible above the water, so they don't provide aesthetic values. While wetlands might provide other use values, such as aesthetic values, EPA was interested in the non-use values for fish production services of wetlands.

The Johnston et al. (2002) survey and results, upon which the value proportions are estimated, indicates that individuals do recognize and value the various services of wetlands (DCN 6-3151).

In the Peconic survey, eelgrass was explicitly described as "fish and shellfish habitat." Thus, it is appropriate to assume that respondents believed that restoring eelgrass would increase fish and shellfish populations in the Estuary. Although services of wetlands were not described in detail in the survey, participants in focus groups were aware that wetlands provide fish habitat. In focus groups for the Rhode Island wetlands survey, which was also used in the analysis, respondents also were aware of fish habitat services of wetlands. It seems reasonable to assume that residents of coastal states in general are aware of fish habitat as one of the services provided by coastal wetlands.

Whether one measures total WTP only (as in the Peconic study) or estimates component values for wetland services (as in Johnston et al.), the fact remains that wetlands in the Peconic and those in Narragansett Bay are quite similar. Narragansett Bay and Peconic salt-water wetlands actually represent a relatively close match for the purposes of benefits transfer. Indeed, real world benefit transfers rarely include study and target sites that are as closely related as Narragansett Bay and Peconic saltwater wetlands.

For EPA's response to comments regarding the connection between values for habitat and values for fish and shellfish, please see the response to comment #316bEFR307.061.

EPA notes that the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) rule. Instead, the Agency used this approach to provide useful information for policymakers to consider in determining the final 316(b) Phase II rule.

Comment ID 316bEFR.303.021

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Subject Matter Code 10.02.04.01

Peconic-based approach

The second criterion that must be met in any benefit transfer to ensure the validity of the resulting estimates is similarity between the original study and the analysis to which benefits are transferred. This includes similarity of the environmental improvement being valued in both cases, as well as similarity in the population that is presumed to value that improvement. Common concerns regarding a lack of similarity between the two cases include differences in: the magnitude of the environmental improvements, the demographics of the populations valuing the improvements, and the availability of substitutes for the resources being improved.<FN 44>

Such concerns pale in comparison, however, with the problems regarding similarity in EPA's analysis. EPA seeks to develop non-use values for reductions in the mortality rate of various aquatic organisms by transferring estimates of the total value placed on preserving or restoring habitats (eelgrass and wetlands). EPA's own Guidelines make clear that such differences in the resource being valued between the original study and the transfer study imply that a benefit transfer cannot be accomplished: "Assessing studies for applicability involves determining whether available studies are comparable to the policy case. Specifically: the basic commodities [environmental improvements being valued] must be essentially equivalent; the baseline and extent of the change should be similar; and the affected populations should be similar" [emphasis added].<FN 45> EPA's analysis fails to meet the first condition, described above, that must be met.

It may be the case, in theory, that the non-use value that society enjoys from the restoration of wetlands and eelgrass may be partly comprised of the non-use value of species that are benefited by that habitat. But in practice, given existing economic knowledge, it is impossible for EPA to develop a reliable estimate for the share of society's non-use value for wetlands and eelgrass restoration that is due to any resulting increase in fish production. Moreover, in the few steps that EPA took in attempting to accomplish this task, it failed to consider the most fundamental economic knowledge about non-use values and information presented in the studies on which it relied.

In its analysis, EPA seeks to compensate for the fact that not only are the resources being valued in the policy case and the original study dramatically dissimilar, but the type of value that EPA is trying to estimate, non-use value, is also different from that estimated in the original study, total value. One means of deriving non-use values from total values in the context of a stated preference method is examining the total values held by the subset of respondents that are not users of the resource being valued, and can therefore only hold non-use values. While this is the approach that EPA attempts, its application is fundamentally flawed. EPA "re-estimated the Peconic model with separate coefficients for users and non-users of fishery resources. The Agency defined users as those who stated that they either fish or shellfish, thus deriving indirect use values from the fish habitat services of eelgrass and wetlands. EPA estimated non-use values for those who do not fish or shellfish."<FN 46> This ignores clear evidence in the documentation of the original study that while 40 percent of the survey respondents may fish and 27 percent may shellfish, 81 percent engage in some recreational use of the Peconic Bay, and it is likely that even more engage in other activities, such as driving along the shore, that would lead to use values from increased wetlands.<FN 47> Consequently, the “non-use” values that EPA derives from its adjustment will not only include non-use values, but also non-fishing use values, which are likely to be substantial.

Having developed its flawed estimates of non-use value for wetland and eelgrass restoration, EPA seeks to determine what share of that value is attributable solely to the impact of that habitat on fish production, as opposed to other services and attributes. Some of the most significant conceptual flaws in EPA’s analysis are made apparent in this step. EPA’s assumption that society’s non-use values for eelgrass and wetlands are entirely due to the physical ecological services that those habitats provide is the most important assumption in EPA’s new method and its most problematic.

Economic research has shown that non-use values are often most significantly influenced by the unique and intrinsic characteristics of specific resources. For example, the non-use value of the bald eagle has little to do with how much or what type of ecosystem services it provides, but rather mostly arises from the fact that it is our country’s national symbol. In like manner, the authors of the original study on which EPA bases its analysis explained that one of the primary motivations for that study was to estimate “the value residents ... hold for the ... ‘sense of place’ [that the wetlands, eelgrass and other resources] provide.”<FN 48> Moreover, the contribution of those habitats to the “sense of place” in some communities may be significantly greater than in others. In other words, not only are there aspects of a resource beyond its ecological services that affect non-use value, but the importance of those intrinsic and unique characteristics of a resource may vary substantially among populations.

Ignoring this fundamental aspect of non-use value, EPA assumes that the non-use value that it has estimated for wetlands is entirely and equally attributable to four ecological services, including fish production. This would suggest that EPA believes that individuals hold no non-use value for the numerous other ecological services that wetlands provide, such as improving water quality by reducing the flow of nutrients and pollutants into nearby bodies of water.<FN 49> But this conclusion is not supported by the Johnston et al. (2002) study, on which EPA relies for its division of wetlands non-use value. That study examines the marginal increase in total benefits (i.e., use and non-use values) from increases in the ecological services of wetlands.<FN 50> It provides no insights into marginal increases in non-use value associated with improvements in particular ecological services, and it makes no attempt to estimate the share of total non-use value those ecological services together comprise, relative to other characteristics of the wetlands that would influence non-use value.

Footnotes

44 These considerations are set forth in both EPA’s Guidelines and in the U.S. Office of Management and Budget’s recently published “Draft Guidelines for the Conduct of Regulatory Analysis and the Format of Accounting Statements.” See EPA, 2000, pp. 85 - 87; and 68 Fed. Reg. 5,492 - 5,527.

45 EPA, 2000, pp. 86 - 87.

46 Tudor et al., 2003, p. 8.

47 In a footnote, EPA recognizes that there may be other users of the wetlands aside from those who fish and shellfish. But EPA claims that it adequately adjusts for this in a following step where EPA makes assumptions about the share of the non-use value of wetlands that is attributable to fish production, as opposed to other ecological services. This is wrong. The step to which EPA refers simply makes assumptions about what share of a fixed non-use value for wetlands should be attributed to various ecological services. It is incapable of correcting for errors in the definition of non-users, which would cause the estimate of total non-use value to be overstated, because that estimate includes individuals’ use values. See footnote 11 in Tudor et al., 2003, p. 8.

48 Opaluch et al., 1998, p. 5.

49 EPA also assumes that the entire non-use value of eelgrass is attributable to fish and eelgrass production, ignoring both the intrinsic value of that habitat and other ecological services, such as water quality benefits.

50 EPA explicitly recognizes this by stating, “Given the four habitat services considered in the [Johnston et al.] survey ... each service provides roughly 1/4 ... of the total marginal utility associated with the combination of habitat improvements and mosquito control [which together make up the four habitat services described above].” Tudor et al., 2003, p. 16.

EPA Response

The comment focuses on the similarity issues in EPA’s benefit transfer of non-use values.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values at the national level for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document.

For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region.

See EPA’s comment #316bEFR303.020 regarding the definition of users vs. nonusers.
The Agency also points out that the fact that 81 % of survey respondents engage in some type of recreational use of the Peconic Bay underscores EPA’s point that by monetizing only recreational and commercial fishing benefits for the Section 316(b) regulation, the benefit analysis significantly underestimates the total benefit of the regulation. EPA was not able to monetize other benefit categories such as watching wildlife while scuba diving or walking on the beach. It is also important to note that this 81% of the household would likely to have relatively high non-use values due to familiarity with the resource.

As shown by empirical studies, the non-use values for users tend to be significantly higher compared to the non-use values held by non-users of these resources. (Whitehead and Blomquist, 1991; (DCN #4-2193)).

Regarding the allocation of wetlands values to different services, this comment is based on arbitrary assumptions unsupported by the focus groups that supported the Johnston et al. (2002) survey and results, upon which the value proportions are estimated (DCN #6-3151). The survey applied by Johnston et al. (2002) to assess values for wetland restoration was designed based on over 16 months of focus groups and interviews with wetland policymakers and over 100 Rhode Island residents. The purpose of this careful preparation was to ensure that the survey captured the full range of values relevant to wetland restoration in Rhode Island. Within the scale of wetland restoration options available, and also the scale of 316b policies, values related to issues such as “sense of place” and water quality impacts were either unimportant to focus group participants, or were judged as trivial impacts by wetlands scientists who were also interviewed. In sum, the Johnston et al. (2002) survey was designed to capture the full range of relevant values, based on a combination of interviews with wetlands scientists and experts, and focus groups with Rhode Island residents.

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Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

The final step in EPA's new analysis entails making a judgment regarding the population that may hold the per-household non-use value that EPA has attempted to estimate. Given that EPA has not conducted an original study to examine how non-use value for reductions in I&E may be affected by distance from the affected resource, it has no basis on which to make this judgment. Hence, the judgments are arbitrary, and yet they dramatically affect EPA's ultimate estimate of nonuse value.

EPA Response

The comment states that EPA has no basis to make a judgment of the affected population for its non-use benefit transfer. EPA disagrees. EPA believes that it has conservatively estimated the extent of the affected population in the study area based on households in counties abutting the affected water body, and households within 32.4 miles of the affected water body. The 32.4 mile figure was chosen based on results from the Rhode Island wetlands study. This study showed that Rhode Island residents who live in the most western parts of Rhode Island and as far as 32.4 miles from Narragansett Bay value wetland restoration in the Bay (see Chapter C6 the final Phase II Regional Studies Document, DCN #6-0003).

In the Peconic study, the survey was conducted only in the towns surrounding the Estuary, so it is impossible to determine from the survey results whether Long Island residents living at a distance from the Estuary would also value habitat improvements in the Estuary. However, evidence suggests that this is likely to be true. The Peconic study included a second survey of recreational users of the Estuary, which found that people traveled great distances to visit the Estuary and recreate there, indicating that these people would likely value the Estuary's habitats. They simply were not asked these questions, so the extent of the market for restoration and protection of the Peconic Estuary's services has not been conclusively determined.

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Peconic-based approach

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

In summary, EPA's new non-use value analysis offers estimates that are no more valid or reliable than those produced by the "avoided cost measures of benefits" that it replaced. It fails to meet both the soundness and similarity criteria that are essential for assessing the validity of benefit transfer methods and applications. Not only are there insurmountable differences between the resource valued in the original study on which EPA relied and the resource that it seeks to value, but in the process of attempting the transfer, EPA has ignored basic economic theory regarding non-use value, and has made adjustments to the original values that are unsupported by the studies on which it relies. Simply put, this new method cannot be considered a valid or reliable basis on which to evaluate the economic benefits from the alternative regulatory options.

EPA Response

The comment states that EPA's non-use valuation estimates are not valid or reliable. EPA disagrees. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values in this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document.

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.303.024

Author Name Robert Stavins

Organization Environmental Economics Program,
John F. Kennedy School of Government,
Harvard University

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Conclusions

The Notice of Data Availability for EPA's proposed 316(b) Phase II rule includes significant changes to, and information regarding, the economic analysis that it employed in supporting that proposed rule. The NODA presents new information regarding both the capital costs of retrofitting existing facilities with cooling towers and the outages that will be required while those retrofits are conducted. When combined with evidence from an analysis of the cost of installing cooling towers at Brayton Point Station, it suggests that more reliable estimates of capital costs may be more than 100 percent greater than those estimated by EPA. This information lends further support to criticisms of EPA's capital cost estimates and suggests that EPA has underestimated the total and incremental costs associated with the waterbody/capacity-based option by a substantial margin.

EPA Response

See responses to comments 316b.EFR.303.001, 316b.EFR.303.006, 316b.EFR.303.008, 316b.EFR.303.009, and 316b.EFR.303.010.

Comment ID 316bEFR.303.025

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Robert Stavins

Organization Environmental Economics Program, John F. Kennedy School of Government, Harvard University

EPA has made revisions to its benefit analysis, addressing many of the flaws that I identified in my previous comments. But, due to its pursuit of a new non-use value analysis that is conceptually flawed and impossible to implement reliably, the overall analysis and the estimates it produces are no more reliable or valid than the “avoided cost measures of benefits” that the analysis replaced. As I stated in my prior comments, if EPA believes there are legitimate and significant non-use values, they should be estimated with original applications of the best stated-preference methods. The possible existence of excluded use values or non-use values does not justify the employment of conceptually flawed and empirically invalid approaches.

EPA Response

The comment states that EPA’s non-use value analysis is conceptually flawed and unreliable. EPA disagrees. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values in connection with this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The comment also states that EPA should conduct a stated preference study of non-use values. EPA does not believe this is necessary. For a discussion of limits to EPA doing original stated preference work in support of the 316(b) regulation, please see comment #316bEFR.303.007.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James J. Opaluch & Thomas A. Grigalunas

On Behalf Of:

Economic Analysis, Inc.

Author ID Number:

316bEFR.304

Comment ID 316bEFR.304.001

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name James J. Opaluch & Thomas A. Grigalunas

Organization Economic Analysis, Inc.

Dr. Opaluch was the Principle Investigator for the Peconic Estuary System (PES) study relied upon by EPA, and both Dr. Opaluch and Dr. Grigalunas were major contributors to the PES study.

Overall, we believe that the results given in the Tudor et al. memorandum cannot be used to assess the potential economic benefits of alternative cooling water control technologies, for three principle reasons:

- First, the PES study results were intended to develop priorities for resource preservation and restoration programs, not absolute dollar values.

- Second, the information provided to respondents to the PES resource survey was inadequate to support a valuation of quantitative changes in fish and shellfish due to changes in eelgrass or wetland resources.

- Third, even if the dollar results of eelgrass and wetlands from the PES resource study could be relied upon, the transfer of these results from the PES sample studied to other populations, such as those in the North Atlantic Region, would likely overstate values because of the substantial difference in socioeconomic and demographic characteristics which exist between the two areas.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment

#316bEFR.306.106.

Comment ID 316bEFR.304.002

Author Name James J. Opaluch & Thomas A. Grigalunas

Organization Economic Analysis, Inc.

Subject Matter Code 10.02.04.01

Peconic-based approach

The PES Study was Intended to Develop Relative Priorities, Not Absolute Dollar Values

The Peconic Estuary System (PES) resource valuation study (Mazzotta, 1996; Opaluch et. al., 1999) primarily was an attempt to develop and apply a method -Contingent Choice -- to elicit relative resource preference priorities in order to contribute to setting natural resource preservation and restoration priorities in the PES. It was pursued as an alternative to the Contingent Valuation Method (CVM), which provides dollar estimates only, specifically because the authors were skeptical of dollar measures of value for natural amenities estimated using CVM, which have been the subject of much debate and controversy in the environmental economics profession (e.g. Hausman, 1993; Opaluch and Grigalunas, 1993; Grigalunas and Opaluch, 1993).

In our view, the PES resource value study results for eelgrass and tidal wetlands should be interpreted as providing relative resource preference rankings rather than absolute dollar values for the resources studied. A major reason for this conclusion is that the results reflect symbolic components, for example, with people wanting to "take action" to protect the environment in general, rather than selecting a particular resource program. Significantly, we found that the results are robust with respect to relative ranking, but not with respect to dollar values.

In fact, the information gathered in connection with the study indicated that the dollar values might not only be unreliable, but generally biased upwards. Important sources of symbolic values in dollar estimates were identified in another analysis of the PES data (Mazzotta et al, 1998). This further analysis found that people appeared to place value on the symbolic notion of "taking actions that protect the environment" beyond values associated with the specific level of resource protection that is provided by those actions. Although it may be feasible to correct for this particular source of symbolic effects, the dollar values likely suffer from other types of symbolic effects that cannot be measured with the available data. For example, during focus groups and debriefings for the PES study, some respondents indicated that they considered dollar payments only when they could not otherwise make a decision. Still others indicated that they selected the more expensive option, not because they preferred it but because it indicated a higher value for the environment. For these reasons, and others, we have expressed confidence in use of relative values of resources, not monetary values.

EPA Response

The comment states that the values estimated in the Peconic study used for EPA's benefit transfer of non-use values are not precise enough for EPA's benefit transfer. EPA disagrees. At issue here is what level of precision of value estimates is required for this particular policy analysis. The results of the Peconic survey have been used by the Peconic Estuary Program to evaluate options and plan for preservation and restoration actions in the Estuary, under the National Estuary Program, programs that require expenditure of scarce public funds and thus have significant opportunity costs for the public.

The Peconic model was designed to both measure dollar values and develop priorities; the dollar values estimated through the PES study have been published in the peer-reviewed literature. As clearly stated by Johnston et al. (Johnston, R.J., J.J. Opaluch, T.A. Grigalunas, and M.J. Mazzotta. 2001. Estimating Amenity Benefits of Coastal Farmland. Growth and Change 32(summer): 305-325. DCN #5-1276) on page 313: "Contingent choice questions were designed to measure respondents' values for changes in the natural resources of the Peconic Estuary system…." Nearly identical text is found in Johnston et al. (Johnston, R.J., T.A. Grigalunas, J.J. Opaluch, J. Diamantedes, and M. Mazzotta. 2002. Valuing Estuarine Resource Services Using Economic and Ecological Models: The Peconic Estuary System Study. Coastal Management 30(1): 47-66; DCN #5-1275).

The original Peconic study concludes that

the minimum conditions for economic rationality are met, with mixed results for the more rigorous tests. The estimated coefficients for all models have the correct sign and are statistically significant. Relative values and priorities are consistent across model specifications, and estimates of dollar values are not highly sensitive to specification. ….

Overall, there is no strong evidence that people are unable to make tradeoffs that express their priorities for resources. Open-ended comments and other qualitative evidence suggest that respondents were concerned about the issues, accepted the scenarios, and made an effort to provide thoughtful answers …

…[R]esponses provide robust estimates of people's priorities and relative values for the natural resources…. Although the dollar values may not be precise, they may be appropriately used to indicate the general magnitude of benefits of different programs as part of a decision-making process that considers a variety of factors, including economic benefits. (Mazzotta, 1996; DCN #5-1284)

The model used for benefit transfer is the model that was intended to correct for possible symbolic values (as described by Johnston et al., 2002), and hence provides the most conservative value estimates for an additional acre of wetlands and eelgrass. This model separates values for simply "taking action" from values for specific resources.

EPA recognizes that the Peconic study does not provide perfect estimates of dollar values. There is no study in existence that provides perfectly reliable dollar values for non-marketed goods. Every non-market valuation study contains some level of bias or uncertainty. However, the Agency believes that the values provided are useful for indicating the magnitude of benefits that would be provided by restoring fish habitat.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including the benefit transfer referred to by this comment. EPA believes that the values provided, while not perfectly ideal, are adequately reliable for the context, and that they could be used in evaluating regulatory options.

EPA notes that the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) Phase II rule. Instead, the Agency used this approach to provide useful information for policymaking officials to consider in otherwise reviewing a final conclusion over the final 316(b) Phase II rule.

Comment ID 316bEFR.304.003

Author Name James J. Opaluch & Thomas A. Grigalunas

Organization Economic Analysis, Inc.

Subject Matter Code 10.02.04.01

Peconic-based approach

The Information Available to Respondents in the PES Study was Insufficient to Support Valuation of Changes in Fish Production Due to Changes in Eelgrass or Tidal Wetland Resources

Serious problems arise from the use of the PES results for the estimated value of eelgrass and wetlands to "get at" the value of fisheries, which is what the EPA memorandum (Tudor, 2003) attempts to do. The questionnaire used in the PES study (Mazzotta, 1996; Opaluch et al., 1999) indicated only in very general terms that eelgrass is a habitat for finfish and shellfish. However, no quantitative information whatsoever was provided regarding the significance of eelgrass or wetlands as a habitat for fish and shellfish. Furthermore, no quantitative information was provided about how changes in eelgrass or tidal wetlands would affect the stock of fish. As a result, the survey respondents in the PES study relied upon by EPA would have had no way of knowing the quantitative link between eelgrass and wetlands and fish and shellfish.

In stated preference studies, a minimum condition is that the commodity must be well defined by the survey instrument. This means that the respondents must have available to them information about the commodity and its attributes that is sufficient to allow them to assign it a value. The "fish and shellfish" presumed to be "produced" by eelgrass and tidal wetlands were not quantified in the materials provided to respondents in the PES study. Nor would people generally be expected to have any significant independent knowledge of the effect of changes in eelgrass and wetlands acreage on fish production. In the absence of this information, it is not reasonable to treat the values given to the eelgrass and wetland resources themselves as reflective of the values that would be placed on the production of fish and shellfish.

EPA Response

The comment refers to EPA's benefit transfer of non-use values. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values in connection with this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including the benefit transfer referred to here.

The comment states that it is not appropriate to use values for habitat to value fish and shellfish. Please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish.

Comment ID 316bEFR.304.004

Author Name James J. Opaluch & Thomas A. Grigalunas

Organization Economic Analysis, Inc.

Subject Matter Code 10.02.04.01

Peconic-based approach

The Significant Differences Between the Population Surveyed in the Peconic Bay Area and Other Areas in the North Atlantic Region Further Undermine the Use of this Benefit Transfer

A third serious problem arises when EPA transfers the values estimated for Peconic Bay to other geographical locations in the North Atlantic Region, such as Mount Hope Bay, in Rhode Island. The use of Benefit Transfer (B-T) is common in economics, and is acceptable -- provided that certain conditions are met. Above, we pointed out that the use of wetlands and eelgrass to value additional fish and shellfish is not appropriate in this case since the PES survey respondents had no basis for determining how many fish and shellfish would be "produced" by adding a unit of habitat. Hence, B-T is not valid in this case. Even so, we comment here on another issue concerning the use of B-T in EPA's analysis.

An important consideration in B-T is that the areas involved – the study area and the area to which the estimates are transferred -- must be similar. However, it is clear that the respondents to the PES questionnaire would likely have quite different socioeconomic and demographic characteristics than those in other parts of the North Atlantic Region for which EPA calculates non-use values. (Tudor, et al., 2003) This can be seen by comparing the population in the Peconic Bay study with the populations around the Brayton Point facility in Mount Hope Bay, one of the areas within the Northeast Region (Tudor, et. al, 2003).

As illustrated in Table 1, the Peconic Bay and Mount Hope Bay may not be distant geographically, but the economic and demographic characteristics of the populations of interest are quite different. The PES survey was administered as an intercept survey to residents and second homeowners at various sites throughout the PES. The survey was administered during the peak summer season in August, 1995 and included residents and seasonal homeowners, and the latter tend to be quite wealthy and highly educated. In contrast, the general population around Brayton Point tends to have a lower household income and fewer residents have four-year college or advanced degrees. The PES survey respondents are much wealthier and much better educated than the population around the Brayton Point facility (Table 1). Income and education were found to be very important variables explaining respondent's preferences and willingness to pay for PES resource programs (Mazzotta, 1996; Opaluch, et al., 1999). Hence, even if the PES estimates of eelgrass were valid estimates for additional fish and shellfish, they could not be applied to the area around Brayton Point without a likely substantial downward adjustment.

The population around Brayton Point considered by EPA also has far more residents who do not speak English well than is true for the PES study respondents (Table 1). Indeed, non-English speaking individuals were not included in any focus groups for the PES study. Hence, there is no way of knowing the preferences and attitudes of non-English speaking residents of the PES. For this reason, Carson et al. (1994), for example, in their study of contamination in the southern California Bight dropped from the affected population all households that were not fluent in English on the basis that it would be inappropriate to include such individuals when no focus groups were done with non-

English speaking populations. EPA's failure to take into account this important difference further undermines the results of its B-T analysis.

Table 1. Comparison of Economic and Demographic Characteristics of PES Survey Respondents (Mazzotta, 1996) in PES Towns (Census Data) and in Counties in the Vicinity of Brayton Point Station (Census Data) Examined in the EPA Memo (Tudor, et. Al., 2003)

(See Table 1. On page 5)

Conclusion

For the foregoing reasons, we believe that EPA's use of the PES study is not a valid application of B-T, and that the values calculated in the Tudor et al. memorandum can not be considered to accurately identify the benefits associated with EPA's proposed cooling water intake technologies.

EPA Response

The comment refers to EPA's benefit transfer of non-use values. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including the benefit transfer referred to here.

The comment states that the demographics of residents of the Peconic Estuary region are quite different from those of residents of the Mount Hope Bay region. EPA does not agree. In fact, residents of the Peconic region do not have quite different demographics from residents of the region around Mount Hope Bay. EPA has addressed the issue of demographics in its analysis, as follows: Corrections were made to WTP values to account for differences in demographics between survey respondents and the general population of the East End of Long Island. These adjustments were made by weighting the model coefficients, using weights that correct for the proportion of the population in each income and education group, according to the U.S. Census, versus the proportion of survey respondents in each group. Values for seasonal residents were similarly adjusted downwards, based on these weights and the proportion of the sample who are seasonal residents. Demographics of the affected population in the Brayton Point case study region (Bristol County, MA; Newport County, RI; and Bristol County, RI) are quite similar to those of the general population of the East End of Long Island.   The Brayton Point region has slightly lower education levels, and slightly higher income levels, on average, than the Peconic region. While values presented in the analysis were adjusted to the Peconic levels, they could be easily re-adjusted to reflect New England levels. However, based on the small differences in demographics between the regions, the effect is likely to be negligible. For information on demographics of the affected population in the original study region and the Brayton Point study region see DCN #6-2501.

The comment also suggests that non-English speaking residents be excluded from calculations of total non-use value. EPA does not agree that certain groups of people should be assigned zero value. EPA agrees that the PES study does not provide information on the preferences and attitudes of non-English speaking residents of the PES, because these individuals were not included in any focus groups. However, there is no empirical evidence to suggest that non-English-speaking people do not value fishery resources. Therefore, the Agency believes that completely excluding non-English speaking households from the analysis is inappropriate.

EPA notes that the benefit transfer method (habitat-based approach) is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. See also EPA's response to comments # 316bEFR.307.061 regarding using habitat values to estimate values for fish, and #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Thomas Englert

On Behalf Of:

Lawler, Matusky & Skelly Engineers
on behalf of PG&E National Energy
Group

Author ID Number:

316bEFR.305

Comment ID 316bEFR.305.001

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Author Name Thomas Englert

Organization Lawler, Matusky & Skelly Engineers on behalf of PG&E National Energy Group

Environment Survival

EPA requested comment on whether it is appropriate to allow consideration of entrainment mortality and survival in benefit estimates. While I agree that it is correct to assume no survival of entrained organisms for the "baseline" condition, for the reasons discussed below, I believe that EPA should allow consideration of entrainment survival in a utility's demonstration of compliance with the entrainment performance standard.

The peer-reviewed report published by EPRI (2000) <FN 2> summarizes 36 studies from 21 power plants. The studies report that hardy species showed entrainment survivals greater than 50%, and that even some fragile species showed survivals of about 25%.

As early as 1979, when they presented their testimony in the Hudson River power plant case, consultants to EPA recognized the reality of through-plant survival and accounted for it in their calculations of plant impacts. This recognition was based on their extensive review of plant sampling programs and data and their personal observation of sampling while it was being conducted at the plants. For EPA to take the position that entrainment survival should now be ignored in power plant loss calculations is both unsupported and a step backward.

Footnotes

2 EPRI (Electric Power Research Institute) 2000. Review of entrainment survival studies; 1970-2000. Report No. 1000757. Palo Alto, California

EPA Response

In today's final rule, EPA has set requirements for reducing entrainment rather than reducing entrainment mortality. EPA chose this approach because EPA does not have sufficient data to establish performance standards based on entrainment survival for the technologies used as the basis for today's rule. If entrainment survival were to be incorporated into any determination of compliance with the performance standards, then the actual performance standard would need to be higher. Please see the response to comment 002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analyses. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.305.002

Author Name Thomas Englert

Organization Lawler, Matusky & Skelly Engineers on behalf of PG&E National Energy Group

Subject Matter Code 7.02

Performance standards

Perhaps most important, ignoring the fact that many species and life stages survive entrainment can lead to incorrect evaluations of the effectiveness of cooling-water and intake technologies. For example, the impact of flow reductions achieved through closed-cycle cooling can be overestimated. This is because, under reduced flow conditions, including use of closed-cycle cooling, more entrained organisms are likely to die because they experience greater levels of thermal stress than would occur under once-through cooling. As a result, the potential benefits of flow reduction may be partially or even totally offset for some species by the increase in through-plant mortality. Similarly, retrofitting intakes with fine mesh screens, which causes many organisms that would otherwise be entrained to become impinged, could result in greater losses if survival on the fine mesh screens is less than would occur with through-plant passage.

For all of the preceding reasons, EPA needs to:

- Recognize that through-plant survival occurs

- Account for through-plant survival in its evaluation of technologies and determination of which cooling-water and intake systems are in fact the most effective in reducing organism losses at power plants.

EPA Response

EPA disagrees. Today's final rule sets performance standards for reducing entrainment rather than reducing entrainment mortality. EPA chose this approach because EPA does not have sufficient data to establish performance standards based on entrainment survival for the technologies used as the basis for today's rule. If entrainment survival were to be incorporated into any determination of compliance with the performance standards, then the actual performance standard that would need to be met would be higher.

Based on its review of all entrainment survival studies available to the Agency, EPA believes that its assumption of zero percent survival in the benefits assessment is justified. The studies reviewed are characterized by significant uncertainty and variability which complicates efforts to synthesize the various results in a manner that would provide useful generalizations of the results or application to other particular facilities for the benefits assessment. The primary issue with regard to these studies is whether the results can support a defensible estimate of survival substantially different from the value zero percent survival assumed by EPA. The review of the studies has shown that while some individual organisms may be alive in some of the discharge samples, the proportion of the organisms that are alive in the samples is highly variable and unpredictable. In addition, the studies contain various sources of potential bias which cause the estimated survival rates to be higher than the actual survival rates. For these reasons, EPA believes the current state of knowledge does not support reliable predictions of entrainment survival that would provide a defensible estimate for entrainment survival above zero.

Comment ID 316bEFR.305.003

Author Name Thomas Englert

Organization Lawler, Matusky & Skelly Engineers on behalf of PG&E National Energy Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Production Foregone

In my letter of August 6, 2002 to EPA (containing initial comments to the Phase II Rulemaking for Existing Facilities), I summarized my review of EPA's application of the Production Foregone Model in the Brayton Point Station case study contained in the proposed Section 316 (b) Regulation for Existing Facilities. In that review I identified two major problems with EPA's production foregone calculation:

- Instead of using life-stage initial and final weights to compute initial biomass values and life stage growth rates, respectively (Rago, 1984 <FN 3> and Ricker, 1975 <FN 4>), EPA used mean weights of individuals at the midpoint of the life stage. (EPA used mean midpoint weights to compute initial life-stage biomass, and used the difference between mean midpoint weights of one life stage and the next stage to calculate growth rate of the earlier life stage.)

-For many species, EPA's mean midpoint weights of early life stages were much too heavy, sometimes thousands of times too heavy.

The combined effect of these two errors was that, for a number of key species, EPA grossly overestimated production foregone due to entrainment and impingement at Brayton Point Station. These same errors were then perpetuated in the EPA, Region I Determinations Document for Brayton Point Station's Draft Permit dated July 22, 2002.

Review of NODA Table X-7 and Appendix 1: Life History Parameter Values Used to Evaluate I&E in the North Atlantic Region reveals that, with the exception of some minor adjustments in egg weights, EPA has perpetuated the errors in its prior production foregone analyses and again produced gross overestimates of the actual losses. As in its calculations prior to issuing the NODA, EPA shows very high production foregone for bay anchovy, tautog, winter flounder, and weakfish. LMS analyses presented in my August 6, 2002 letter showed that EPA's errors caused overestimates of production foregone for these species by factors ranging from 53 to 1200. Even the EPA adjustments in egg weights seen in the NODA show glaring inconsistencies, reflecting the types of errors EPA has made in the estimation of weights for other early life stages. For example, in Table 1-51, the weight of an egg with a diameter of 1.0 mm is reported as 0.00000115 lb, <FN 5> whereas in Table 1-24 the weight of an egg identical size is listed as 0.0539 lb, a difference of more than three orders of magnitude. Although these weights are for different species, the similarity of the eggs' physical dimensions and densities means that their weights should be approximately the same.

EPA errors in larval weights are equally obvious and actually of more importance in the calculation of production forgone. In Table 1-51, weights listed for winter flounder larval stages at Brayton Point and Millstone are 10,000 times heavier than those listed for larval stages at the Pilgrim Power Plant (Table 1-52), in spite of the fact that egg weights listed for winter flounder for all three plants are the same. Additionally, the larval weights in Table 1-51 are 1,000 times greater than the egg values, even though on page 9 of its response to UWAG Questions Re; Phase II Proposal Record (Revised December 2, 2002), EPA indicates that larval weights should be only slightly larger than egg weights. These types of inconsistencies, coupled with the errors in formulation of production foregone, identify and explain EPA's gross overestimation of winter flounder and other species production forgone losses at Brayton Point Station.

It is disturbing indeed to see that EPA has apparently ignored most of the comments I and others have made on its production foregone calculations and perpetuated in the NODA the same errors previously identified in the Brayton Point case study and draft permit.

Footnotes

3 Rago, P.J. 1984. Production Foregone: An alternative method for assessing the consequences of fish entrainment and impingement losses at power plants and other water intakes. Ecological Modelling, 24:79-111

4 Ricker, W.E. 1975. Computation and Interpretation of Biological Statistics of Fish Populations. Bull. Fish. Res. Board can., 191. 382 pp.

5 The value in Table 1-51 is consistent with the weight of a sphere of 1.0 mm diameter and the same density as water; therefore, it is a good approximation of weight of an egg of that diameter.

EPA Response

Several commenters have raised questions about the EPA calculations of production foregone, primarily with regard to the values of stage-specific fish weights. These commenters have claimed that in some cases the weight parameters used by EPA may lead to overestimation of production foregone. Some commenters have also questioned inconsistencies between values used for the same species occurring in different regions, and apparent discontinuities in weights between early life stages. EPA's responses to these inter-related issues are addressed in the following sections.

Unrealistic Weight Parameters
EPA relied upon numerous published records, local experts, and other resources to develop weight estimates. Through the course of reviewing public comments on the initial case studies and later comments on the NODA, EPA has reviewed and revised many of the weight parameters to correct clerical errors and to improve upon certain biological interpretations. Following suggestions of commenters, EPA also revised some of its approximation methods, including the use of volumetric methods to improve estimates of egg weights.

Use of Mean Weights per Stage
Some commenter indicated that the mathematical definition used to calculate estimates of foregone production require weights that represent the beginning and the end of each life stage. EPA acknowledges that this is ideal. However, such data are seldom available. With few exceptions, facility impingement and entrainment records did not provide a comprehensive set of the relevant fish weights, so it was necessary for EPA to conduct an extensive literature search to obtain weights. The weights used by EPA in its analyses include a variety of types of values, some of which are unknown because in some cases the reference documents are not explicit about whether the values represent weights for the beginning, the end, or midpoints of particular stages. This issue is also complicated by the fact that some weights are determined indirectly through length-weight regression relationships. Length-at-age values found in different literature sources may also represent different parts of a lifestage.

Although such uncertainty is unfortunate, EPA believes that the practical effect on the benefits estimation is negligible. EPA disagrees with the characterizations put forth by some commenter that accuracy of these estimates are of vital importance to the benefits estimates. EPA notes that the benefits assessment does not put any direct valuation on the production foregone, per se. Production foregone estimates are used only in the context of the trophic transfer model, which is used only to generate estimates of incremental foregone yield attributable to losses of forage species. The portion of the total benefits associated with the trophic transfer pathway is quite small, usually less than five percent of the total within any particular region. Thus, even if inflated estimates of production foregone caused the trophic transfer model to overestimate foregone yield, the practical effect on the total benefits estimate would be very small.

Comment ID 316bEFR.305.004

Author Name Thomas Englert

Organization Lawler, Matusky & Skelly Engineers on behalf of PG&E National Energy Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Trophic Transfer Efficiency

In the case studies to support the proposed regulation, EPA used a net trophic transfer efficiency of 2.5% to estimate the yield of harvested species lost as a result of entrainment and impingement losses forage species. In the NODA, EPA says that, based on "additional review of the scientific literature," it has modified the model so that the net trophic transfer efficiency is 20%.

This is clearly a dramatic change because it means that 8 times as much of the production foregone for forage species will now be translated into lost yield. The basis for this change is not well documented. EPA provides only one reference dealing with the trophic transfer issue, and that reference is based on studies prior to 1988. Thus it does not include recent work done with bioenergetics models that support a value of 10% (PSE&G, 1999) <FN 6> the value we used in converting forage losses into production foregone of harvestable species.

Furthermore, the approach in the NODA assumes that all the lost forage production would have been consumed by harvestable species. (EPA does not make clear how the lost production would be allocated among the harvestable species.) In contrast, in the February 2002 case study, EPA assumed correctly that a large portion of the production foregone is likely consumed by intermediate predators and then by harvestable species. The latest assumption by EPA in the NODA- that all forage biomass is consumed directly by harvestable species-clearly leads to an overestimate of losses of harvestable species.

The combined effect of the elimination of the intermediate predator pathway and the use of an inflated value for trophic transfer efficiency results in a considerable overestimate of the amount of fishery yield lost due to losses of forage species at power plants. This could lead to incorrect conclusions regarding the value of various intake technologies in reducing entrainment and impingement losses.

Footnotes

6 PSE&G (Public Service Electric and Gas) 1999. Biological modeling of fish protection alternatives. PSE&G Renewal Application, Salem Generating Station, March 1999

EPA Response

Several commenters have questioned the simple trophic transfer model that EPA used to estimate the foregone yield that could result from losses of forage species. The trophic transfer model used by EPA is highly generalized. However, EPA believes that the effort necessary to perform more detailed analyses of the wide variety of food webs affected by I&E is unwarranted because the effort required to do so would be very substantial, with added value disproportionate to the added costs of the assessment. For its final analysis, EPA has used a 10% net efficiency based on information in Pauly and Christensen (1995) (DCN# 6-1004). EPA notes that the practical value of developing further refinements of the trophic transfer model are unwarranted due to (a) the likelihood that any single model will be inadequate for all situations and (b) the relatively minor contribution to total benefits that this pathway adds.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Doug Dixon & Kent Zammit

On Behalf Of:

EPRI

Author ID Number:

316bEFR.306

Comment ID 316bEFR.306.001

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

EPA's development of the Technology Efficacy Database (TED) is a notable accomplishment and will be a valuable tool for supporting identification of technologies. Tracking fish protection technology development and assessing technology performance is one of the major services that EPRI provides for our members and we would like to work with EPA in further development of the TED. We have made several recommendations herein that we believe will improve the content and utility of the TED.

EPA Response

See comments 316EFR.306.054-60.

Comment ID 316bEFR.306.002

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.05

Intake structure technology costs (e.g., screens, etc)

EPA has improved the cost estimation process and has added costs for several additional fish protection technologies. As this process is further improved, the information will also be valuable to supporting the compliance assessment process. We have made several recommendations herein that we believe will improve the content and utility of the cost modules.

EPA Response

The Agency notes the comment which is favorable towards the revised cost estimation process presented in the NODA.

Comment ID 316bEFR.306.003

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.04

Streamlined Technology Option

The first streamlined technology option (i.e., cylindrical wedge wire screens in freshwater rivers and streams) may work, with some modifications, to meet the entrainment reduction standard, most importantly that the slot size is selected in accordance with the size of eggs and larvae to be protected at the site. In general, while existing research indicates that slot size of 0.5 to 1.0 mm may be protective in all cases; in some situations, it may be over-protective. In many cases, slot sizes of 1.5 mm and higher will afford the same level of protection as the narrower slot sizes. Given the direct relation between slot size and intake flow, wider slots will minimize unnecessary retrofit costs. We do note that screens configured as noted in EPA’s wording (including a slot width of 1.75 mm as assumed from EPA cost analyses) should virtually eliminate impingement of juvenile and adult fish. The uncertainty regards entrainment reduction may be reduced with additional research.

EPA Response

EPA agrees that the slot size of the wedgewire screen must be sufficiently protective to assure proper application of the preapproved technology. This is reflected in § 125.99(a)(1)(D), which states that “The slot size is appropriate for the size of eggs, larvae, and juveniles of all fish and shellfish to be protected at the site” is one of the conditions that constitute approved design and construction technologies for purposes of §125.94(a)(iv). As such, EPA had not specified a universal slot size, but rather left it to the discretion of the Director to select an appropriate slot size based upon the unique assemblage requiring protection from entrainment at a facility. Please refer to EPA’s responses to comments 316bEFR.017.003 and EPA's 316bEFR.063.005 for additional details of how the Director will determine compliance.

Comment ID 316bEFR.306.004

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.04

Streamlined Technology Option

The second streamlined option would establish the criteria and process for approving cooling water intake structure (CWIS) control technologies for complying with Phase II section 316(b) requirements. This option would allow the development of information demonstrating the effectiveness of other technologies to meet the impingement mortality and entrainment performance standards when operated under defined conditions. The second option differs from the first in that it calls for the systematic development of criteria for the approval of technologies to meet the §316(b) fish protection goals. If EPA adopts scientifically sound criteria for approving technologies and sufficient input is solicited from resource agencies, industry, and stakeholders, this approach could lead to the development of a functioning streamlined approach to implementing §316(b). Via this approach, EPA and industry could effectively collaborate to identify and improve on existing fish protection technologies. EPRI would also be pleased to participate in such a collaborative process.

EPA Response

EPA appreciates EPRI's support.

Comment ID 316bEFR.306.005

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's apparent elimination of the Habitat Replacement Cost (HRC) approach for estimating the national economic benefits from the proposed rule is correct. As we noted in our comments on the proposed rule, costs are not a measure of benefits. The new regional benefits estimation approach used by EPA is also an improvement toward more accurately estimating national benefits of the proposed rule. As subsequently discussed, we continue to identify, however, conceptual errors in both the estimation of regional losses and in economically valuing those losses that result in significantly overestimating the benefits of the proposed rule.

EPA Response

This comment acknowledges that EPA does not use the HRC method in the cost benefit analysis for the NODA or the final Section 316(b) Phase II rule.

It also refers very generally to other perceived errors. The specific comments to these errors are included elsewhere in the author's comments and responses are provided for those comments.

Comment ID 316bEFR.306.006

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

While EPA's revised biological, engineering, and economic analyses that support the proposed rule have been improved since proposal, they continue to have numerous conceptual flaws that result in grossly overestimating fish losses at CWIS and the potential economic benefits that may accrue from their protection. Drs. Lawrence Barnthouse (Appendix A) and Webb Van Winkle (Appendix D) both note the conceptual and parameter errors in estimating fish losses in the two case studies presented in the NODA. Most notably, the new EPA assumption concerning impingement age distributions is incorrect based on extensive monitoring data, and greatly overstates the benefits of reducing impingement. As both also note, EPA's failure to consider entrainment survival (see subsequent summary comments) and density-dependent processes also contributes to the inflation of the national benefits of the rule.

EPA Response

Regarding the age of impinged fish, please see EPA's response to Comment 316bEFR.029.105.

For EPA's conclusions about entrainment survival see Chapter A7 of the Phase II Case Study Document (DCN #6-0003) and response to Comment 316bEFR.306.506.

For a discussion of EPA's assumptions concerning density dependence see the response to Comment 316bEFR.025.015.

Comment ID 316bEFR.306.007

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Dr. Ivar Strand (Professor Emeritus, Fisheries Economics, University of Maryland – Appendix B), notes how EPA's revised economic analyses, most importantly the nonuse valuation approach, while notable for apparently abandoning the HRC approach remains technically flawed and greatly over-estimates likely benefits that could be attained. In particular, Dr Strand notes that EPA's estimates of non-use value in the North Atlantic region raise substantial concerns, the most prominent among them are:

- There is no research that addresses the non-use value inherent to fish and shellfish stocks affected by the proposed regulations. Does the non-use value change with decreases in numbers of fish and shellfish impinged and entrained? Or is it more akin to existence value, with a threshold effect? No one knows but EPA assumes that non-use value changes with decreases in numbers of fish and shellfish impinged and entrained;

- To obtain non-use values of changes in North Atlantic fish and shellfish stocks, EPA uses a willingness to pay per wetland or eelgrass acre contained in a study of eastern Long Island. In that study, the authors specifically state "we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions" (p 5,Opaluch et al. 1998);

- In responding to the valuation questions about wetlands and eelgrass acreage changes in this study, the respondents had no information regarding the effect of wetlands and eelgrass acreage on fish and shellfish populations;

- The population on which the values are derived is quite affluent and resides nearby the resource in question. This is not representative of the North Atlantic population to whom the non-use values were extrapolated. This creates an upward bias in the aggregate of non-use values;

- In transforming the questionable value per acre of wetlands and eelgrass in the North Atlantic into a value per change in fish population, EPA goes through a process that relies on numerous assumptions and judgments. These result in a fundamentally arbitrary and excessively large non-use value.

EPA Response

The comment states that no research addresses the non-use value intrinsic to affected fish and shellfish stocks; and that non-use value may change with changes in fish populations, or may have a threshold effect. For the final 316b rule analysis, EPA, recognizing the uncertainties associated with the measurement of non-use values for this rule, has not included quantitative measures of nonuse values. However, the Agency has considered several measures that indicate the potential magnitude of non-use values, including a peer-reviewed meta-analysis of non-use values, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II

Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002). The agency would like to point out that the HRC method is a useful tool in the regulatory decision making process. The Agency, while not abandoning it, is no longer using it in the national cost-benefit analysis.

The rest of the comment deals with specifics of EPA's benefit transfer approach to estimating non-use values. For EPA's responses on these topics, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services.

Comment ID 316bEFR.306.008

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

EPA's provision for restoration as a mitigation approach is reflective of the state-of science that is increasingly demonstrating that aquatic community health and fish productivity is related to habitat quality and that aquatic habitat loss and alteration is one of the major factors responsible for fish population declines. More importantly, ecosystem research is finding that habitat loss and alteration may ultimately prove to be more deleterious to stock restoration efforts than over exploitation of adults. Increasingly, resource management agencies are adopting management strategies designed to protect and restore critical aquatic habitat. Peru's research on habitat restoration and other environmental enhancements supports EPA's proposal to allow habitat restoration as an approach to mitigate for impingement and entrainment (I&E) losses. EPRI recently completed a report that provides an assessment of the state-of science on restoration and habitat enhancement strategies for mitigating the impacts of I&E. This report is included in this comment package. The report concludes that restoration science is rapidly evolving, restoration projects are increasingly demonstrating success, and, most importantly, while projects can mitigate for I&E losses, they also provide long-term ancillary environmental benefits. Unlike with CWIS fish protection hardware where population benefits are highly uncertain, fish population and other environmental benefits will result from effectively designed environmental enhancement and restoration projects. EPRI has relatively minor comments relative to EPA's refinement of the requisite information to support restoration proposal.

EPA Response

For a discussion of restoration measures, see EPA's response to comment 316bEFR.074.007.

Comment ID 316bEFR.306.009

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

At the request of EPRI, Dr. John Maulbetsch reviewed the document prepared by Synapse Energy Economics, Inc. entitled "Comments on EPA's Proposed Clean Water Act Section 316(b) regulations for Cooling Water Intake Structures at Phase II Existing Facilities" dated August 7, 2002 (EPA Docket No. W-00-32). This document was prepared by Synapse for the Riverkeeper, Inc. and submitted in response to the EPA proposed Phase II rule. Details of Dr. Maulbetsch's review can found in Appendix C; however, his findings can be summarized in the following points:

-The costs of major cooling tower retrofit projects at existing, operating power generating facilities are fundamentally site specific in nature. In the absence of detailed studies at individual sites, it is impossible to make generalized statements about the costs of retrofit with any degree of precision. EPRI studies (EPRI 2002d – Cooling System Retrofit Cost Analysis Report) have demonstrated the high degree of variability in the costs resulting from site-specific factors.

-The outage times required for units to install recirculated cooling are not trivial, and certainly could have impact on grid reliability in the case of the All Cooling Tower Option.

-In typical retrofit circumstances, the cooling tower would have to be sized for the higher flow rates associated with once-through cooling. Redesign and conversion of the cooling system to accommodate the lower flows and smaller towers of a typical recirculating system would entail extensive revisions to the plant cooling system, more extensive outages, and an overall increase in capital cost over the unoptimized system.

-EPA estimates of retrofit costs are lower than the estimates prepared by engineering firms for nearly every one of 50 site-specific studies EPRI obtained, sometimes by a factor of more than 2x.

-Locating a cooling tower in an existing site is not always easy, possible, or cheap, and can include the need for long circulating water lines, additional land purchases, etc.

-EPA was prudent in its determination that wet cooling is not a reasonable alternative for retrofit to existing facilities. In addition, I would add that the retrofit of dry cooling to existing plants would be even more problematic, increases technical complexity, costs, and efficiency penalties, and most assuredly would require extended outages.

EPA Response

The Agency responded to the referenced document (as summarized by the Riverkeeper's comments) at response to comment 316b.EFR.404.058.

The Agency responds to the individual points made the commenter in this summary comment in responses 316b.EFR.306.401 through 316b.EFR.306.406.

Comment ID 316bEFR.306.010

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01

Ecological Evaluation Methodology

EPA is inconsistent in the methods and rigor they use for scientific analysis and in dealing with uncertainties associated with those analyses. For entrainment survival, EPA set a standard of rigor that is unique from all the analyses it conducted for all other parts of the rule development. In this analysis, EPA sets a condition of certainty so high that it is virtually impossible to reach credible scientific conclusions concerning entrainment survival. EPA similarly completely ignores density dependent processes that we know with scientific certainty must exist (otherwise all populations would rapidly spiral out of control or become extinct). Both entrainment survival and density dependent responses significantly mitigate losses due to impingement and entrainment. Failure to consider them greatly inflates regional and national fish losses and the economic benefits associated with attainment of the proposed performance standards. While ignoring entrainment survival and density dependence, EPA uses a questionably appropriate single study on willingness to pay for habitat and makes a benefit transfer analysis based on that one study to estimate economic benefits for the protection of nonuse values for the entire North Atlantic Region. Inconsistent scientific standards for acceptance and rejection of scientific data are found throughout the rule documentation. As we have previously commented and as noted by Drs. Barnthouse, Van Winkle and Strand whose comments are appended, the inconsistencies are biased toward data that overly inflate fish losses, performance of technologies, and economic benefits. We recommend that EPA use a consistent set of scientific rigor with quantitative uncertainty analysis for all analyses conducted to support the proposed rule. The appendices offer some suggested improvements that could be made to more effectively deal with and
represent uncertainties.

EPA Response

The commenter argues that EPA has used "inconsistent scientific standards for acceptance and rejection of scientific data," but does not provide any examples. EPA disagrees with this characterization of its analyses. While it is true that EPA sometimes used different life history parameter values for the same species located in different regions, this was done at the recommendation of local fisheries experts to reflect regional differences and thereby improve region-specific estimates. See Chapter A7 of the Phase II Regional Report for a discussion of EPA's assumptions about entrainment survival and its response to Comment 316bEFR.025.015 for a discussion of density dependence. Please also see Chapter A6 of the Regional Analysis Document (DCN #6-0003) and EPA's response to Comment 316bEFR.041.843 regarding uncertainty in the context of its 316b analyses. Responses to Comment 316bEFR.338.046, 316bEFR.338.047, 316bEFR.206.047,and 316bEFR.307.061 discuss nonuse benefits.

Comment ID 316bEFR.306.011

Subject Matter Code 12.03.02

Entrainment survival chapter

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA's continued determination that CWIS entrainment survival is 0% (based on its additional analyses) is scientifically untenable. With 100% certainty, scientific study has documented that entrainment survival occurs and that for many species, survival can exceed 50%. Entrainment survival monitoring methods have significantly advanced since the early 1970s and results collected since the late 1970s are valid. In lieu of accepting or using fixed entrainment survival values in its analyses, EPA could employ uncertainty or sensitivity analyses that illustrate the range of reasonable regional and national fish losses and associated economic benefits based on entrainment survival ranges observed in the scientific literature.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

Comment ID 316bEFR.306.012

Subject Matter Code 1.01
Comment period

Author Name Doug Dixon & Kent Zammit
Organization EPRI

In addition to the conceptual flaws noted above and discussed herein, it has been almost impossible to verify or check the implementation of the methodology EPA employed. We found it nearly impossible in the amount of time available to track or find supporting documents in the docket, and verify calculations of impingement and entrainment losses at the plant level by species, to waterbody type and regional impingement and entrainment losses. Basically, we could not reproduce the numbers presented by EPA, as for example, in tables X-6 through X-10.

EPA Response

EPA has made every effort to provide assistance to the public to access and understand data used to support today's final rule.

Comment ID 316bEFR.306.013

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Doug Dixon & Kent Zammit
Organization EPRI

EPRI requested a review by Drs. Lawrence Barnthouse and Webb Van Winkle of the comments submitted by Pisces, Inc. (August 2002) on behalf of the Riverkeeper, Inc. in response to the EPA proposed Phase II rule. They both found numerous conceptual errors in the analyses performed and comments made that would result, if employed by EPA, in further inflating fish losses and the economic benefits of their protection. Details from Drs. Barnthouse and Van Winkle review of the Pisces Report can be found in Appendices A and D, respectively.

EPA Response

This comment does not focus on EPA's analysis, but rather on public comments submitted on EPA's analysis. No response is required.

Comment ID 316bEFR.306.014

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02

Performance standards

While we agree that high levels of fish protection can be attained for some species and life stages with many of the technologies reviewed by EPA, we continue to believe that EPA has not accurately expressed the impingement mortality and entrainment performance standards in terms that are comparable to the metrics by which performance has been historically assessed. The database of information from which EPA derives the proposed "standards" is a research database and not a database resulting from long-term compliance assessments. Field research was generally conducted under short-term optimal operational and environmental conditions. The data, therefore, does not represent long-term performance following routine operation & maintenance and exposure of the technology to the extremes of environmental conditions. Other site-specific issues, as subsequently noted, may also impair performance during certain time periods. We, therefore, recommend caution in adoption of "performance standard ranges" based on the research database. Unlike "end of pipe" technologies that are not subject to performance confounding environmental elements, "front of pipe" technologies are heavily influence by them. EPA may wish to alternatively consider performance "targets" as a fish protection objective, allowing the state resource agencies the flexibility of determining if those targets have been achieved.

EPA Response

Please see response to comment 316bEFR.074.005.

Comment ID 316bEFR.306.015

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02

Performance standards

EPA's recognition that the proposed performance standards cannot apply to "all species and all life stages" is also notable. EPA requests comments on more practical measures including the "all species" and "representative indicator species (RIS)" approaches as well as whether they should apply to numbers or biomass of organisms. All of these approaches can be fundamentally correct depending upon site-specific issues and the technology or restoration approach pursued to mitigate fish losses. The RIS approach has a long established history of use in scientific investigations relative to 316(b) and other water quality issues. We do note that EPA should consider providing flexibility in identifying the number of inclusive species that are either of concern to the resource agencies and tribes and/or comprise the majority of species impact by CWIS operations. This is an alternative to an arbitrary selection of 10 to 15 species considered by EPA. The "all species" approach may be relevant when impingement and entrainment is overwhelmingly dominated by one or a few species. Numbers of organisms will generally be the metric for measurement; however, biomass could be the relevant metric when restoration is the compliance option that is pursued. Measuring biomass may also be efficient for assessing entrainment reduction, particularly when entrainment is dominated by only a few species. Measuring biomass avoids labor intensive microscopic taxonomy and counting. We do note that EPA may wish to consider providing the option to use equivalent adult analyses, particularly for evaluating entrainment reduction performance. Essentially, it may be more cost-effective to protect late stage but entrainable juveniles that are equivalent in number to eggs or early stage larvae. Overall, because of species, technology, operational, and resource management-specific issues, allowing for maximum flexibility in selection of species and metrics for analysis may be the most defensible scientific approach.

EPA Response

Please see response to comment 316bEFR.063.005.

Comment ID 316bEFR.306.016

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02

Performance standards

EPA's recognition that technologies cannot perform as a result of major episodic events that result in natural mortality of fish and their subsequent "collection" by CWIS is noted. Inclusion of language that reflects fish that are moribund and dead on-arrival and their exclusion when measuring technology performance is technically and practically the preferred approach. EPRI recommends that EPA also consider accommodating for seasonal and episodic debris events in the impingement and entrainment "targets" that may preclude a technology's ability to provide fish protection. Such events include corn shuck loading in the central U.S., leaf and woody debris loading, heavy suspended sediment loads including extreme bed-load transport, seaweed and jellyfish loading following ocean and estuarine storm events (and non-storm events), and other site- and water body-specific seasonal and episodic biological and physical phenomena. EPA may also wish to consider precluding the application of the standards to exotic (invasive) and other nuisance species whose ecosystem removal is a preferred aquatic resource management approach.

EPA Response

EPA believes today's final rule maintains sufficient flexibility to accommodate the situations presented by the commenter. In recognition of the difficulty in establishing a uniform means of measuring compliance with these standards, today's final rule defers to the Director to determine the most appropriate means by which compliance with the rule's requirements is to be measured.

Comment ID 316bEFR.306.017

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA's incorporation of the cost-benefit test as an alternative form of the site-specific assessment process (as EPRI has noted in previous comments) is supported by the scientific database of information. Nearly 30 years of national and international research on CWIS impacts and fish protection technologies has demonstrated that impacts and technology effectiveness to address impacts where they exist (as subsequently summarized) are a site-specific issue. EPA's draft 1976 guidance reflects this knowledge. The importance of site-specificity was further articulated during presentations at the recent EPA-sponsored symposium on cooling water intake structure technologies (May 6-7, 2003 in Arlington, VA). A structured site-specific approach, using, for example, EPA's own Ecological Risk Assessment process would allow for efficient determination of impacts and installation of effective fish protection technologies where application of technologies will result in net environmental benefits.

EPA Response

Supports the rule. No response necessary.

Comment ID 316bEFR.306.018

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

Finally, though we briefed EPA in our previous comments, we have completed our own analysis and have located other supporting information on water withdrawal impacts. We believe that the public record should clearly reflect this information because it relates to the environmental benefits that may (or may not) be derived from implementation of the proposed rule. Nearly 30 years of historical data and analyses by many public and private research organizations indicate that ‘adverse environmental impact’ (AEI), as defined at the population level and attributable to CWIS is extremely limited or nonexistent. EPRI’s recently completed analyses (preliminary results were submitted to EPA in August 2002) indicate that water withdrawal impacts are insignificant relative to other environmental factors and that there is virtually no direct relationship between water withdrawal and fish population and ecosystem health. As we have previously reported, biannual EPA reports to the U.S. Congress on the state of the nation’s water quality conditions, based on information provided by the States, have never identified CWIS impacts as a water quality or resource impairment of concern. The State of Maryland has the most comprehensive power plant research program in the U.S. and they have concluded relative to CWIS impacts "…that while operations of individual power plants impact various ecosystem elements in various ways, those impacts, taken together, have had no identifiable substantive cumulative impact on Maryland's aquatic resources to date" (M-PPRP 1999 and Richkus and McLean 2000 in Dixon et al. 2000). Long-term analyses of fish populations in the Hudson River and Delaware Bay have similarly failed to detect an impact associated with long-term operation of CWIS. More recently, the Texas Commission on Environmental Quality has reported (TCEQ 2003) that examination of 30 years of CWIS data in the Houston Ship Channel found either an upward trend or no statistically significant change in total abundance, species richness, and diversity for over 100 taxonomic fish groups examined. Only one species of fish demonstrated a downward trend. Finally, the Hudson Riverkeeper organization frequently states “…CWIS have contributed to the decline of recreational and commercial fisheries” – no refereed scientific documentation is provided to support such a conclusion and EPRI is not aware of any such evidence. This extensive data base suggests that aquatic community and population health is not measurably affected by CWIS operations and that implementation of fish protection technologies, except for restoration approaches, to achieve the EPA required performance standards may not have measurable benefits that will accrue at multiple ecological scales including population, community, or ecosystem levels.

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion on the environmental impacts associated with cooling water intake structures. The reports identified by the commenter, which are submitted by States under section 305(b) of the Clean Water Act, tend to focus on water quality problems associated with the presence of pollutants. Indeed, this is to be expected in view of the reference in section 305(b)(1)(A) to the water quality criteria guidance published by EPA under section 304 of the Clean Water Act concerning the presence of pollutants and the reference to pollutants throughout section 305(b). Moreover, section 305(b) does not require States to identify the source or cause of the water quality concern. Therefore, the fact that cooling water intake structures are not identified in these section 305(b) reports is not a basis for declining to regulate them.

Comment ID 316bEFR.306.019

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 6.01
Overview of I & E effects on organisms

Water Withdrawal Impact Information

EPRI funded the Oak Ridge National Laboratory to investigate the relationship between water withdrawal (e.g., cooling, irrigation, public supply, hydropower), including cumulative impacts, and the health of fish populations and communities in the water body from which it is withdrawn. Preliminary results were presented in our comments on the EPA proposed draft rule (August 2002). This effort is now complete and the final report (EPRI 2003a) is included in this comment package. Results of the analyses support the non-flow reduction alternative and further demonstrate the site-specificity of impacts.

The study tested the hypothesis of a dose-response model relating volume of water withdrawn (as the “dose”) to the status of fish populations (the “response”). A corollary question is whether there is some lower threshold of water intake volume in relation to water body volume below which the numbers of fish involved are inconsequential for survival of fish populations (consistent with a threshold dose-response model). We analyzed many types of withdrawals from water storage reservoirs as well as CWIS in order to have a wider range of withdrawal volumes for identifying a possible dose response pattern (note: the aquatic environment does not discern between withdrawal use patterns).

The ORNL project team approached the analyses in six parts: (1) provision of background information on CWIS and discussions of a dose-response model approach, a hierarchical framework to view potential biological impacts, and the definition of adverse environmental impacts; (2) characterization of the withdrawal of surface waters throughout the United States from perspectives of geographic distribution and use type; (3) original data analyses to determine if there is a relationship between the amount of water withdrawn from reservoir systems (via normal reservoir discharge and/or CWIS withdrawal) and various measures of a fish population or community health; (4) analysis of the potential impacts of low-volume water withdrawal; (5) summarization of previous studies that provide insight into the relationship between intake volume and population level effects; and (6) summarization of the importance of other factors that contribute to the risk of environmental impact of CWIS, such as location of intake, temporal effects, species characteristics, water body type, and cumulative effects of other sources of mortality.

The analyses and reviews did not find a dose-response relationship between volume of water withdrawn and status of fish populations. Evidence from multiple sources does not support that the dose-response model is anything other than a horizontal line, with a slope of zero (no response), and high variability. Additional findings include the following:

- Except for some specific regions (power plants on the Great Lakes and Northeast U.S.), no national relationship was found between the numbers of organisms entrained and the volume of water withdrawn. Even when a relationship was found, correlations were very weak. High variability was common in all analyses
performed.

- A summary of Russian reservoir research indicated that the ecological zone from which water is withdrawn was the major factor in determining species and numbers of fish entrained.

- Analysis of Texas and Tennessee Valley Authority reservoirs showed no consistent relationship between intake rate and fish population response at reservoir withdrawal rates of 1 to 5,200 MGD.

- The proportion of the source water that is withdrawn in a given length of time appears to affect fish populations more directly than the absolute volume withdrawn.

- Where long time series of data on the factors affecting fish productivity, along with data on fish population dynamics, are available, e.g., the 20-year National Reservoir Research Program, volumetric flow relationships have not ranked high for determining fish productivity. Other factors are more influential in determining effects on fish communities and populations, such as total dissolved solids, reservoir morphology, weather anomalies, the ecological zone from which water is withdrawn, seasonal reservoir drawdown, seasonal timing of water withdrawals, and life strategies of affected species.

- Cooling ponds and reservoirs with high water turnover rates often have highly productive fish populations.

Site-specific analyses, undertaken with knowledge of the potential effects of water withdrawal, remain essential for predicting or monitoring fish population effects of water intakes. Site-specific details of the environment and specific fish populations appear to predominate over a simple dose-response model in determining whether populations are affected by specific water withdrawal rates.

EPA Response

Please see response to Comment 316bEFR.041.037.

Comment ID 316bEFR.306.020

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

In addition to the information contained in the EPRI study, the Texas Commission on Environmental Quality (TCEQ) recently completed and reported on the results of a 30- year (1972-2001) study that evaluated the nekton collected from the cooling water intake traveling screens at two facilities located on the Houston Ship Channel (HSC) (TCEQ 2003). The objectives of this report were to (1) evaluate nekton community structure in the HSC, and identify the most common and abundant species; (2) evaluate potential long-term trends with the nekton community and with individual species; (3) evaluate the relationship between the nekton and abiotic factors; and (4) determine the degree of impact cooling water intake systems have on nekton populations. The two facilities examined included Houston Lighting and Power Deepwater Plant (HL&P) and the downstream Oxyvinyls-Houston Operations (Oxyvinyls). Key findings included the following:

- Species richness, diversity, and CPUE for most species were higher at Oxyvinyls compared to HL&P indicating better overall conditions for nekton closer to the open bay.

- At HL&P, statistical analysis revealed an upward trend in total abundance (CPUE), species richness, and diversity over the 30 years. This upward trend in abundance included brown shrimp, white shrimp, and blue crabs (some of the most frequently impinged species at the plant). No species at HL&P demonstrated a statistically significant decline over the 30 years.

- At Oxyvinyls, an upward trend was observed with diversity, while species richness and total abundance (CPUE) showed no statistically significant changes over the 30 years. Abundance of bay anchovy, brown shrimp and blue crab (also some of the most frequently impinged species at this plant) demonstrated an upward trend, while black drum demonstrated a downward trend.

- Biomass collection estimates for the two facilities for white shrimp, brown shrimp, blue crab, and four commercial fish species were estimated to be less than one percent of the average commercial/recreational landings in the Galveston Bay system. The annual biomass estimate for Atlantic croaker collected at Oxyvinyls, however, caused concern. The degree of impact to the total bay population, however, is difficult to assess due to unknown standing crops.

- The upward trends in abundance of aquatic organisms at both stations are presumably due to major improvements in dissolved oxygen levels in the HSC.

Results of these analyses are consistent with the long-term findings of estuarine CWIS impact assessment in the Chesapeake Bay (Richkus and McLean 2000; McLean et al. 2003), Hudson River (Barnthouse 2000), Connecticut River (EPRI 2001 Connecticut River Ecological Study Re-Visited) and Delaware Bay (Barnthouse et al. 2003). Furthermore, much as occurred in the Hudson River where a ten-fold increase in striped bass stocks occurred following a fishing moratorium, the increase in abundance of most species in the HSC indicates that CWIS operation does not retard aquatic community recovery when other major stresses are reduced or eliminated, and, therefore, the CWIS operations alone do not cause significant impacts.

EPA Response

Please see the response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts associated with cooling water intake structures. EPA agrees with this commenter that many environmental and anthropogenic factors work concurrently on the environment. It is difficult to separate out the effects of any one factor in particular on fish populations.

Comment ID 316bEFR.306.021

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Restoration/Enhancement as a I&E Mitigation Approach

Research is increasingly demonstrating that aquatic community health and fish productivity is related to habitat quality and that aquatic habitat loss and alteration is one of the major factors responsible for fish population declines. As Langton et al. (1996) note, habitat loss and alteration may ultimately prove to be more deleterious to stock restoration efforts than over exploitation of adults. Increasingly, resource management agencies are adopting management strategies designed to protect and restore critical aquatic habitat (Langton et al. 1996; Minns 1997; Fluharty 2000; Saunders et al. 2002). Based on our reviews, EPRI believes that the existing and rapidly growing body of scientific evidence strongly supports EPA’s proposal to allow restoration as an approach to mitigate for I&E losses.

EPA Response

For a discussion of restoration measures, see EPA's response to comment 316bEFR.074.007.

Comment ID 316bEFR.306.022

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

EPRI has initiated research on the state-of-science and feasibility of using restoration or environmental enhancement as an approach for mitigating CWIS impacts. Research is being performed for EPRI by Argonne National Laboratory. We have now completed our final report Enhancement Strategies for Mitigating Potential Operational Impacts of Cooling Water Intake Structures (EPRI 2003b) and copies have been electronically filed to the Public Docket. This report describes environmental enhancement or restoration approaches that may be applicable for mitigating impingement and entrainment impacts associated with CWISs. These approaches are described with respect to their underlying objectives, implementation and operational requirements, costs, current use by government and the private sector, and advantages and limitations for potentially mitigating CWIS operational impacts.

Environmental enhancement and trading strategies were evaluated against a variety of technical, ecological, regulatory, and operational parameters, including technological status, potential relationship to CWIS impacts, and the current level-of-use and state-of the- science. A variety of sources were used to collect information for evaluation in this report, including scientific journals; technical publications; conference and workshop proceedings; government, non-governmental organizations (NGO), and private sector publications and websites; and personal communications with technical and regulatory experts. The project team did not comparatively evaluate the various enhancement and trading approaches, but rather addressed each on its own merits.

Enhancement approaches fell into two general categories: 1) those that directly address fish numbers; and 2) those that address habitat. Stocking addresses fish numbers, and may mitigate CWIS impacts by replacing fish directly affected by impingement or entrainment. Habitat enhancement approaches may mitigate impacts by providing more or better quality habitat to support fish reproduction, growth and survival. These approaches include restoration of fish passage, creation or restoration of wetlands and submerged aquatic vegetation beds, creation of artificial habitats such as reefs, and improving water quality parameters that limit community and ecosystem productivity. These enhancement approaches are widely used by a variety of government agencies and NGOs to successfully manage, restore, and/or protect fisheries resources in marine and freshwater environments. Trading approaches could include: 1) fish-for-fish trading that allows a cooling water user that provides greater CWIS impact reductions than required by its permit to trade those excess reductions to a second cooling water user; and 2) pollutants-for-fish trading that allows a cooling water user to have relaxed CWIS impact limits in its permit in exchange for reducing the load of key pollutants. Each enhancement and trading approach has its own set of design, implementation, operation, and cost requirements and constraints, as well as unique regulatory implications. These factors are discussed in detail in the EPRI report.

EPA Response

For a discussion of restoration measures, see EPA's response to comment 316bEFR.074.020.

Comment ID 316bEFR.306.023

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Cost of Retrofitting Cooling Towers

At the request of EPRI, Dr. John Maulbetsch reviewed the document prepared by Synapse Energy Economics, Inc. entitled “Comments on EPA’s Proposed Clean Water Act Section 316(b) regulations for Cooling Water Intake Structures at Phase II Existing Facilities” dated August 7, 2002 (EPA Docket No. W-00-32). This document was prepared by Synapse for the Riverkeeper, Inc. and submitted in response to the EPA proposed Phase II rule. Dr. Maulbetsch’s comments have been previously summarized at the beginning of this comment document; details of his review can found in Appendix C. Comments prepared by Dr. Maulbetsch supplement technical information previously submitted to EPA in the EPRI Report Cooling System Retrofit Cost Analysis (EPRI 2002d).

EPA Response

See response to comment 316b.EFR.306.009.

Comment ID 316bEFR.306.024

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Drastic reductions in I&E (~95%) – This statement makes the assumption that impingement and entrainment mortality are directly proportional to flow, which is incorrect. EPRI has submitted to EPA a report that examined the potential correlation of impingement to velocity. The extensive analysis of all available data sets showed a very poor correlation. It would therefore be incorrect to assume that a 95% reduction in flow would result in a 95% reduction in impingement. A second EPRI study (EPRI 2003a) found that, except for some specific regions (power plants on the Great Lakes and Northeast U.S.), no national relationship was found between the numbers of organisms entrained and the volume of water withdrawn. Even where relationships were identified, those relationships were generally weak (low R2) and often driven by a few outliers which that when deleted negated any relationships found. High variability was common in all analyses performed. In addition, this statement does not take into account the entrainment and impingement survival that has been documented at many stations and by EPRI. Flow reductions can also impact entrainment mortality. Mortality can be increased with reduced flows if the peak temperature rises. In addition, flow reduction through the use of recirculated cooling would result in 100% mortality of the entrained organisms (although the number entrained would be significantly lower). Rough estimates show that if you have an entrainment survival of 50-70% (common for many species) and salinity that requires 1-3 cycles of concentration, total entrainment mortality between once-through and recirculated cooling would be essentially equal.

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption made for EPA's analysis that I&E is proportional to flow.

Please see Chapter A7 of the Regional Analysis Document (DNC #)and response to Comment 316bEFR.306.506 for a discussion of EPA's conclusions regarding entrainment survival.

Comment ID 316bEFR.306.025

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Reduction of flow would allow the source to be switched to municipal water supply or effluent – EPRI assumes that this statement would apply in cases where a once-through system is retrofitted with a recirculated wet system. In such a case, it may be technically possible to switch to municipal water, but it may not be feasible, practical or environmentally beneficial. For example, the municipality that would serve the plant may not have capacity in their distribution system to meet this increased demand. Such a demand may further tax a subsurface aquifer at a time when population growth, water quality degradation and drought are over-taxing such sources. And finally, if that municipality withdraws water from the same surface source, the reduction in withdrawal is negated, and any impacts would be simply shifted to a different intake. Of course, if they switch to reclaimed water, the withdrawal impact would be zero.

EPA Response

This comment does not address the Phase II rule, but rather a presentation by an organization other than EPA. Nevertheless, the comment does generally acknowledge that entrainment and impingement can be reduced through flow reduction, a concept that is incorporated into parts of the final rule. Although EPA does not necessarily agree with all of the commenter's points addressing the potential use of effluent or public water system water for cooling, in developing the rule EPA has considered these possibilities (see, 67 FR 17129; April 9, 2002) and the final rule includes certain provisions that clarify such use. (See, 40 CFR 125.91(c) and (d)).

Comment ID 316bEFR.306.026

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 3.01

Definition: Existing Facility

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Repowering (add combustion turbine) (33%) – While EPRI does not believe that repowering can be considered a CWIS technology, we do believe that repowering can provide benefits in fish protection. Most repowering projects derive about 2/3 of the capacity from the combustion turbines and approximately 1/3 from the heat recovery steam generator/steam cycle. The latter cycle would still require cooling water, and in the case of using once-through cooling, could theoretically offer a 66% savings in cooling water use under the same operating conditions. However, the station could also be repowered to deliver approximately three times the original capacity if the original water flows are retained. All of the environmental benefits and impacts have to be considered in such a decision. For example, a station could be repowered with no net increase in capacity. In such a case, the station could potentially reduce cooling water flow by 66%. But data may show that overall aquatic impacts would be lower by maintaining a higher flow rate (could still be lower than original design) that enhances entrainment survival and minimizes impacts of the thermal plume by reducing the discharge temperatures.

EPA Response

This comment does not address the Phase II rule, but rather a presentation by an organization other than EPA. Nevertheless, the comment does generally acknowledge that entrainment and impingement can be reduced through flow reduction, a concept that is incorporated into parts of the final rule. Although EPA does not necessarily agree with all of the commenter's point addressing repowering, EPA recognizes that repowering using combined-cycle processes may offer the opportunity for some facilities to either lower their cooling water needs or increase their power output while maintaining their existing cooling water flow. However, existing facilities that repower can just as easily use such technology to increase both their output and cooling water flow.

Comment ID 316bEFR.306.027

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

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While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Issues in Flow Reduction – These issues were addressed in detail in an EPRI report submitted to EPA (Cooling System Retrofit Cost Analysis) (EPRI 2002d).

EPA Response

Please see response to Comment 316bEFR041.037 regarding the assumption used for EPA's benefits analysis that I&E are proportional to flow.

Comment ID 316bEFR.306.028

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.01

Overview of I & E effects on organisms

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Flow/Impingement Relationships – It is possible to plot a curve through any available dataset (including randomly generated numbers) and derive a mathematical expression, but the equation for that curve cannot be used to predict further data points without some indication of the accuracy of the curve-fit. There is no indication of the R2 value for any of the equations presented, and until that is demonstrated, and the developer can show the data set was large enough to provide an accurate prediction, and can demonstrate the sensitivity of the predictions to factors such as water type, species entrained or impinged, size relationships, etc., these formulas cannot be considered as accurate predictive tools. Extensive EPRI work on this subject has failed to identify a close correlation between E/I and any other factor recorded in the performance of available studies. These formulas would also imply that E/I is uniform throughout the flow withdrawal, with no correlation to events commonly documented (increased entrainment counts during spawning seasons, impingement events related to natural causes, etc.) EPRI has also demonstrated that the flow of water out of a system does not correlate to an impact to that system and it's populations, even in the case of quantified entrainment and impingement losses (EPRI 2001, 2003a).

EPA Response

Please see response to comment 316bEFR.041.037 regarding the assumption used for EPA's analysis that impingement and entrainment are proportional to flow. Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define adverse environmental impact in today's final rule.

Comment ID 316bEFR.306.029

Subject Matter Code 6.01

Overview of I & E effects on organisms

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Cooling Systems, Flow and E+I – This chart oversimplifies the impact reduction achievable by ignoring entrainment and impingement survival and assuming impingement and entrainment reductions are directly correlated to flow. This graph does demonstrate that if wet towers are considered for a particular site, the huge cost of going further to dry or wet/dry cooling does not result in significant additional reduction in impingement or entrainment.

EPA Response

Please see EPA's response to Comment 316bEFR.041.037 regarding the assumption used for EPA's analysis that I&E are proportional to flow.

EPA notes that cooling towers are not required by today's final rule.

Comment ID 316bEFR.306.030

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Flow Reduction at New Plant (Athens data) – These costs are projected capital costs, only, and do not include the operating costs and efficiency penalties associated with both systems.

EPA Response

EPA notes the comment. The comment is a counter argument to points made by Riverkeeper in a presentation at the technology conference. The Agency responds to the comments from the Riverkeeper relating to the 316(b) proposal, NODA, and technology conference in other comment responses.

Comment ID 316bEFR.306.031

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Flow Reduction at Replacement Plant (Morro Bay) – While Riverkeeper's characterization of these data would lead one to believe that the incremental cost for adopting dry cooling is low, the fact remains that the estimates for Morro Bay show a $52M differential in capital cost and a 1.5% energy penalty. The slide also gives the impression that this is somehow the cost differential for a 1000MW gas-fired plant with a 1954 vintage heat rate. It was, of course, for a 1,200MW combined cycle plant, of which only 400 MW was generated with steam with cooling water requirements. In today's competitive power pool, the addition of $52M in capital costs is significant enough to potentially eliminate the profitability of many of these projects. As an example, many of the recent CA power projects have been delayed or cancelled due to the current power market conditions, with many of those facilities not having the additional expense of dry cooling mandates. Duke Energy stated publicly on more than one occasion that a requirement to install ACCs at Morro Bay would cause them to have to abandon the project. The quoted energy penalty of 1.5% also appears to be low, and may refer only to the increased backpressure on the steam turbine or the parasitic load of pumps and fans, but does not appear to include both. Morro Bay is also located in a very moderate climate, where temperatures are normally low due to the effects of the Pacific Ocean and meteorological conditions. These moderate temperatures greatly reduce the expected heat rate penalties from dry cooling, and cannot be translated to the typical conditions expected throughout most of the country, where penalties could be much greater during seasons when temperatures are higher.

EPA Response

The Agency agrees with the commenter's counter arguments regarding Riverkeeper's technology conference discussion of the Morro Bay replacement plant. The Agency reiterates the point made by the commenter about the energy penalty estimates of dry cooling being potentially much higher than 1.5 percent, as stated by Riverkeeper. The Agency refers to the energy penalty study it conducted for the New Facility 316(b) rule (as outlined in the EPA-821-R-01-036), which found that energy penalties for new facility dry cooling plants can significantly exceed 1.5 percent. The Agency also references the independent energy penalty study conducted by the Department of Energy on cooling tower retrofit projects, as presented in comments 316b.EFR.010.101 through 316b.EFR.010.103. The

Agency responds to the comments from the Riverkeeper relating to the 316(b) proposal, NODA, and technology conference in other comment responses.

Comment ID 316bEFR.306.032

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Comments on Riverkeeper's Presentations at the EPA CWIS Technology Conference: May 6-7, 2003, Arlington, VA

EPRI submits the following comments on the presentation by Reed Super, Riverkeeper, Inc. at EPA Cooling Water Intake Symposium, May 6-7, 2003, entitled "An Overview of Flow Reduction Technologies" and 'Retrofit of Closed-Cycle Cooling Towers"

While these presentations do highlight the fact that entrainment, and to a much lesser extent, impingement can often be reduced by flow reduction, several of the points made in the presentations (and likely in the papers to be submitted) were over-simplification or overstatement of the potential for reduced impacts and in some cases miss-represented scientific information. Specific comments are:

- Decline in winter flounder associated with operation of Brayton Point – A graph was presented that implied an association between start-up operation of the Brayton Point Power Station and a tremendous decline in abundance of winter flounder in Mount Hope Bay from which cooling water is derived. Mount Hope Bay has experienced an 87% decline during the mid to late 1980's in winter flounder. However, this same decline also occurred in nearby Narragansett Bay, which is not affected by Station operations. In fact, the winter flounder decline is a coast wide phenomenon generally believed to be due to over exploitation that began about the same time Brayton Point operations were initiated. Changes in North Atlantic climatic factors are also believed to have contributed to the coast wide decline.

EPA Response

EPA agrees that many factors can effect populations concurrently. It is difficult to separate the affects of any one factor. The data that EPA have received indicate that while both Mount Hope Bay and Narragansett Bay have shown a downward trend of finfish abundance, significantly greater declines have occurred in Mount Hope Bay where the Brayton Point Station operates and correspond in time with a 45 percent increase in cooling water withdrawal from the bay due to the modification of Unit 4 from a closed-cycle recirculating system to a once-through cooling water system and a similar increase in the facility's thermal discharge (please see section IV of the preamble for more detail).

Comment ID 316bEFR.306.033

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Comments on the Pisces Report Submitted on Behalf of the Riverkeeper, Inc. in Response to the Proposed EPA Phase II Rule <FN 1>

EPRI requested a review of this report by Drs. Lawrence Barnthouse and Webb Van Winkle. Their detailed comments can be found in Appendices A and D, respectively. In reviewing Pisces' comments, they both identified several significant errors and misinterpretations, and they found that most of Pisces' major conclusions are incorrect. The following are summary points from their review:

- In its analysis of entrainment and impingement loss rates, Pisces used an inapplicable data set and misinterpreted cooling water withdrawal data for the Salem Generating Station. There is no evidence that EPA had underestimated these losses as commented by Pisces.

Footnotes

1 Henderson, P. A., R. M. H. Seaby, and J. R. Somes. 2002. EPA Phase II Existing 316(b) Report. Pisces Conservation Ltd., Lymington, England. August 6, 2002. Prepared for the Riverkeeper, Inc. and submitted as comments on the proposed EPA Phase II rule.

EPA Response

The comment addressed here critiques another commenter's comments. The comment does not provide any details that would allow EPA to respond.

Comment ID 316bEFR.306.034

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 10.01.02.01
EPA methods: age 1 equiv, yield, prod foregone

Comments on the Pisces Report Submitted on Behalf of the Riverkeeper, Inc. in Response to the Proposed EPA Phase II Rule 1

EPRI requested a review of this report by Drs. Lawrence Barnthouse and Webb Van Winkle. Their detailed comments can be found in Appendices A and D, respectively. In reviewing Pisces' comments, they both identified several significant errors and misinterpretations, and they found that most of Pisces' major conclusions are incorrect. The following are summary points from their review:

- Pisces' assertion concerning the impact of impinging fish older than one year-of-age is partially correct. However, the conclusion that impingement loss rates, when expressed as age-1 equivalent losses, are nearly as large as entrainment loss rates is based on invalid reasoning and is incorrect. Essentially, Pisces used incorrect natural mortality rates and incorrectly assumed that scaling older fish backwards to age 1 is equivalent to scaling younger fish forward to age 1. This latter assumption is incorrect because no foregone yield or reproduction would accrue due to the deaths of these older fish.

EPA Response

EPA agrees with the commenter.

Comment ID 316bEFR.306.035

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Comments on the Pisces Report Submitted on Behalf of the Riverkeeper, Inc. in Response to the Proposed EPA Phase II Rule 1

EPRI requested a review of this report by Drs. Lawrence Barnthouse and Webb Van Winkle. Their detailed comments can be found in Appendices A and D, respectively. In reviewing Pisces' comments, they both identified several significant errors and misinterpretations, and they found that most of Pisces' major conclusions are incorrect. The following are summary points from their review:

- Pisces' analysis of variability and bias in estimates of natural survival rates for early life stages of fish is invalid and the conclusion that survival rates for all species should be increased by 25% is incorrect. Analysis of EPA survival data indicates that they are consistent with literature values and, unlike Pisces assertions, EPA survivorship data does not include the effects of power stations and, therefore, they (survivorship) are not biased high. Further Pisces assertion that conditional mortality rates are typically in the 10% -25% range is not true. These rates have only been observed at a few sites (Hudson River and Delaware Bay) and for only the most susceptible species at those sites. Values this high are definitely not representative of all sites or species nationwide.

EPA Response

EPA agrees with the commenters that there is no justification for increasing EPA's loss estimates by 25%. However, EPA disagrees with the commenters' assertions about conditional mortality rates. It is correct that conditional mortality rates are between 10-25% at facilities were such calculations have been made. However, because few facilities have calculated conditional mortality rates, it is not known what such rates are nationwide.

Comment ID 316bEFR.306.036

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Comments on the Pisces Report Submitted on Behalf of the Riverkeeper, Inc. in Response to the Proposed EPA Phase II Rule 1

EPRI requested a review of this report by Drs. Lawrence Barnthouse and Webb Van Winkle. Their detailed comments can be found in Appendices A and D, respectively. In reviewing Pisces' comments, they both identified several significant errors and misinterpretations, and they found that most of Pisces' major conclusions are incorrect. The following are summary points from their review:

- Pisces' "reproductive value" approach to estimating the economic value of fish that die of natural causes ignores density-dependence and would be expected to greatly overstate the actual economic value of unharvested fish. Essentially, Pisces assumption that recruitment is directly proportional to egg production is fundamentally incorrect and leads to excessive overestimates of economic value.

EPA Response

Regarding reproductive value, please see EPA's response to comment 316bEFR.206.065.

Comment ID 316bEFR.306.037

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Comments on the Pisces Report Submitted on Behalf of the Riverkeeper, Inc. in Response to the Proposed EPA Phase II Rule1

EPRI requested a review of this report by Drs. Lawrence Barnthouse and Webb Van Winkle. Their detailed comments can be found in Appendices A and D, respectively. In reviewing Pisces' comments, they both identified several significant errors and misinterpretations, and they found that most of Pisces' major conclusions are incorrect. The following are summary points from their review:

- Pisces' critique of habitat restoration and replacement projects is one-sided and substantially understates the potential environmental benefits of these projects. While it is true that habitat restoration or replacement projects cannot possibly be designed to provide specific numbers of specific fish species. Even the most aggressive proponents of habitat restoration make no such claims. Successful restoration projects can, however, enhance the productivity and diversity of entire ecosystems.

EPA Response

EPA acknowledges that there are uncertainties with the assessment, design, performance, and implementation of restoration projects. For a discussion of the uncertainties associated with restoration, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.306.038

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

IV. Engineering Cost Analysis – Technology Cost Modules and Facility-Level Costing Options

The following comments are submitted by EPRI as supported expert consultants from Alden Research Laboratory, Inc (Alden).

General Comments on Costs

- In general, the costs associated with fish protection technologies, as presented in the NODA, are more accurate than those presented at proposal. In addition, the revised NODA costs reflect EPA's increased appreciation for the cost variation associated with site-specific conditions. A comparison of the revised EPA costs and those from site-specific data developed by Alden indicate that the ranges in costs often overlap. However, site-specific costs generally have a substantially higher upper limit (Table 1). EPA costs are driven entirely by flow rate. Therefore, for any given technology, the lowest flow facility will always have the lowest EPA estimated cost. Likewise, for any given technology the highest flow facility will always have the highest cost. In addition, since EPA costs are algorithmic, a hypothetical cost can be generated for any flow rate. Historic costs, by contrast, are influenced by flow, but are also driven by site-specific factors that are not flow related (e.g., available space, species to be protected, degree of fouling, etc.) Therefore, the historic low and high costs may or may not be associated with the lowest and highest flow rates. Since historic data is derived from existing designs and installations, costs can not be generated for any flow rate. To make a meaningful comparison between the ranges of EPA costs and ranges of historic costs for each technology, Alden took the lowest and highest cost installations in the historic database, determined the flow rate for those facilities, and 22 used those flow rates to compute an equivalent EPA cost (using the algorithms provided in the NODA). These comparisons are presented in Table 1.

Table 1.- A comparison of site-specific costs developed from historical data and costs developed by EPA in the NODA.

[Please see hardcopy page 22 for table]

EPA Response

EPA notes that the following statements by the commenter in characterizing the costs developed by the Agency are incorrect: "EPA costs are driven entirely by flow rate. Therefore, for any given technology, the lowest flow facility will always have the lowest EPA estimated cost. Likewise, for any given technology the highest flow facility will always have the highest cost." The fact is that although the capital costs developed by EPA are driven primarily by the flow rate, a variety of site-specific or technology related costs drive the capital, operation and maintenance, permitting, pilot study, monitoring, and connection outage costs. Similarly, the commenter is incorrect in concluding that site-specific factors do not play a significant part in EPA's cost estimates. The Agency's development of technology costs incorporated available space as a factor in the determination of which technologies would be candidates at certain facilities. The Agency incorporated potential for bio-fouling in specific technology module costs. In addition, the Agency addressed the type of water (saline vs. fresh), the navigability of the waterway, the degree of debris loading at the intake, the distance of a potential relocation of an intake, the velocity of the existing intake and potential need for building a larger structure to reduce velocity to account for sensitive species survival, the distance needed for proper fish return systems, the type of plant (i.e., nuclear vs. non-nuclear) and other site-specific factors. The end result is that EPA's costs as applied through its site-tailored application methodology vary between facilities based on a variety of factors, including flow. The commenter's elementary summary of EPA's cost methodology is incorrect and misrepresents the national costs of the final rule.

One very significant item the Agency includes in its cost estimates is largely unrelated to flow: facility downtimes due to construction. These downtime costs can be a sizeable driver of the overall annualized costs of retrofitting some of the technologies forming the basis of the final rule and are relatively unrelated to the flow rate of an intake. This is an important point to consider in the context of the commenter's review of and comparison to the Agency's costs: the commenter failed to account for the total costs EPA considered in its analysis by ignoring the downtime (and other substantial) costs and therefore, the conclusions of the commenter relating to the costs developed by the Agency for the NODA preferred option and, hence, the final rule are not based on definitive comparisons of the sum total of the EPA costs considered. In addition, the commenter also did not incorporate into its determination of what it deemed "EPA costs" those costs for pilot studies, demonstration studies, recurring monitoring and reporting, and initial permitting costs for which the Agency provided information in the NODA. Because the commenter did not provide itemized costs for its data set of costs against which it compared EPA's, it is not possible to ascertain whether or not these pilot, demonstration, and permitting costs were aggregated in the commenter's data set and this further brings into question the comparisons made by the commenter and the conclusions reached.

Comment ID 316bEFR.306.039

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

The logic underlying the application of the cost modules also shows EPA's increased awareness of site-specific issues that influence the practicability of retrofitting certain fish protection technologies. However, EPA largely ignored species and life stage considerations relative to the efficacy of technologies and their associated costs. For example, costs associated with a wedge wire screen will be greater if particularly small slot sizes (e.g., 0.5 versus 1.0 mm or larger) are necessary to protect the species and life stages at a given site. In addition, the presence of fragile species in large numbers at a given site may preclude the use of technologies that physically handle fish (e.g., modified screens). By contrast, the composition of species and life stages in the vicinity of a CWIS may warrant the use of less protective technologies (e.g., wedge wire screens with larger slot sizes) than those selected by EPA.

EPA Response

The Agency notes the comment and has incorporated the suggestion of utilizing small and large slot sizes for fine-mesh wedgewire screens (see response to comment 316b.EFR.306.046). The Agency concedes that it did not have sufficient information to make extremely rigorous site-specific determinations for the vast number of facilities in-scope of the final rule as to the specific species and life stages that are present at all these facilities. The Agency also contends that acquisition of this information is not practical or feasible for a project the size of this final rule. As such, the Agency approached the costing effort and application of cost modules in a manner that would be applicable for a wide variety of typical cases. The general approach of the Agency was to approach the application of technology modules conservatively so as to apply the best performing technologies in cases where uncertainty about life stages and species exist. Therefore, in the example case given by the commenter of wedgewire with larger slot sizes than those selected by EPA the net effect would be for the Agency to have conservatively estimated costs for this particular example case. For the case that the presence of fragile species in large numbers at a given site may preclude the use of technologies that physically handle fish, such as modified screens, the Agency notes that its analysis would not be able to identify all of these situations due to the fact that no national data set exists upon which to base the determinations. Therefore, in order to account for these cases the Agency applied a variety of modules that do not physically handle fish to a variety of cases, thereby incorporating into the national cost estimates the expected variation between sites experiencing this phenomenon. The Agency refers to the Technical Development Document for further analysis of the variety and methodology for selecting and assigning technology modules for the final rule cost analysis.

Comment ID 316bEFR.306.040

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

EPA guidance on the use of the cost modules is required. Use of the spreadsheets provided in the NODA is not clear. The cost modules could be used to compare site-specific costs to EPA's costs during a cost-cost test. The cost modules should not be used to determine the appropriate technology alternative for a given facility. Selection of an appropriate alternative or a suite of alternatives is a site-specific process as discussed in detail in EPRI's 2000 guidance document (Procedural Guideline for Evaluating Alternative Fish Protection Technologies to meet § 316(b) Requirements of the Clean Water Act) (EPRI 2000a) which has been previously submitted to EPA.

EPA Response

The Agency agrees that a site-specific process is necessary to determine the appropriate compliance method for a plant. Hence, the Agency has included in the final rule costs for conducting comprehensive demonstration studies and pilot studies for complying facilities.

The Agency notes that it provided specific guidance to the commenter (i.e., employees of Alden Labs) as follow-up on the use of the documentation in the NODA for the technology cost modules. For the final rule, the Agency has provided a more "user-friendly" tool for executing the technology costing modules. As such, the requests of the commenter have been met.

Comment ID 316bEFR.306.041

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.05

Intake structure technology costs (e.g., screens, etc)

A 6-month compliance schedule is not a realistic time frame for the design and installation of even the simplest impingement reduction technology. Retrofitting traveling screens with fish removal features or fish return systems would require more than 6 months. Efforts would include detailed design, preparation of construction and fabrication drawings and specifications, procurement and fabrication of components, and complete installation. At least one year would be required to complete even simple modifications.

EPA Response

See the preamble to the final rule for a discussion of the time frames for submitting the studies required by the rule and of the ways that compliance with the rule can be demonstrated.

Comment ID 316bEFR.306.042

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Specific Comments on Cost Modules

EPA uses the 1.0 ft/s velocity as a criterion for the application of modules. Expanded intakes (module 3), wedge wire screens (on shore or offshore; module 4 and module 7, respectively) and dual flow screens (module 11) were generally applied when intake velocities were above “roughly” 1 ft/s. The costs included in modules for these technologies include the cost associated with lowering intake velocity (i.e., increasing the number of screens). Adding fish handling systems (coarse or fine mesh; module 1 and module 2, respectively), were applied when intake velocity was “roughly” 1 ft/s or below. The off shore options (modules 8 and 9) and barrier nets (module 5) had no velocity criterion. We assume that this is a through-screen velocity. In our opinion, there is no evidence to suggest that many of technologies cannot be operated effectively at velocities above 1.0 ft/s (in fact, the EPRI-Alden developed Modular Inclined Screen (MIS) works effectively up to approach velocities of 3.0 ft/s and higher) (EPRI 1996). Using the velocity criterion in the application of the modules will lead to the application of more costly velocity reducing technologies in cases where less expensive and equally effective technologies may be available. Using a conservative velocity criterion of 1 ft/s will overestimate the number of facilities installing velocity-reducing technologies and underestimate the costs of implementing the Rule on a national level.

EPA Response

The commenter is incorrect in the following statement: ” Using a conservative velocity criterion of 1 ft/s will overestimate the number of facilities installing velocity-reducing technologies and underestimate the costs of implementing the Rule on a national level.”

In fact, this statement contradicts the commenter's previous sentence in which it states, “Using the velocity criterion in the application of the modules will lead to the application of more costly velocity reducing technologies in cases where less expensive and equally effective technologies may be available.”

By using a criterion of 1 ft/sec, above which generally more expensive technologies would be implemented, the costs of the national rule would be greater than in a case, such as that suggested by the commenter, that a higher velocity criterion would be used. The commenter's assertion in the final sentence of the comment – that national costs may be underestimated due to the Agency’s velocity criterion – is not at all supported by the body of the rest of the comment.

As to the matter of whether or not technologies may operate well and protect organisms at velocities above roughly 1 ft / sec, the Agency agrees with the commenters assertion that this can be the case. This is potentially the case for velocity cap technologies, which the Agency applies to a few moderate velocity cases in its module cost applications. The Agency utilizes the concept of velocity criterion in the analysis of technology applications as a screening component of the analysis, and not as the primary basis for decisions. The Agency notes that the final rule has no requirements based on velocity. As to the matter of the basis of the velocity criterion, the Agency utilized the reported, design through screen intake velocities that it obtained through the 316(b) survey.

Comment ID 316bEFR.306.043

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

The open area for traveling screen mesh varies according to the selected mesh opening and material. EPA's assumed open area of 68% may overestimate through mesh- opening velocities in larger mesh sizes and underestimate through-mesh velocities in finer mesh sizes. The approach velocity immediately upstream of the screen mesh would be a more appropriate and consistent method for defining impingement velocities. In angled screens, the component of approach velocity that is normal to the screen face should be the defined impingement velocity.

EPA Response

The Agency's assumption for the open area of a traveling screen is the median, typical opening of those intakes within the scope of the rule. The Agency acknowledges that it may overstate or understate mesh-opening velocities in some cases, but that is the nature of a median, and for the purposes of the national rule estimates is appropriate. As such the Agency continues to view its assumption regarding open area, which is endorsed by the expertise of the leading manufacturers and vendors of screening technologies, as reasonable for the final rule analysis. Because the Agency relied upon the 316(b) survey data applicable to those facilities within the scope of the rule, it utilized the through-screen velocities reported by the facilities. Hence, although approach velocity would be a reasonable metric for sizing impingement velocities, the Agency referred to the available data for its reasonable analysis.

Information from vendors and the questionnaires indicates that the majority of existing traveling screens use coarse mesh screens and the most prevalent size is 3/8 in mesh. The vendors stated that typical wire is #14 gauge (0.08 in. diameter). Percent open area for square mesh can be calculated as:

Percent Open Area (%) = 100 * (opening side) 2 / (opening side + wire diameter) 2

A traveling screen vendor explained that while finer mesh will tend to result in lower percent open areas, the difference is not that great if finer wire is also used (Brackett Green 2002). Finer wire can be used as long as there is sufficient support for the mesh. EPA notes that all of the traveling screen technologies used as the basis of compliance involve fine mesh overlays. In such systems the coarser mesh screens provide structural support for fine mesh screens. The commenter notes that approach velocity would be a more appropriate and consistent method of defining impingement velocities. EPA notes that the use of a consistent value for percent open area effectively results in an approach velocity to through screen velocity ratio that is constant. In other words, the 1.0 fps through screen velocity is equivalent to an approach velocity of 0.68 fps. Vendors have noted that the slight increase in through screen velocity has not been an issue with respect to screen performance. Rather, finer mesh sometimes resulted in operational problems associated with an increase in the amount of debris collected. EPA addressed this potential problem by including costs for physically removing the fine mesh overlays during annual periods of heavy debris loading.

EPA reviewed the use of percent open area as it was applied to various technologies. For the new larger intake structure EPA concluded that use of the percent open area of 68% and a target through-screen velocity of 1.0 fps may produce a less than ideal design. While existing intakes with through flow screens do not have the luxury of being able to increase the screen area available for through flow screens, newly installed screen structures can be designed to produce any target through-screen velocity as long as space is available. EPA has concluded that in estimating the new intake structure screen width, a 50% percent open area (rather than 68%) is more consistent with the finer screen mesh. Vendor data indicate that typical Fine Mesh Screens have open space ranging of 50% (Industrial Screen Products) to 58.5% (Screen Services - #69 Johnson Vee-Wire screen) or lower for very fine screens. As such. EPA has decided to reduce the percent open space value used in calculating the size of the new larger intake from 68% to 50%.

Comment ID 316bEFR.306.044

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 2 – Add Fine Mesh Traveling Screens with Fish Handling and Return

-Fine mesh overlays will not work. Fine mesh screens need to be constructed of components that are designed to withstand the rigors of continuous rotation.

-In addition, acceptable hydraulic conditions within the fish buckets and a smooth transition between the buckets and screen mesh would not be achieved with overlays.

-The effectiveness of the low-pressure, internal spray wash system in gently removing organisms would be diminished due to the obstruction resulting from the presence of the coarse mesh.

-EPA uses fine mesh of 1-2 mm for the traveling screen option. A finer mesh may be required to protect certain species and life stages.

EPA Response

The commenter states that fine mesh overlays won't work because they won't withstand rigors of continuous rotation, will not achieve acceptable hydraulic conditions within the fish buckets smooth transition between buckets and screen, and the effectiveness of the low pressure spray wash system would be diminished. EPA contacted the vendor who has extensive experience installing fine mesh overlays and his responses to issues posed by the commenter disagree with the assertions of the comment (see DCN 6-3587).

EPA also notes that fine mesh overlays are only added where the existing screens already have fish handling and return technology. It is assumed that existing systems use fish handling technology that employs properly designed baskets and fish buckets with hydraulic conditions that minimize impingement. EPRI's comment is correct where the Past attempts to add fish baskets without employing redesigned baskets resulted in poor hydraulic conditions.

Comment ID 316bEFR.306.045

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 3 – Add New Larger Intake Structure with Fine Mesh, Handling and Return

-EPA applied this module to facilities that are required to meet only the impingement standard and where EPA determined that intake velocities were “extremely high.” EPA should define “extremely high.” Application of this module to impingement-only sites is likely to drive the national costs higher.

EPA Response

For the case of impingement only facilities to which the Agency applied enlarged intakes the velocity definition of “extremely high” was those cases above 3 ft / sec. The cases of application of impingement only sites with the new larger intake module was rare for the final rule. The Agency utilized it to represent cases when the shoreline traveling screen systems would not provide adequate impingement survival protection at extreme velocities. The alternative technologies to enlarging an intake would be to install a barrier net system or relocate the intake to offshore. The barrier net system is not practical for cases of navigable waterways and the relocation of the intake would correspond approximately to the costs of building a larger intake. EPA notes that reducing the approach velocity is the obvious non-flow-reduction solution for facilities which are experiencing impingement problems. Such a modification cannot be performed without substantial modification of the intake structure. As such, there are cases, in the Agency’s opinion that would reasonable correspond to the necessity of enlarging the intake structure for controlling impingement. Because the Agency applies the technology module to only a select set of cases in which other less costly technologies would not be practical, the Agency views the effect on national costs to be reasonable and not an overestimate, as the commenter asserts.

Comment ID 316bEFR.306.046

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 4 – Add Passive Fine Mesh Screens at Shoreline

-Wedge wire screen costs are based on 1.75 mm openings. This opening size will not be effective in eliminating entrainment of many species and life stages. The use of 0.5 or 1.0 mm slot sizes will greatly increase the costs of affected facilities.

-EPA stated that currents "are utilized for controlling impingement." In reality, impingement is correlated to the ratio of slot velocity to sweeping velocity.

EPA Response

EPA selected 1.75 mm openings based on the "typical" fine mesh size reported by vendors. In comment 316b.EFR.306.045 the commenter has noted that depending on site-specific data such as species and life stage requiring protection, some facilities may require smaller mesh sizes (e.g., 0.5 to 1.0 mm) and some larger mesh sizes with corresponding higher and lower costs than the cost of the "typical" fine mesh design. EPA has concluded that design values selected for the modules will tend to produce a balance of higher and lower than actual costs such that the overall total represents a reasonable estimate of the national total. EPA realizes that the costs for smaller mesh screens increases significantly as the mesh size becomes smaller due to the decrease in percent open area of the finer mesh screens and increased O&M due to capture of additional debris. Vendors were questioned about installation of fine mesh screens and stated that anything less than 1.0 was rare. EPA expects that the use of very fine mesh (i.e., <1.0 mm slot size) will be limited to a small subset of facilities. In order to determine the relative cost for these facilities, EPA reviewed the technical data from the vendors and selected a slot size of 0.03 inches (0.76 mm) as representative of the smaller "very fine" mesh. Capital and O&M cost estimates were then developed for passive screens with this slot size. Therefore, to be conservative (i.e., erring towards higher national costs) the Agency has applied the fine-mesh wedgewire system in roughly 25 % of cases (those in estuarine and ocean environments).

EPA agrees that the degree of impingement is correlated to the ratio of slot velocity to sweeping velocity. However, EPA notes that even in situations where this ratio is high (i.e., installations with low sweeping velocity), that the system performance with respect to impingement and entrainment will be much improved over the system it replaces if designed properly.

Comment ID 316bEFR.306.047

Subject Matter Code 9.07
Cost Modules

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Module 5 – Add Fish Barrier Net

-In some cases, EPA applied this module in combination with entrainment reduction technologies. Using technologies in combination is an innovative approach that is generally lacking elsewhere in the NODA, but should be considered.

EPA Response

The commenter notes that combining technologies like was done with fish barrier nets is innovative and encourages EPA to consider applying other technologies in combinations. Adding fish barrier nets to intake systems in conjunction with existing or improved shore-based technologies generally requires little or no major modification to the existing intake structure. Since the nets are generally targeted to sensitive species that do not require fine mesh, the use and function of the shore-based screening system is often still required for the entire system to function properly. Also where nets are only required on a seasonal basis or would be damaged during winter months, a shore-based screening system is still required during the period of non-deployment. In other words these technologies are more easily combined without having to consider the effect each has on the other. Aquatic filter barriers (AFB) could also be applied in combination with other technologies, but EPA notes that if the AFB functions properly a shore-based screening system would be rendered redundant. Such redundancy may serve as a backup or insurance that the entire system will continue to function should the AFB fail, but a screen system would not be required to operated except to maintain it in working order. If after a reasonable time the AFB has demonstrated itself to be reliable, shore-based screens may be abandoned altogether. Another module technology that may be used in combination with other technologies is adding a velocity cap at a submerged intake in combination with improvements to a shore-based screening system. The application of such a system would require knowledge of site-specific conditions that is not available to EPA for the model facilities.

Comment ID 316bEFR.306.048

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 6 – Aquatic Filter Barrier

-EPA did not apply this module at any location despite the fact that the AFB is one of the three technologies upon which EPA developed the national performance standards.

EPA Response

EPA agrees that aquatic filter barriers (AFBs) should be included and has added AFB technology as the compliance technology for several model facilities in the final compliance cost analysis.

Comment ID 316bEFR.306.049

Subject Matter Code 9.07
Cost Modules

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Module 7 – Relocate Intake to Submerged Offshore with Passive Screens

-This module was applied to reduce velocity at facilities where there was insufficient space in the vicinity of the CWIS to expand the intake. To determine the distance of piping, EPA used the median distance of other offshore passive screens in the same water body type. EPA should have used bathymetry in the vicinity of the CWIS to determine the location of the technology.

-It appears that this was the "default" module: "…the Agency relied on this module to represent situations where there was not one module that stood out as the clear choice alternative." Because Module 7 is relatively expensive, default application of this module will likely increase the national cost estimate.

-Although not explicitly stated, this option should provide "location" benefits similar to those for Module 9.

EPA Response

EPA did not use bathymetry data to determine the distance to the new submerged offshore intake because no such data is readily available for all facilities in-scope of the rule. Lacking this data, EPA chose to use the median distance offshore of existing submerged intakes for facilities in the database that reported such data. Recognizing that there are general differences in the bathymetry of different waterbody types, EPA divided the facility data into waterbody types and then used the median value for each. As with other design parameters, EPA has concluded that the use of median values for existing similar technologies should result in cost estimates that will include a somewhat equal mix of cost estimates that are both lower and higher than what would actually be required with the producing a reasonable overall national estimate.

EPA disagrees that utilizing relocation of an intake as a type of "default" choice would "increase" the national cost estimate. As the Agency notes and the commenter quotes, the module was applied when no one module stood out as a clear choice. However, what the commenter has not noted is that there is practical basis for this approach and that this approach is in concert with the commenter's recommendations for the Agency to account for cases of uncertainty about species variability and site-specific conditions. Additionally, the commenter has not noted that the Agency applied a hierarchy decision making process for selecting the appropriate technology prior to relying on any form of default in order to narrow down the available options for a particular model-site. By narrowing down the modules that might apply through hierarchy of selection, the Agency applied all available data in a reasonable manner to the selection of the technology costs. Finally, the commenter has not noted that the cases in which the Agency applied the supposed "default" choice were rare. Therefore, because of all these factors, the Agency contends that the commenter's assertions relating to likely increases in the national cost estimate are not accurate.

EPA agrees with the commenter that all offshore intake technologies would provide “location” benefits and the final rule accounts for this fact in its analysis of in-place and potential retrofit technologies.

Comment ID 316bEFR.306.050

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 8 – Add Velocity Cap at Offshore Inlet

-We agree with EPA that a velocity cap, in and of itself, may not meet the required reduction in impingement, but does provide a benefit based upon location. Velocity caps should be designed for entrance velocities much higher than 0.3 ft/sec (referenced in the NODA as the design velocity for the one manufacturer of prefabricated steel velocity caps). Fish will be unable to detect and avoid a velocity cap designed with entrance velocities not significantly different than the velocities of ambient currents in the vicinity of the cap. Velocity caps should be designed with velocities (1-2 ft/sec) that can be detected and avoided by fish, thereby reducing entrainment.

-Velocity caps have been constructed from concrete. The formulas for the stainless steel and carbon steel velocities cap costs are associated with the wrong graphs.

EPA Response

EPA disagrees that a 1-2 fps inlet velocity is required in order to for fish to detect the velocity cap intake. EPA notes that the primary problem that velocity caps are intended to resolve involve the relative inability of fish to detect changes in vertical velocities. EPA notes that it is just as important that the intake velocity be low enough to allow slow swimming fish be able to escape. For screen type systems EPA has selected a through-screen velocity of 0.5 fps as suitable for new systems to allow for most fish species to escape. Corresponding approach velocities are even lower. The velocity caps at the St Lucie Nuclear Power Plant have an inlet velocity of about 0.5 fps (FPL 2002). If the commenter's assertion were true, then all velocity caps would perform poorly whenever the system was withdrawing water at a flow rate much lower than the design value.

Reference:

FPL Florida Power and Light. Summary of Meeting with FPL Concerning Potential Request for Additional Information Pertaining to the St Lucie, Units 1 and 2, License Renewal Application (page 3). July 31, 2002.

Comment ID 316bEFR.306.051

Subject Matter Code 9.07
Cost Modules

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Module 9 – Add Passive Fine Mesh Screen at Inlet of Offshore Submerged Intake

-Same comments as Module 7 above.

EPA Response

EPA notes that although the commenter references their comments from 316b.EFR.306.049, that those particular comments regarding relocating an intake (and the Agency's application of module 7) do not necessarily apply to adding passive screens to offshore submerged intakes. The Agency notes that application of module 9 (adding wedgewire screens to an existing offshore inlet) was dictated primarily by whether or not a facility had an existing offshore intake, the type of intake controls in-place, and the requirements that applied to the facility. Relocating an intake is different than retrofitting the offshore intake.

Nonetheless, the Agency has responded to the referenced comments at 316b.EFR.306.049.

Comment ID 316bEFR.306.052

Subject Matter Code 9.07
Cost Modules

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Module 10 – Add / Modify Shoreline Technology for Submerged Offshore Intake

-EPA did not use this module. Unless an onshore screen exists, it is unlikely that any facility would add one as a retrofit, since more cost-effective options are available. The exception may be where they may be an economic benefit to moving the intake offshore that is associated with a reduced heat rate that will improve facility performance associated with colder source water.

EPA Response

EPA agrees with the comment. EPA did not use this module because it required site-specific information concerning the presence of onshore screens and an assessment of whether retrofitting the onshore system would effectively resolve the problem. Rather EPA chose to retrofit at the inlet where improvements in impingement and/or entrainment were deemed necessary. The comment concerning moving the intake offshore to access cooler water applies to module 7. The benefit of greater turbine efficiency would be difficult to predict and therefore was not given any monetary value. This can be viewed as another situation where a conservative approach (tending towards higher net compliance costs) was used.

Comment ID 316bEFR.306.053

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.07

Cost Modules

Module 11 – Add Double-Entry Single-Exit with Fine Mesh, Handling and Return

EPA applied dual-flow screens to facilities that need to reduce velocity but lack the space required to expand the intake. Retrofitting to dual-flow screens within an existing screenwell does not increase screen surface area over standard once through traveling water screens and, therefore, will not decrease velocity at the screen face. To achieve uniform flow through a retrofitted dual-flow screen, the ascending and descending faces are approximately half the width of the through-flow screen baskets. The baskets in a dual-flow retrofit are shorter to avoid non-uniform flow through the screens. If a dual flow screen is located too close to the pump bellmouth, the uneven flow caused by the water jet exiting the screen may result in cavitation of the pump. To prevent possible cavitation, the pumps should be located no less than 15 ft (and preferably > 20 ft) downstream from the screen exit. EPA used the dual flow module at 59 facilities. The dual-flow option will not decrease velocity as EPA contends, thus other technologies will need to be used to achieve the desired 1 ft/s velocity. Since all other velocity reducing modules are more expensive, the national costs will be greater than EPA estimated.

EPA Response

After conducting additional research EPA agrees that dual flow screens have a limited ability to reduce through screen velocities. As such, EPA has reduced the number of facilities requiring dual flow screens particularly those with higher through-screen velocities. The greatest single advantage of dual flow screens is that they significantly reduce the problem of debris blinding and carryover. One of the problems encountered when coarse mesh screens are replaced with fine mesh (e.g., fine mesh overlays) is that the amount of debris captured by the screens increases resulting in operational problems. All else being equal, this problem increases with increasing screen velocity. As the commenter has noted many installations can operate effectively at through-screen velocities >1.0 fps. Thus, EPA has concluded that at model facilities identified as requiring dual flow screens where the through-screen velocity does not vary far from the desired through-screen velocity, it is reasonable to apply dual flow screens as the compliance technology.

Considering the operational benefits of dual flow screens, EPA has decided to use dual flow screens instead of through flow screens as the screening technology used in conjunction with the new larger intakes module.

As such, the Agency has changed its application of the module for the final rule. The Agency has utilized other technologies in-place of the dual-flow screens for some of the 59 cases cited by the commenter. The Agency no longer applies the dual-flow technology for the majority of situations that call for decreased velocity in its costing module application methodology.

Comment ID 316bEFR.306.054

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

VII. Performance Standards

A. Technology Efficacy Database (TED) to Support Performance Standards

The following comments are submitted by EPRI as supported by experts with Alden. EPRI believes that the EPA TED is a notable effort that should provide valuable information to support both the resource agencies and permitted facilities in determining compliance options with the proposed rule. EPA has made a good start compiling available data on the effectiveness of fish protection technologies for application at CWIS. However, there are some shortcomings and limitations to the database as currently configured that should be addressed as subsequently discussed. EPRI would be pleased to work with EPA in further developing its content and utility.

-There are more studies and data available in both peer reviewed and gray literature that could be added to the TED. Additional reports and information on technologies for the protection of fish at cooling water intake structures can be found in the comprehensive review of the subject prepared for EPRI in 1999 (Fish Protection at Cooling Water Intakes: Status Report) (EPRI 1999b). EPRI is currently engaged in updating this report with the latest developments in technology research and the latest information on the cost of retrofitting the technologies to existing CWIS. The new report will be available by December 2003. The new report will be a web-based document for our members that will allow for efficient continual updating as new information becomes available. EPRI would welcome the implementation of collaborative efforts with EPA that extend the content and utility of the EPA TED.

EPA Response

Please see response to comment 316bEFR.325.004.

Comment ID 316bEFR.306.055

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

The TED presents data using varying metrics. In many cases, this is unavoidable as data may have been presented differently in individual papers. EPA should be aware of the inconsistency in reporting of the data and exercise caution when comparing effectiveness estimates between two sites. In addition, the biological efficacy of a technology has to be measured differently depending upon that technology's mode of action. For example, a behavioral barrier acts to illicit a physiological response in adult or juvenile fish that repels them from the CWIS (or in some cases attract them toward a safe location). With such a technology, the benefit lies in a reduction in the total number of fish impinged. Behavioral barriers do not improve impingement survival (i.e., those fish that are not repelled will experience the same survival as they would in the absence of the technology). By contrast, a collection system (such as a Ristroph screen) improves the survival of impinged organisms over a conventional screen, but does nothing to prevent organism impingement. The database needs to clearly distinguish impingement reduction from improved impingement survival.

EPA Response

EPA agrees with the commenter that the high degree of variability between the data in the TED warrants caution from those who use it. The data summarized in the database is not intended to be used in direct comparison between studies but rather to provide an abstract that will guide users to the appropriate original documentation. EPA has modified the database contained in the docket to clarify the data contained therein to distinguish between impingement survival and impingement reduction.

Comment ID 316bEFR.306.056

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

There is limited biological data contained within the TED. Only 59 of the 154 records within the database include biological effectiveness data. The distribution of those studies supporting the technologies EPA used to develop the national performance standards are shown in Table 2. Despite the lack of data presented, we think that there are sufficient data to suggest that technologies do exist that can be used on a site-specific basis to meet the performance standards. In some cases, there may be no technology capable of meeting the standards for a given site.

Table 2.- Number of studies included in the Technology Efficacy Database for those technologies on which EPA based the National Performance Standard and contain biological information

Fine Mesh Ristroph Screens 7
Modified Ristroph Screen 6
Wedge Wire 2
Velocity Cap 10
Barrier Net 3
Aquatic Filter Barrier 1
Total 29

(See Hard Copy)

EPA Response

EPA notes that not all documents in the database contained biological data. The purpose of the database was not to summarize only those studies with rigorous biological data but also any document that provides some level of analysis or study. EPA agrees with the commenter that there is sufficient data cited in the docket to support the performance standards in today's final rule.

Comment ID 316bEFR.306.057

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

The structure of the TED should be altered to be more user-friendly. Currently, a user can only view one record at a time. Queries should be designed to allow users to sort data into meaningful groups (such as by technology or waterbody type).

EPA Response

EPA has modified the database to allow queries and other functions as mentioned by the commenter. EPA also notes that the underlying data tables are available for use as needed by the user.

Comment ID 316bEFR.306.058

Subject Matter Code 7.02.03

Technology Efficacy Database

Author Name Doug Dixon & Kent Zammit

Organization EPRI

The EPA should conduct a Q/A program to standardize the method of reference used throughout the TED. The current inconsistent reporting of bibliographic information makes it difficult to ascertain the ultimate source of the data. In addition, there are inconsistencies in the way authorship is attributed. For example, in some cases EPRI reports are attributed to EPRI, while in other records they are cited by the Principle Investigator. For example, EPRI's most recent technology evaluation (Fish Protection at Cooling Water Intakes: Status Report) (EPRI 1999b) is attributed to E. P. Taft. The inconsistencies of the citations make it difficult to acquire and assess the accuracy and relevance of the data. Fifty-eight records in the database have either no source given or they are from secondary sources. In general, very little of the data is from peer-reviewed literature.

EPA Response

EPA has rectified the discrepancies noted by the commenter. Please see DCN 6-5000 in the docket.

Comment ID 316bEFR.306.060

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.02.03

Technology Efficacy Database

Additional information should be provided in the TED to allow users to assess the quality of the data. For example, information should be provided on data collection methods, sample sizes, waterbody type in which studies were conducted, etc. Such information would allow users to assess the potential source of differences in biological efficacy.

EPA Response

EPA has provided basic data about the quality of documents included in the database, if available. EPA notes that many of the documents do not contain all levels of information necessary to assess the overall quality and compare it to other documents and cautions users when attempting to measure the results of one study against another.

Comment ID 316bEFR.306.061

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 7.04
Streamlined Technology Option

Streamlined Technology Option For Certain Locations

The following comments are submitted by EPRI as supported by experts with Alden. EPA's attempts to identify a non-burdensome technology approach for both industry and the regulators is notable. EPRI is also willing to collaborate with EPA to further develop streamlined technology options including establishing the criteria for technologies to be so identified.

EPA is seeking comment on two possible streamlined technology options. Under the first option, EPA would evaluate the impingement mortality or entrainment reduction expected for a specific technology based on review and analysis of available data, studies, and literature. In addition, EPA would assess the site-specific characteristics under which technologies are most effective (e.g., location, flow, velocity, species, life stage, etc.). EPA would promulgate new regulations that would allow the use of approved technologies for complying with Phase II section 316(b) requirements.

Currently EPA believes that there may be sufficient data to use the streamlined approach for wedge wire screens in certain water bodies and under specific water hydraulic conditions. EPA is considering the inclusion of the following words:

"Use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity is 0.5 feet per second (ft/s) or less."

We offer the following comments relative to this approach:

-This version of the streamlined technology option may work with some modifications to meet the entrainment reduction standard. Most importantly, the slot size should be selected in accordance with the size of eggs and larvae to be protected at the site. In general, while existing research indicates that a slot size of 0.5 to 1.0 mm may be protective in all cases; in some situations, it may be over-protective. In many cases, slot sizes of 1.5 mm and higher will afford the same level of protection as the narrower slot sizes. Given the direct relation between slot size and intake flow, wider slots will minimize unnecessary retrofit costs. We do note that screens configured as noted in EPA's wording (including a slot width of 1.75 mm as assumed from EPA cost analyses) should virtually eliminate impingement of juvenile and adult fish. The uncertainty regarding entrainment reduction may be lowered with additional research.

-For all wedge wire screen options throughout the NODA, EPA over-emphasizes the importance of ambient currents. Recent laboratory studies of wedge wire screens (EPRI 2003d) have shown that currents as low as 0.25 ft/s are sufficient to provide protection for many life stages and species tested. Currents of this magnitude occur commonly in all water body types and should be sufficient to protect fish eggs and larvae, as well as juvenile and adult fishes.

EPA Response

For EPA's response to the comment regarding slot size, please refer to comment 316bEFR.306.003. With regard to the role of ambient currents in the Approved Technology Option, § 125.99(a)(1)(ii) requires that the cooling water intake structure be situated such that sufficient ambient counter currents exist to promote cleaning of the wedgewire screen face. EPA has not specified a uniform ambient current velocity, as the Director will be responsible for determining whether ambient currents are sufficient for the technology to be effective. Please refer to EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005 for additional details of how the Director will determine compliance. EPA therefore disagrees that it has placed excessive emphasis on the ambient currents: ambient currents are one of several site conditions that must be present for the wedgewire screen technology to perform as required.

Comment ID 316bEFR.306.062

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.04

Streamlined Technology Option

The second option would establish the criteria and process for approving cooling water intake structure control technologies for complying with Phase II section §316(b) requirements. This option would allow the development of information demonstrating the effectiveness of other technologies to meet the impingement mortality and entrainment performance standards when operated under defined conditions. Our comments are as follows:

-The second option differs from the first in that it calls for the systematic development of criteria for the approval of technologies to meet §316(b) rather than through the inappropriate use of available data.

-If EPA adopts scientifically sound criteria for approving technologies and sufficient input is solicited from resource agencies, industry, and stakeholders, this approach could lead to the development of a functioning streamlined approach to implementing §316(b).

EPA should recognize the efforts of industry to develop technologies and not penalize them for good faith efforts to improve fish survival at their facilities. EPA should also make every effort to ensure that these regulations do not inhibit the development of new, more efficient technologies that could further enhance fish protection.

EPA Response

EPA believes that the second Approved Design and Construction Technology Option described in § 125.99(2)(b) provides an opportunity for industry and other interested parties to develop innovative technologies to protect aquatic life from cooling water intake structures. The option allows any interested individual or group to submit a technology for review as a means of complying with today's final rule. If the Director approves the technology, it will thereafter be available to all applicants in the region to use as a means of compliance. EPA believes that the inclusion of such an option will foster creativity and cooperation among industry and State representatives. EPA anticipates that this compliance option will generate a number of new Regionally-approved technologies that will be both protective and efficient.

Comment ID 316bEFR.306.063

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Biology – Supporting Information

Entrainment Survival

EPRI previously commented that we disagree with the results of EPA’s analysis of entrainment survival and we continue to disagree with EPA’s additional analyses. We believe that the scientific data demonstrates with 100% certainty that entrainment survival can be significant for many fish and shellfish species. In the following paragraphs we offer some comments on the details in EPA’s analysis. However, more importantly, we would like to point out that EPA sets a standard of rigor in their analysis of entrainment survival that is inconsistent with all other analyses conducted to support the proposed rule. For example, EPA’s review of the results of 36 entrainment survival studies and subsequent rejection of them for various study limitations (which will always exist) is in sharp contrast to EPA’s use of a single contingent valuation study (Peconic Bay Study) to estimate nonuse benefits for the entire North Atlantic Region. It is scientifically and economically questionable if EPA’s use of this study is appropriate (see comments by Dr. Strand); in fact, the authors of that study would likely disagree with its use in the EPA context. It is readily apparent that in this instance EPA rejects information that was developed from peer reviewed, state-of-the art methods (which reduce national losses and associated benefits) while also embracing non-standard approaches with highly uncertain data and potentially inappropriate use of that data to estimate economic benefits (which inflate benefits by nearly an order-of-magnitude). We recommend that EPA attempt to be as consistent as possible in dealing with data set analysis and use. Furthermore, we recommend quantitative uncertainty analysis (at least sensitivity analyses) that reasonably bound all types of estimates EPA derives. This could be easily accomplished for entrainment survival. Reasonable entrainment survival ranges have been reported in the EPRI Entrainment Survival Report (EPRI 2000b).

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule.

EPA did not use the Peconic Bay study mentioned by this commenter to determine non-use values in the benefits assessment for today's final rule. Please see response to comment 316bEFR.307.061.

Comment ID 316bEFR.306.064

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

As part of it's efforts on the issue of entrainment survival, EPA has revised Chapter A7: Entrainment Survival of the Case Studies document, but the revised version, similar to the initial version, suffers from a lack of perspective for the realities of entrainment survival programs. In the revision, EPA has selectively used the available literature to promote a position that the current state of knowledge is insufficient to utilize the existing data. EPA has relied heavily on some of the oldest entrainment survival literature, which used the most primitive sampling methods, and on literature that contains speculation about entrainment survival, while not reviewing literature that presents updated information that would contradict EPA's analysis, addresses concerns raised by EPA, or identifies the sampling biases and speculation contained in some of the early reports. Specific comments on the revised Chapter A7 are as follows:

- A7-1.1 Fragility of Entrained Organisms – EPA states "For these reasons, entrained eggs and larvae are believed to experience high mortality rates as a result of entrainment." EPA provides no reference to support this statement. EPA could have cited the work of it's own consultants from the 1970's which demonstrated that many species of larval fish can survive the entrainment stresses, despite early speculation that they must be too fragile to do so. EPA could also have cited later reviews that identified which of those early reports on entrainment survival contained no quantitative information or lacked valid controls (Jinks et al. 1981)<FN 2>. In fact, numerous scientific studies have since demonstrated that fish eggs and larvae do survive entrainment, in some cases in very high percentages. The preponderance of this information was sufficient to convince even early skeptics of the reality of entrainment survival, yet EPA chose to introduce their review with the same speculative impressions on fragility that preceded thorough scientific study.<FN 3>

Footnotes

2 Jinks, S.M., G.J. Lauer, and M.E. Loftus. 1981. Advances in the techniques for assessment of ichthyoplankton entrainment survival, in Proceedings of the Fifth National Workshop on Entrainment and Impingement: Issues Associated with Impact Assessment, 5-7 May 1980 (L.D. Jensen, ed.), pp. 91-110. Ecological Analysts, Inc., Sparks, Maryland.

3 Kedl, R. J. and C. C. Coutant. 1976. Survival of juvenile fishes receiving thermal and mechanica stresses in a simulated power-plant condenser. In Esch, G. W. and R. W. McFarlane. (eds) 1976. Thermal Ecology II.

EPA Response

EPA stands by its statement that fragile organisms will experience high mortality rates and believes there is sufficient support in the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.306.065

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

A7-1.2 Thermal Stress - EPA relies primarily on two reviews of the thermal effects literature (Schubel et al. 1978 and Stauffer 1980) which omit the majority of the studies designed to address thermal effects of the entrainment process. EPA could have accessed more recent literature that presents a more comprehensive and up-to date view of thermal stresses, such as EPRI (1981)<FN 4> and Kellog et al. (1984).<FN 5> In addition, EPA makes no mention of approaches that have been developed to use thermal effects information obtained from laboratory studies to evaluate thermal effects (and relationships to CWS flow) during entrainment. Predictions of temperature effects during entrainment have been found to be in reasonable agreement with temperature effects observed in field studies of entrainment survival (Jinks et al. 1978)<FN 6>.

Footnotes

4 EPRI. 1981. Literature Review: Response of Fish to Thermal Discharges. Prepared by Oak Ridge National Laboratory. EPRI EA-1840. Palo Alto, CA.

5 Kellogg, R.L., R. Ligotino, and S. Jinks. 1984. Thermal Mortality Prediction Equations for Entrainable Striped Bass. Trans. Amer. Fish. Soc. 113:794-802.

6 Jinks, S.M., J. Cannon, D. Latimer, J. Clafin, and G. Lauer. 1978. An approach for the analysis of striped bass entrainment survival at Hudson River power plants, in Proceedings of the Fourth National Workshop on Entrainment and Impingement (L. D. Jensen, ed.), pp. 343-350. EA Communications, Sparks, MD.

EPA Response

EPA did not use analyses of thermal effects from laboratory studies because the Agency believes thermal stress is not the only stress that leads to entrainment mortality as organisms pass through a cooling water intake structure. EPA's chapter on Entrainment Survival in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule, also examines chemical and physical stress. Entrained organisms perish due to a variety of reasons due to stress within and after discharge from a cooling water intake structure. Therefore, laboratory studies which isolate thermal stress have only limited utility.

Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

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Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

A7-1.3 Mechanical Stress – Again, EPA has relied upon very old information. While it may be true that "mechanical mortality is the dominant cause of entrainment mortality at many facilities", the references cited (Marcy 1973 and Marcy et al. 1978) leave an impression that mechanical mortality is nearly 100%. Marcy (1973) reported on studies conducted from 1970-1972 at the Connecticut Yankee plant using plankton nets, which themselves would have induced a considerable degree of mortality to the primarily alewife and blueback herring larvae (97.6% if the total catch). Studies during the 1970's clearly showed that high discharge velocities were the primary source of mortality observed using net sampling in early entrainment survival studies (NYU 1972, 1973; Lauer et al. 1974). Marcy et al. (1978) reviewed studies published no later than 1977, and did not consider advances in sampling techniques that were being developed at the time, which demonstrated much lower mechanical stress for some species. EPA's conclusion that "the only effective method of minimizing adverse effects to entrained organisms is to reduce the intake of water (Marcy 1975)" does not accurately reflect the source, which actually stated "…it may be possible to increase condenser ΔT's while lowering intake volumes, especially since the mechanical damage component of the mortality appears to dominate." Marcy's suggestion to increase, rather than maximize ΔTs, indicates a consideration of both thermal and mechanical stresses. In addition, Marcy was working from the perception at the time that mechanical entrainment mortality was generally high. Subsequent data showed that for many species, mechanical mortality could be quite low and that the potential for thermal effects at reduced CWS flow needed to be carefully evaluated (Jinks et. al. 1978; Steen and Schubel 1986). More detailed examples of flow reduction strategies that incorporate the both types of stress are found in the more recent literature.<FN 7>

Footnotes

7 Steen, A. E. and J. R. Schubel. 1986. An application of a strategy to reduce entrainment mortality. Journal of Environmental Management 23:215-228.

EPA Response

EPA reviewed studies that indicated that mechanical stress was the primary cause for mortality and other studies with indicated that temperature stress was the primary cause. These inconsistencies between the studies reviewed gave EPA further indication that entrainment survival was unpredictable and variable. EPA contends that entrained organisms perish due to a variety of reasons due to stress within and after discharge from a cooling water intake structure.

Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.306.067

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

A7-1.4 Chemical Stress – EPA continues to assert that biocides are routinely used, even though many facilities do not use biocides in the condenser cooling system at all, and those that do often have strict limitations on the amount of time during which biocides may be used. Typical usage, for those facilities that do employ biocides, would be on the order of a few hours per week. One of EPA's primary sources for this chapter (Marcy 1973) reported no increase in mortality due to biocide use.

EPA Response

EPA included information on biocide use because some facilities continue to use biocides. The typical usage cited by the commenter of a "few hours per week" is exactly what EPA meant by stating that biocides are "routinely" used. Several studies EPA reviewed indicated that during times when biocides are added to the water flow through a cooling water intake structure, 100 percent mortality can be assumed. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.306.068

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 12.03.02
Entrainment survival chapter

A7-2 Factors Affecting the Determination of Entrainment Survival – In this section, EPA has confused empirical and theoretical issues. In several instances, EPA has cited a modeling exercise intended to examine the potential biases that would result with particular types of sampling errors as evidence that these errors do, in fact, exist:

"Some species are extremely fragile and disintegrate during collection or when preserved, and are thus not documented when samples are processed (Boreman and Goodyear, 1981)." [Page A7-3]

"The loss or damage of organisms beyond identification during plant passage causes overestimations of the true fraction of live organisms in the discharge samples, because the disintegrated organisms are extruded from the sampling device (Boreman and Goodyear, 1981)." [Page A7-3]

"Additionally, the initial survival estimates may be overestimations of survival due to the disintegration of entrained organisms and their subsequent extrusion through the sampling gear (Boreman and Goodyear, 1981)." [Page A7-4]

A detailed reading of Boreman and Goodyear (1981) shows that none of these statements are actually attributable to them. Their paper is a theoretical analysis of the potential sources of error in survival studies and any statements about error sources should be interpreted in a hypothetical rather than empirical context. Several lines of evidence, none of which are discussed by EPA, indicate that disintegration of larvae from transit through the CWIS is not extensive and is not a significant source of bias in the entrainment survival studies. First, laboratory studies using power plant CWIS simulators have exposed a variety of fish eggs and larvae to hydraulic regimes, shear forces, and pressures designed have to duplicate exposures typically occurring during transit through operating steam-electric plants. These controlled studies indicated no extensive destruction or loss or test organisms exposed to such stresses (Poje et al. 1978; Ginn et al. 1978; Coutant and Kedl 1975; Kedl and Coutant 1976; Cada et al. 1981).

Second, entrainment survival gear development studies have been conducted in which known numbers of entrainable life stages of several species were entrained through a variety of types of pumps and small (3-6") diameter piping (ESEERCO 1978). Similarly gear tests and calibration studies conducted on pump/larval table collection systems have passed known numbers of striped bass larvae through 4" diameter trash pumps and through 4" diameter tubing at high velocity. These studies generally gave no evidence of wholesale disintegration or destruction of organisms.

Third, a number of entrainment survival studies conducted by Ecological Analysts enumerated larval fragments in intake and discharge collections as a quality control check on potential for extensive damage from entrainment and/or gear effects. These studies typically showed relatively low and similar amounts of fragments in intake and discharge samples.

Fourth, direct release studies using very large numbers of striped bass larvae (which were stained with dye prior to release) introduced into power plants intakes showed no evidence of mass destruction of larvae in discharge collections. (In fact in one direct release study, EPA's own consultant from ORNL observed over 90% survival of stained striped bass larvae swimming vigorously in the sample container after collection from the Bowline Point high velocity diffuser and immediately called ORNL to report that the high survival being reported by the utility studies was real).

Fifth, a number of entrainment survival studies have sampled from high velocity (10 ft/s) diffusers or locations of high turbulence in condenser outfalls. There would be little chance for dead fish or fish fragments to settle out in the discharge under such hydraulic conditions, yet survival percentages were relatively high for a number of species in these studies. If extensive destruction were occurring, high percentages of dead and dismembered fish would have been expected to occur in the discharge samples.

EPA Response

Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule. The citations to the Boreman and Goodyear paper after the statements made by EPA were intended to give that paper credit for highlighting the fact that organisms may be extruded through the sampling gear and not counted in entrainment survival calculations. The extrusion of organisms through the gear is only partly due to the velocity of the flow through the sampling gear. The main reason why organisms are extruded is that they are smaller than the size of the mesh in the sampling gear.

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Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

EPA also indicated concern for settling of dead organisms: "There is also evidence that dead organisms may even sink to the bottom of the water column after entrainment (Marcy, 1975)." [Page A7-46] Marcy (1975) stated that dead organisms would settle out rapidly but provided no reference in support of this claim. However, Marcy (1973) found decreasing densities of dead fish along the 1.8 km discharge canal of the Connecticut Yankee station. Although, as Marcy speculated, dead organisms may possibly settle out in this physical setting, a long discharge canal is not necessarily a typical situation. In a study that EPA reviewed for this analysis, samples from both surface and bottom of the Indian Point discharge canal did not find significant settling<FN 8>. Plants with discharge pipes, rather than canals, typically have very high water velocities that would preclude settling. Many of the entrainment survival studies intentionally sampled from high velocity sections of discharges, including high velocity diffusers, specifically to minimize the potential for settlement to affect the results.

Footnotes

8 EA Engineering, Science & Technology. 1989.

EPA Response

Based on its examination of the data, EPA concludes that dead organisms have the potential to settle out of the water column and may not be included in the samples. This is one of many challenges that need to be addressed when attempting to design a proper entrainment survival study. Please see response to comment 316bEFR.002.015 for the discussion regarding the inclusion of entrainment survival in site-specific benefit analyses.

Comment ID 316bEFR.306.070

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

EPA also expressed concern that “sampling conditions be nearly identical at intake and discharge locations (Marcy, 1973).” This concern is always relevant, but is much harder to achieve, especially with respect to water velocity through the sampling device, when using plankton nets, as did Marcy (1973) and other early studies, than when using more advanced sampling gear developed in later years.

On page A7-4 EPA discusses the mathematical calculation of mortality rates and raises concerns that control mortality may be higher than 5%-10%, sample sizes may not be equal at intake and discharge, and that sampling mortality and entrainment mortality may not be independent. EPA therefore recommends that mortality data from the discharge not be adjusted for intake mortality. In making these recommendations, EPA has not considered the work of its own former consultants who reviewed the mathematical calculations and developed formulae to estimate confidence bounds and power levels for mortality estimates. <FN 9> Those results do not require equal sample sizes at intake and discharge, nor do they require that intake mortality be less than 10% as EPA has suggested. They do correctly point out that lower intake mortality rates and higher sample sizes will lead to more precise estimates of entrainment mortality, and EPRI agrees with this conclusion.

Footnotes

9 Vaughan, D. S. and K. D. Kumar. 1982. Entrainment mortality of ichthyoplankton: detectability and precision of estimates. Environmental Management 6(2):155-162.

EPA Response

EPA is concerned that in many studies reviewed high intake mortality rates (nearing 100 percent) are used to offset only slightly lower discharge mortality rates, and thereby, give the impression that 100 percent of organisms survive entrainment. When looking at the data behind these estimates of entrainment survival, the reality is that few organisms are alive in either sample. It is for this reason why EPA recommends that discharge samples not be corrected for intake mortality. Please see the response to comment 306.0073.

Comment ID 316bEFR.306.071

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Previous comments submitted on the proposed rule (UWAG 2002) presented reasons why no fixed standard for intake mortality rates can be established, similar to the "rules of thumb" used for bioassay studies (Newman 1995). Those reasons include 1) test organisms are those naturally occurring in the source water body rather than organisms intentionally selected because they work well for laboratory testing; 2) test organisms will vary greatly in lineage, age, size, and physical condition rather than being relatively uniform in all of these characteristics as can be expected with bioassay organisms; 3) sampling organisms from the environment will necessarily impose more stress than using laboratory-reared organisms. In addition, as was pointed out by EPA, recirculation of the discharge will result in the sampling of previously entrained organisms at the intake. For all of these reasons, it is unrealistic to expect that intake mortality should or can be reduced to levels that are typical of bioassay studies.

EPA Response

EPA acknowledges receipt of this comment. This submission highlights the fact that studies to accurately document entrainment survival rates are extremely difficult to conduct. Please see response to comment 316bEFR.002.015 for the discussion regarding the inclusion of entrainment survival estimates in site-specific benefit analyses.

Comment ID 316bEFR.306.072

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

On the issue of non-independence of sampling and entrainment mortality, USEPA hypothesizes a situation in which sampling mortality would be lower at the discharge due to weaker organisms dying during entrainment. An alternative scenario could also be hypothesized in which sampling mortality is higher in the discharge due to the combination of entrainment and sampling stress; i.e., larvae that would have survived entrainment die in the sampling gear as a result of the combined stresses. It is clear that no definitive position on the independence of entrainment and sampling mortality is possible at the present time, however, EPA has considered only one of the possible directions for the bias.

EPA Response

EPA disagrees with this commenter. The stresses encountered by the organisms by entrainment occur first so the weakest organisms will most likely die from entrainment before encountering stresses associated with sampling. In addition, the stresses from entrainment are also generally considered to be of a higher magnitude than the stresses associated with sampling.

Comment ID 316bEFR.306.073

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

On page A7-8 EPA states “These small sample sizes may not be sufficient to provide accurate estimates of entrainment survival given that these facilities entrain organisms on the order of millions to billions per year.” This statement seems to indicate a fundamental misunderstanding of the statistical concepts involved. The size of the sample is the only relevant issue. The numbers actually entrained, whether the number is in the thousands, millions, or billions is not relevant to the accuracy of the estimate.

EPA Response

Both the EPA document and the commenter may be confusing accuracy with precision.

Accuracy (or statistical bias) can be related to sample size and population size, depending on the details of sampling. No sweeping generalizations can be made - accuracy depends on how the details of sampling relate to the population.

Precision increases with sample size (the number sampled) but is also related to the fraction of the population sampled. However usually the dependency on sampling fraction is influential only at small sample sizes, and as sample size increases the precision (or the confidence limits for a population estimate) will depend almost entirely on sample size and will effectively be independent of population size.

The importance of the quoted statement on page A7-8 is that sample size needs to be reckoned in appropriate units of sampling. If there is substantial variation among days, operating conditions, and seasons in entrainment survival, then sampling on a small number of days risks both inaccuracy and imprecision. Inaccuracy could result because of failure to design the sample to properly reflect the temporal distribution of physical conditions, organism sizes and species, and operating conditions. Imprecision could result because the sample size is small in terms of the relevant scales of variation (days or hours). Some studies assume that a single binomial distribution adequately describes variability of survival. Unless temporal variation (i.e. heterogeneity of proportions) in the proportion surviving is correctly accounted for, variability will be underestimated. A sample size adequate for a given precision, and an unbiased sampling design, cannot be specified until temporal variation in survival has been characterized and accounted for on relevant time scales.

Comment ID 316bEFR.306.074

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

In addition to their value in site specific analyses, the entrainment survival studies provide background information (EPRI 2000b) that is useful for planning and conducting prospective analyses of benefits of intake alternatives, including that: 1) biocides, if they are used at all, are used infrequently, thus the chemical component of entrainment stress is typically non-existent; 2) at many stations, the combinations of cooling water flow rate and heat rejection rate actually observed do not result in significant thermal mortality for many of the commonly entrained taxa; and 3) survival rate depends on species sensitivity to the physical stresses of entrainment, which should be relatively similar for closely related species. Significant proportions of entrained organisms from taxonomic groups that are relatively hardy (e.g. Serranidae, Ictaluridae) might be expected to survive passage through some cooling systems, while only a small percentage of more sensitive taxonomic groups (e.g. Engraulidae, Clupeidae) would be expected to survive passage through a cooling system regardless of thermal and chemical stresses.

EPA Response

Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule. Please see the response to comment 316bEFR.002.015 for the discussion regarding the inclusion of entrainment survival estimates in site-specific benefit analyses.

Comment ID 316bEFR.306.075

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Assuming that entrainment survival is considered in the BTA assessment, existing survival data may be useful in:

- Screening of intake alternatives—a screening study of all available management options can be used to identify and prioritize intake alternatives for detailed evaluation. As part of this screening, existing entrainment survival studies can be used to identify intake alternatives that would be most beneficial and to qualitatively evaluate their potential for reducing entrainment losses.

- Selection of representative species—if representative species are the basis for the assessment, one of several possible criteria for their selection is that they be susceptible to effects of the intake. Existing entrainment survival data can be used to help assure that the focal species selected for assessment adequately represent a range of species' sensitivities to entrainment.

- Detailed evaluations of fish protection benefits— the use of existing entrainment survival data is necessary for calculating the potential reductions in entrainment mortality that may be achieved by installation of technology or operating alternatives. Where site-specific survival data for the existing intake technology and operation is not available, it may still be desirable to conduct evaluations of entrainment losses for the existing intake using survival estimates appropriately selected from studies at other sites. Such evaluations help to evaluate the relative reductions in entrainment mortality each of the feasible alternatives is likely to provide. Later verification of the assumptions used in the evaluations, including entrainment mortality rates, can still be performed, if necessary.

Where significant site- and species-specific data exist, or could be developed, it may be possible, now or in the future, to protect more organisms by specifying operating conditions that will minimize the numbers of organisms killed by entrainment rather than minimize the number entrained. Development of a site-specific operation plan will depend upon the species involved and their particular phenology, the flow control capabilities of the station, generation levels, ambient temperatures, and design of the cooling water system. Stations that have good entrainment survival data should be permitted to incorporate those data into their plan for compliance with entrainment criteria.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.306.076

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Although entrainment survival studies are difficult and expensive to conduct, the EPA review of existing studies in the Case Studies Chapter A7 was overly pessimistic on several issues:

- Taxa covered – Typically only a few taxa are entrained at high densities at any particular station. Studies of entrainment abundance have shown that the 5 most abundant taxa will comprise on the order of 90% or more of entrained ichthyoplankton. For instance, at the Yorktown Station (York River, VA) a study in 1977 reported that entrained fish larvae were 68% Anchoa mitchilli, 15% Gobiosoma sp., 7% Menidia menidia, 4.5% Microgobius thallisinus, 1.5% Syngnathus fuscus, and approximately 4% others<FN 10>. In a 4-year study of entrainment at the Fort Calhoun Station on the Missouri River, freshwater drum (Aplodinotus grunniens) and suckers (Catastomidae) comprised 95.4% of all larvae collected<FN 11>. Because most species are entrained at low levels, it is neither possible nor necessary to derive empirical estimates of entrainment survival for every species that may be encountered.

Footnotes

10 Virginia Electric Power Corporation, Yorktown Power Station, Yorktown, VA. Environmental Studies- 1977.

11 King, R. G. 1977. Entrainment of Missouri River Fish Larvae through Fort Calhoun Station. Pages 45- 56 In L. D. Jensen (ed) Fourth National Workshop on Entrainment and Impingement. EA Communication, Melville.

EPA Response

EPA was referring to the number of taxa with regard to attempting to develop predictions of entrainment survival for national benefits and not site-specific determinations.

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Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Temporal extent of sampling -- Seasonal patterns of entrainment, particularly in northern states with large seasonal temperature variation, are typically very peaked, with a high proportion of total entrainment occurring over a short period of time. The timing of the peak varies depending upon the environmental conditions and taxa present in the source water body. At the Fort Calhoun Station, peaks occurred in June through early July, reflecting the spawning period of freshwater drum and suckers<FN 12>. Similarly peaked temporal distributions have been found in other freshwater and estuarine systems<FN 13> <FN 14>. Thus, it is not necessary to conduct year-round studies of entrainment survival. A much more cost-effective and relevant study would be done over the periods of peak abundance.

Footnotes

12 Ibid

13 Gammon, J. R. 1976. Measurement of Entrainment and Prediction of Impact on the Wabash and Ohio Rivers. Pages 159-176 In L. D. Jensen (ed.) Third National Workshop on Entrainment and Impingement. Ecological Analysis, Melville.

14 LMS Engineers. 1993. Ravenswood Impingement and Entrainment Report. September 1991-September 1992.

EPA Response

EPA believes that it is important to gain an understanding of entrainment survival throughout the year and in all temperature regimes that organisms may encounter as they pass through a particular cooling water intake structure.

Comment ID 316bEFR.306.078

Subject Matter Code 12.03.02

Entrainment survival chapter

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Inconsistent methodology – The methods employed in the studies reviewed by EPA in Chapter A7 and in the NODA varied among sites and sometime among years at a given site because of site-specific deployment issues and/or the rapid evolution of sampling technology during the period when most of the studies were conducted.<FN 15> Preferred sampling gear changed from plankton nets to pumped flumes to rear-draw and pumpless flume systems, with more reliable results as each advance in gear design reduced the effects attributable to the sampling itself. However, the rear-draw and pumpless systems appeared in the late 1970s and early 1980s, about the time when most entrainment survival studies were discontinued. Only 2 of the studies reviewed by EPRI were more recent than 1985.<FN 16> Future studies would benefit from this evolution in methods and would be expected to provide even more useful information for the facility-specific assessment of benefits. Moreover, while inconsistent methodology may be a valid objection for using the existing data to establish national benefits for the rule, it is not necessarily a reason to reject facility specific use of the data. That is, valid data may be obtained by alternate methods, the principal requirement being that the methods used at any facility provide estimates of entrainment mortality rates that are acceptable in terms of their accuracy and precision.

Footnotes

15 EPRI 2000

16 Ibid

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.306.079

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Sample size – EPA criticized the relatively small sample sizes that were reported in many of the entrainment survival studies. It is true that many single-year studies had low sample sizes for many of the species collected. However, this was generally a reflection of the fact that only a relatively small percentage of the total number of species resident in the waterbody have significant susceptibility to entrainment. Many species are not susceptible to entrainment because of their life history and behavioral characteristics and habitat preferences. Sample size is often relatively high for the species most susceptible to entrainment, which are the logical focus of protection measures. In addition, it may be quite reasonable to combine information across years at a facility to obtain the most precise estimate of the entrainment survival rate. Loss reduction estimates made on the basis of multiyear averages in entrainment survival would not be inconsistent with management objectives that seek to protect the long-term health of the fish populations.

EPA Response

Please see response to 316bEFR.306.073. It may be necessary to combine data from different years at a facility. However, only like data should be combined.

Comment ID 316bEFR.306.080

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.02

Entrainment survival chapter

Latent effects –EPA criticized the latent effects component of the studies for not providing realistic or comprehensive assessment of sublethal effects. Although the artificiality of the latent observation period is undeniable, the critical issue is whether the entrained organisms collected from the discharge experience the same conditions as the unentrained organisms collected from the intake. On this issue, EPA had no comment. In other regulatory efforts, EPA employs similarly artificial test settings to determine the effects of contaminant exposures.

EPA Response

EPA disagrees. The issue is not whether the entrained organism collected from the discharge experience the same conditions as the unentrained organisms collected from the intake in the latent effects studies. Control and experimental samples must always experience identical conditions in any laboratory scientific study. The issue is whether the artificial laboratory setting in which the latent effects studies are conducted accurately reflects the conditions in the field that the discharged organisms are subjected to post-entrainment.

Comment ID 316bEFR.306.081

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

In its final rule EPA may wish to consider using entrainment survival (mortality) in the compliance assessment, thereby aligning the entrainment metric with the impingement mortality metric. It is entrainment mortality, not mere entrainment, that constitutes potential impact. Allowance of the opportunity to factor valid estimates of survival into the estimate of reduction from baseline levels (which assume 100% mortality) may stimulate the collection of better information than presently exists, particularly where some of the hardier taxa are the most commonly entrained. This additional information, even if it does not ultimately demonstrate high survival rates, will nevertheless be useful in understanding the factors which contribute to entrainment stresses and could ultimately lead to improved design of once-through cooling systems or entrainment protection technologies and techniques.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards.

Comment ID 316bEFR.306.082

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

EPA has also requested comment on how to design entrainment survival studies to properly account for organisms that may be destroyed during passage through the condenser system. Destruction of organisms is a concept that is difficult, although not impossible to address. Although comparison of sample densities at the plant intake and discharge would be the simplest approach, this usually will not be sufficient because ichthyoplankton may exhibit distribution patterns at the intake that are typically removed in the discharge sample due to turbulence. Thus, the intake sample may have a systematic bias that is usually not found in the discharge sample. Even so, if properly designed, a comparison of net or pump samples at intake or discharge, in terms of density of organisms and their length-frequencies, can provide valuable information with which to address this question.

Much additional information on destruction can be obtained from use of state-of-the-art survival sampling at intake and discharge stations. By comparing the frequency and types of damage at both locations, some information can be obtained on the severity of organism destruction. If organisms are being completely destroyed during plant passage, then it is also likely that the occurrence of damaged, but still recognizable, organisms will be significantly higher also. Thus a finding of low and roughly similar frequencies of damaged organisms in both intake and discharge samples would suggest a low degree of destruction. However, a significantly higher frequency of damaged organisms in the discharge samples would suggest that organism destruction could be a factor that must be considered.

Direct release studies, in which large quantities of hatchery-reared organisms are released into the cooling system, are perhaps the most effective way to assess organism destruction. Release of a few hundred hatchery-reared organism directly into the intake sampling device, and larger numbers (order of 105) into the intake structure for subsequent sampling in the discharge using state-of-the-art survival gear can provide a direct estimate of damage that is not confounded by the unknown state of wild organisms. Direct release studies are probably most informative if the hatchery-reared organisms can be released somewhat out of the natural period of abundance so that there is no possibility of wild organisms of the same species and life stage appearing in the sample. These direct release studies have been used at plants on the Hudson River.

The approach to assessing destruction of organisms promoted by EPA in the revised Chapter A7, measurements of DOC and POC at the intake and discharge, seems unlikely to yield definitive results. Typical entrainment densities are less than 1 fish egg or larvae per m3, and even very high densities during peak periods at most stations would typically not exceed 10 organisms per m3. The amount of carbon that would be converted from POC to DOC, even if all entrained organisms were to be dissolved during passage through the cooling system, would be on the order of parts-per-billion (ppb), and would not be exclusively assignable to destruction of fish eggs and larvae.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.306.083

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Restoration

Peru's comments relative to restoration have been previously noted in our first section of this comment report and are contained in detail in the our report Enhancement Strategies for Mitigating Potential Operational Impacts of Cooling Water Intake Structures (EPRI 2003b) included in this comment filing. We recommend that the states or the permitted have the flexibility to determine the need for independent peer review. Many states have existing restoration programs and extensive expertise on restoration design and performance thereby negating the need for independent peer review. Descriptions of uncertainty associated with proposed restoration projects is a reasonable and prudent scientific approach.

EPA Response

In the final rule, permitting authorities have the flexibility to determine the need for external peer review. The final rule includes a requirement for uncertainty analysis.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.306.084

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Adaptive management is also reasonable and scientifically prudent; however, we recommend that conditions that trigger adaptive management exercises be clearly articulated in restoration plans otherwise all groups involved in the project could abuse the process with constant project course direction changes. This is especially important, given the long-term nature of environmental restoration projects and the time lags between action and response, since frequent adjustment of management actions based on monitoring data can be counterproductive. Implementation of adaptive management should apply active, rather than passive, adaptation (Walters and Holling 1990)<FN 17>. Active adaptation explicitly chooses management actions to enhance learning and attempts to balance expected short-term performance with the long-term value of improved understanding of system behavior.

Footnotes

17 Walters, C. J., and C. S. Holling. 1990. Large-scale management experiments and learning by doing. Ecology 71(6): 2060-2068.

EPA Response

EPA agrees with the commenter that adaptive management should include active adaptation approaches.

The final rule requires creation of an adaptive management plan by the permit applicant and approval of the plan by the permitting authority. EPA believes this process will allow for strong communication between the permitting authority and the permit applicant about plans and expectations for the restoration measure.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.306.085

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Request for Impingement and Entrainment Data

EPRI submits its recently completed report: Evaluating the Effects of Power Plant Operations on Aquatic Communities: Summary of Impingement Survival Studies (EPRI 2003c). This report provides a summary of impingement survival studies conducted at steam-electric power plants since 1970, along with guidance for their interpretation and use. This information will be of value in estimating impingement effects, evaluating the potential fish protection benefits of technologies, operational measures, and habitat restorations/enhancements, and designing future impingement survival studies. The report is a companion to the EPRI Entrainment Survival Review (EPRI 2000b), which summarizes entrainment survival information, and complements EPRI reports TR- 112013 (Catalog of Fish Population Assessment Methods) (EPRI 1999a), 1005176 (Guidance for Selection of Fish Population Assessment Methods) (EPRI 2002a), and 1005337 (Ecological Risk Assessment Framework for Section 316(b)(EPRI 2002b), which describe the assessment framework and methods and depend, in part, on impingement survival inputs.

Available impingement survival study reports were identified and accessed from several existing holdings, search of the open literature, questionnaires soliciting impingement survival information that were sent by EPRI to its members, and direct requests to several companies thought to have completed impingement survival studies. All documents thus obtained were reviewed and a database of relevant study descriptors and impingement survival estimates was compiled. The study descriptors included in the database provide information on important variables that may influence impingement survival or the interpretation of impingement for each study. To facilitate access to the reported details of the impingement survival studies, the source documents were scanned, compiled on CD and cross-referenced to tables contained in the report. The report discusses the general methodology used in the impingement survival studies; the coverage of species, waterbodies, and screen system characteristics provided by the studies; the factors influencing impingement survival; and factors to consider when using existing impingement survival data for §316(b) planning and assessments.

The review included 65 reports covering impingement survival studies at 29 steam electric plants located in 15 states and the province of Ontario. These studies covered all four of the major waterbody types for which EPA has proposed §316(b) performance requirements. The studies include survival data for three major types of traveling screens (angled, dual-flow, and single-flow) and the majority of studies have tested some form of modification to screen design and/or operation intended to enhance impingement survival. These studies have reported survival data for over 300 different taxa, most identified to the species level, although for many species sample size was small.

Various biological, CWIS, and water body factors have been shown to influence impingement survival rates, but no generally applicable mechanistic models for predicting impingement survival have been developed. Species type appears to be the primary biological factor influencing impingement survival, although growth transitions and seasonal changes in condition may also play important roles. Survival rates vary widely among species, but over 50% of the taxonomic families of fish and shellfish studied to date appear to have the potential for impingement survival rates of 80%

or higher with adequate screen design and operation.

The survival data indicate that the hardier species tolerate the stresses of impingement so well that they exhibit high survival rates under virtually all screen design and operating conditions. For moderately tolerant and sensitive species, the data suggest that modifying screenwash operation to a continuous mode may be the single most effective means for enhancing impingement survival. Screen rotation speed and the use of additional Ristroph-type modifications generally also improved survival of these species. Water temperature and, in the case of estuaries, salinity have been found to be important environmental variables influencing impingement survival, with higher survival at lower temperature and higher salinities.

The uses of impingement mortality rate estimates in §316(b) compliance assessments are discussed and general guidance is provided on factors to consider in using impingement survival data in planning studies and assessments.

EPA Response

EPA thanks the commenter for this submission.

Comment ID 316bEFR.306.086

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

National Benefits

There are two major issues embodied in EPRI's comments on this section. First is the methodologies employed by EPA. Relative to this issue, we have solicited expert comments from Drs. Lawrence Barnthouse and Webb Van Winkle relative to the soundness of the methods used to estimate impingement and entrainment losses. Relative to converting avoided losses to economic benefits, Dr. Ivar Strand is our expert. Details on their comments are presented in Appendices A, D, and B, respectively. Summary comments are presented below. The second issue relates to verifying the calculations performed by EPA and the source of data used in those calculations, as should be found either directly in the NODA or in supporting documents in the Water Docket. Our findings relative to this issue are discussed in the following section.

Case Study Clarifications and Corrections

Essentially, we found verification of the calculations presented in the NODA to be extremely difficult, in some cases, impossible. The following are examples of some of clerical errors identified and some of the calculations we could not verify.

Section X - Clerical Errors

- EPRI and our experts identified at least six separate errors in data entry in these tables, indicating a lack of QA/QC on the effort. For example, (1) Table X-13: The number for the Before Discount column for No Target Species should read 161,685.22 not 151,685.22. In the Discounted using 7% column, the Bottom Fish value should read 77,608.91 not 77.608.91; (2) Table X-24: The number for the Reduced impingement and entrainment as % of total catch column for Bottom Fish should read 6.577 not 6.595; and (3) Table X-25: The number for the Change in recreational losses from impingement and entrainment as % of total catch for Bottom Fish should read 5.010 not 5.024.

- Table X-27: Missing #'s denoted as NA are found in the 316 (b) Regional Case Studies: Chapter F5: Recreational Fishing Benefits. The number for the Boat mode column for Other Fish should read 276. The numbers for the Shore mode column for Sturgeon should read 12,185 and for Big Game, 7,173.

- Table X-28: The number for the 3% discount rate column for No Target should read 417,034 not 471,034. The number for the 7% discount rate column for No Target should read 380,994 not 390,994.

EPA Response

The errors that the commenter notes were only errors in transcribing output from estimation programs to the document, and did not affect other uses of the data. EPA noted this submission and corrected the identified clerical errors in the final Phase II Regional Studies Document (DCN # 6-0003), as appropriate.

Comment ID 316bEFR.306.087

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Questions on validity of I&E values for All Ocean Facilities in the North Atlantic Region

Our main question is this: there are only 2 Ocean Facilities in the North Atlantic Region - Seabrook and Pilgrim. Both I&E data sets are found in the 316(b) Case Studies, Chapter G3: Evaluation of I&E Data. Therefore, one would assume that the Total Annual I&E losses for all Ocean Facilities in the North Atlantic region expressed as Age 1 Equivalents, Foregone Fishery Yield, and Production Foregone, would mirror the combined values located in Chapter G3. This holds true for the entrainment data for Age 1 Equivalents. If you sum the mean Annual Entrainment at Pilgrim, by Species, Expressed as Age 1 Equivalents (Table G3-15) and the mean Annual Entrainment at Seabrook, by Species, Expressed as Age 1 Equivalents (Table G3-7) you get the values found in Table X-9 (page 13554) of the NODA.

The above assumption does not hold true for any other calculation. For example, the entrainment values of Total Yield and Production Foregone found in Table X-9 do not equal the summed entrainment values for the two facilities found in Tables G3-8 and G3-9 for Seabrook, and Tables G3-16 and G3-17 for Pilgrim. The values in Table X-9 of the register are higher.

See Hard Copy for Tables

EPA Response

The commenter has noted some apparent discrepancies among tables reported in the Case Study Document presented at proposal (DCN #4-0003) and analogous tables reported in the NODA. EPA revised aspects of the proposal I&E analyses for the NODA and therefore results from proposal and the NODA do not necessarily agree. General changes to EPA's I&E analyses are presented in the NODA and in Chapter A5 of Part A of the Regional Analysis Document (DCN #6-0003) prepared for the final Phase II rule. Any changes in the life history data used by EPA are provided in the life history appendix provided with each regional study report in the Regional Analysis Document.

The tables are in agreement with respect to age 1 equivalents, as expected. The tables disagree with respect to foregone yield for two reasons: (a) EPA revised many growth-related parameters (such as weight-at-age) between the time that the two separate reports were issued, which affects estimated weight-at-harvest; and (b) the tables listing foregone yield in the NODA include so-called "secondary yield", i.e. the augmentation of foregone yield flowing from the trophic transfer model (see Chapter A5 of the Regional Analysis Document), whereas the table reported in the initial Case Study Document (DCN #4-0003)presented at proposal do not include secondary yield.

Comment ID 316bEFR.306.088

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

As best we can determine, there have been no major changes in the calculations for Total Yield and Production Foregone. In the NODA it states that the Yield Equation contains a typographical error in the Case Study document, but EPA verified that the correct equation was used for the case study analysis. EPA did increase the "net trophic transfer efficiency" from 2.5% to 20% in the model used to calculate Production Foregone. But then EPA states that," although this change in transfer efficiency increases the portion of total yield attributable to the consumption of forage fish, the net effect is insignificant because the trophic transfer pathway accounts for a very small portion of the total foregone yield." If this statement were true, we would not expect to see changes in the values for Total Yield and Production Foregone from the case study analysis to the NODA.

None of the impingement data found in Table X-8 of the Federal Register mirrors the summed impingement values for Seabrook (Tables G3-3, G3-4, and G3-5) and Pilgrim (G3-11, G3-12, and G3-13). This increase is due to the fact that in the case studies EPA assumed that all impinged fish were age 1. The current NODA assumes instead that the ages of impinged fish are age 1 and older.

For example:
Below are the values for Mean Annual Impingement, Expresses as Age 1 Equivalents

(See hardcopy page 44 for table)

EPA Response

EPA used a trophic transfer efficiency of 10% for its final analysis, based on information in Pauly and Christensen (1995) (see DCN #6-1004). EPA notes that any changes in values for Total Yield and Production Foregone will depend on numerous other variables in addition to the trophic transfer efficiency (e.g., growth and mortality rates of life stages and species impinged and entrained).

Comment ID 316bEFR.306.089

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Author Name Doug Dixon & Kent Zammit

Organization EPRI

We also tried to verify age 1 equivalent data, but were unable to reproduce the numbers in the NODA or even the docket documents DCN 5-1002 and DCN 5-1003 (Outline of 316(b) Case Study Evaluation of Impingement and Entrainment Data). We believe that the equation for Feffective found in these two documents is incorrect. Also, to be able to verify I & E values in the NODA, the following information is needed:

- Which facilities are the case study facilities for the new regional study? (We assume Millstone and Brayton Point for the North Atlantic Region, Estuary/Tidal River Facilities, but it is never clearly stated)

- What is the flow at the case study facilities? (We know 822 MGD for Brayton Point, Millstone-?)

- Total Flow in the region?

- The NODA contains a statement that Average Annual Results for facilities with I & E data were averaged and extrapolated on the basis of operational flow to facilities without data. Our question is, were all years for which data were available used for the extrapolation, or were certain years excluded due to low operation/shutdown, etc?

EPA Response

The commenter believes that the equation defining F(effective) is incorrect, but does not elaborate on how it is incorrect. Without more description of the supposed problem, EPA is unable to respond to this comment.

The commenter is uncertain about the model facilities used to generate regional estimates. The commenter is correct that Millstone and Brayton Point are the model facilities for estuary/tidal river facilities in the North Atlantic Region. Information on the facilities with I&E data that were evaluated in each region are presented in the Regional Analysis Document (DCN# 6-0003).

The commenter asks for information about flow rates at several facilities. This information is considered by some facilities to be Confidential Business Information, so it is intentionally omitted from the Regional Analysis Document

The commenter questions EPA's timeframe (use of years in which data were collected). EPA selected representative years of operation through consideration of representative plant operations. In order to establish a meaningful baseline, in some cases loss rates from the year of collection were adjusted by a scalar reflecting changes in installed protective technologies or other plant characteristics between the time of data collection and current conditions. EPA did not use data from years in which plant operations were known to be atypical, such as years with significant shutdowns.

Comment ID 316bEFR.306.090

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Dr. Lawrence Barnthouse in his review of the regional analyses also concluded the following:

“I was greatly impeded in my review by the poor documentation provided in the NODA and in the docket. I was unable to reproduce any of the age-1 equivalent loss, foregone yield, or production foregone estimates provided in the North Atlantic and Northern California case studies. For this reason, I cannot evaluate the quantitative importance of the errors and overly conservative assumptions I identified. In addition to the problems I found in my review, some of the values provided in the benefits tables for these new case studies appear suspicious, (e.g., the extremely high value of tautog production foregone in Table X-7, FR page 13553), however, the information needed to confirm whether errors have been made is unavailable.”

The above are likely only a few of the errors and/or lack of clarification/guidance for verifying EPA’s calculations. Without extensive conversations with EPA regarding their development, much as occurred during the proposed Phase II rule comment period, EPA’s calculations cannot be verified.

EPA Response

EPA has conducted extensive QA/QC of results presented in its final analysis and believes that any errors or inconsistencies in earlier drafts have been eliminated. See EPA’s QA/QC plan for a general discussion of its procedures (Docket #6-1002).

EPA has also made a concerted effort to document its analyses as completely as possible. Nonetheless, because these analyses are complex and involve multiple data sets and analytical methods, EPA recognizes that some reviewers may find it difficult to duplicate all of EPA's calculations.

Comment ID 316bEFR.306.091

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 10.02.07
Regional Benefits Approach

Regional Approach to Developing Benefits Estimates

Drs. Lawrence Barnthouse and Webb Van Winkle prepared detailed comments on behalf of EPRI on the methods used to convert I & E losses into age 1 equivalents, fishery yield and biomass production foregone. Their comments can be found in Appendices A and B, respectively. The following are summary comments from each of their reviews.

Dr. Barnthouse:

- In the NODA, EPA announced a change in the assumptions made concerning the age distribution of impinged fish and concerning the fraction of forage fish biomass that is converted to harvestable predator biomass (termed "trophic transfer efficiency"). In reviewing the NODA itself and the supporting information provided in the docket, I found significant problems with both of these methodological changes.

- The new assumption concerning impingement age distributions is clearly wrong, is contradicted by data already in the docket, and would greatly overstate the benefits of reducing impingement. Monitoring data collected throughout the U.S. demonstrate that impinged fish are generally age 0.

- The new assumption concerning trophic transfer efficiency is inconsistent with the most recent scientific literature and would overstate the benefits of reducing entrainment and impingement of forage fish.

EPA Response

Few facility studies provide information on the age distribution of impinged fish. In EPA's original case studies, EPA assumed that all impinged fish were age 1. Based on comments on this assumption and a review of available information on the ages of impinged fish (e.g., the 1992 monitoring report for the Millstone facility (DCN #5-2307) and New York's Draft Environmental Impact Statement for the State Pollutant Discharge Elimination System Permit Renewal for Bowline Point, Indian Point 2 & 3, and Roseton Steam Generating Stations (DCN #4-3100)), EPA's final analysis for the 316b Phase II rule assumed that impinged fish range in age from juvenile to age 5 and that the age distribution of impinged fish is species specific and follows a fixed distribution as indicated by the set of stage-specific survival rates for each species. In all cases, this method leads to an assumed age distribution that is dominated by juvenile stages, followed by age 1-age 5 fish, each in decreasing relative abundance.

In its final analysis, EPA used a trophic transfer efficiency of 10% as recommended by the commenter and supported by Paul and Christensen (1995) (see Docket #6-1004).

Comment ID 316bEFR.306.092

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.02

Fish Population Modeling

Dr. Van Winkle:

Benefits expected by EPA are not realistic. The benefits expected by EPA in their 316(b) rule making for Phase II existing facilities are not realistic for two reasons. First, empirical evidence is not available from any field study during the past three decades indicating I&E losses are the sole cause, or even the primary cause, of changes at the population, community or ecosystem levels. Second, theoretical considerations and real-world experience relating to direct mortality losses, such as I&E and fishery losses, clearly indicate that managing fish populations by managing direct mortality on early life stages is not as effective as managing fishing mortality Thus, detecting effects at the population and higher levels (much less, economic benefits for humans) caused by reductions in I&E losses seems highly unlikely, even with extensive multi-year monitoring studies.

EPA Response

EPA agrees with the commenter that it is extremely difficult to detect effects at the population and higher levels of biological organization (see the book by Schmitt and Osenberg, "Detecting Ecological Impacts", DCN 2-019A-R21). For this reason, EPA did not base its section 316b benefits analysis and regulatory decision-making on such analyses. EPA also notes that its analysis was not concerned with determining the relative efficiency of minimizing I&E and reducing fish harvest. EPA is concerned with all stressors on fishes in U.S. waters. EPA also notes that control of harvest alone can be insufficient for stock recovery, as indicated in the case of winter flounder in Mt.Hope Bay, Massachusetts. In addition, for the 98% of I&E losses that are not of commercial and recreational fishery species, harvest control is obviously not an option.

Comment ID 316bEFR.306.093

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

EPA's assumptions concerning entrainment survival and compensation are not appropriate in the context of EPA's regional—national cost-benefit analysis. Two assumptions made by EPA in its regional-national cost-benefit analysis are not supportable because we know, with 100% certainty, that they are both inconsistent with scientific evidence. EPA assumes 0% entrainment survival for all life stages of all fish species at all facilities under all operating and environmental conditions for all years. EPA also assumes zero compensatory offsets of I&E losses for any population of any species at any facility under any operating or environmental conditions in any year. Furthermore, adoption of these two assumptions, without any characterization of uncertainty, results in providing decision-makers, all stakeholders and the public with inflated estimates of I&E losses and inflated estimates of benefits of reducing these losses. In the context of site-specific 316(b) determinations, these two assumptions may be reasonable. However, for EPA's regional-national analysis these two assumptions apply to ~550 facilities and hundreds of fish populations under all conditions, and in this context EPA's two assumptions are not scientifically supportable.

In estimating regional I&E losses and benefits of reducing these losses, the focus is on a population of 550 facilities and hundreds of fish populations under a broad range of conditions. EPA's analysis is designed to compare the national benefits and national costs of the proposed rule as applied to this population of facilities and associated fish species. As part of such an analysis, EPA is mandated by its own policies to characterize the uncertainties in both benefits and costs. EPA did not do this in either the proposed rule or the NODA. EPA's assumptions concerning entrainment survival and compensation are two of the most troubling examples.

Having calculated total regional impingement and entrainment losses by waterbody type and species or species group, EPA's next step should have been to consider uncertainty relating to entrainment survival and compensation. Use of fuzzy numbers is an effective and simple method for representing uncertainty in entrainment survival and compensation in EPA's benefits analysis. For both entrainment survival and compensation, the fuzzy-number approach provides for acknowledging EPA's reasons for adopting the simplistic and convenient assumptions of 0% entrainment survival and 0% compensatory offset. However, the approach also acknowledges that:

- EPA has an obligation to characterize uncertainty.

- With 100% certainty we know that some entrainment survival and some compensatory offset will occur among the hundreds of fish populations experiencing I&E losses at the 550 facilities covered by EPA's rule making for Phase II existing facilities.

- Ignoring these realities results in inflated estimates of I&E losses (especially entrainment losses) and benefits of reducing these losses.

EPA Response

EPA did a thorough analysis of available entrainment survival documents. For EPA’s conclusions about entrainment survival see Chapter A7 of the Phase II Regional Analysis Document (DCN #6-0003). See also EPA's response to Comment 316bEFR.306.506.

For a discussion of EPA’s assumptions about compensation see the response to Comment 316bEFR.025.015.

For a discussion of omissions, biases, and uncertainties in relation to EPA’s analysis, see Chapter A6, Chapter A10 and the regional reports contained in EPA's the Regional Analysis Document (DCN #6-0003) for the final rule.

Comment ID 316bEFR.306.094

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

EPA has failed to adequately characterize uncertainties. EPA's regional and national benefit analysis is unavoidably based on many decisions, assumptions and information sources, and it involves many computational steps. In addition, the analysis requires extrapolation on a grand scale both ecologically and economically. Uncertainty, whether due to unavoidable variability or other sources of uncertainty, is associated with every decision, assumption, and information source incorporated in the analysis and with every additional computational step and level of extrapolation. Consequently, uncertainty is guaranteed to monotonically increase throughout EPA's analysis.

I propose seven inequalities involving I&E losses, complexity of EPA's analysis framework, benefits, costs, and uncertainty. These inequalities have several advantages over a detailed quantitative uncertainty analysis that attempts to cope with the many individual steps in EPA's analysis. They are simple and easy to understand, and they all make a macro-level claim. In addition, they are not likely to be controversial because in the context of EPA's analysis they can be easily verified or, in the case of the uncertainty inequalities, are likely to be accepted. Alone or in combination, these inequalities highlight important issues and make powerful statements in the simple manner that should appeal to decision-makers and nontechnical people. Based on these inequalities, it is clear that EPA's cost-benefit analysis for reducing entrainment losses is less convincing than its case for reducing impingement losses. This is an important conclusion to be able to reach because it should condition the vigor with which EPA is justified in requiring costly technological requirements to reduce entrainment losses compared to impingement losses.

EPA Response

Please see response to Comment 316bEFR.503, which is identical to this comment.

Comment ID 316bEFR.306.095

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

EPA Inflates Benefits of Reducing I&E Losses by Compounding Precautionary Assumptions. EPA has made precautionary assumptions at multiple steps in both its biological evaluation of I&E losses and its estimation of the benefits of reducing these losses. Several biological examples are highlighted elsewhere in my review, including 0% entrainment survival and 0% compensatory offset. Without these multiple precautionary assumptions, the economic benefits analysis would be very different. However, EPA has not acknowledged that it is relying on a precautionary approach, has not justified the need for this approach, and has not quantified the magnitude of the inflationary bias created by adopting this approach.

EPA Response

Please see Chapter A7 of the Phase II Regional Analysis Document(DCN #6-0003)and response to Comment 316bEFR.306.506 for a discussion of EPA's reasons for assuming zero entrainment survival. See response to Comment 316bEFR.025.015 for a discussion of EPA's assumptions regarding biological compensation. Please see response to Comment 316bEFR.005.026 regarding the term "precautionary approach."

Comment ID 316bEFR.306.096

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

North Atlantic Regional (NAR) Study

In addition to some of the errors or lack of clarity in the EPA analyses, as noted above, we also attempted to verify the NAR equivalent loss calculations that are presented in the NODA to see if they are reasonable. Unfortunately, EPA does not provide sufficient information in either the NODA or original Case Studies to duplicate their answers. For example, EPA does not provide estimates of the duration of each life stage nor the breakdown of the total entrainment by life stage. Even without such data, we identified a few points that do not look correct:

- The production foregone values for tautog for the North Atlantic (NODA Table X-7) appear totally inconsistent with the number of Equivalent Age 1 and estimated Yield Foregone. By assuming that most (~80%) of the entrainment was eggs, we were able to get Age 1 numbers comparable to EPA's for Brayton Point from the Case Study. When we ran the production foregone model for this species, we came up with more than 12 million pounds. This appears to be unreasonably high. We then looked at the life history values used for tautog (Case Study Table F1-13) and found that they assumed each egg weighed ~1 gram (0.00022 lbs) and each larvae weighed ~10 grams (0.022 lbs). These would be very big eggs and larvae! (Note: for comparison, a 3 inch (75 mm) striped bass weighs just over 5 grams). To see if this might be the reason for the high EPA production foregone values, we re-ran the production foregone model using more reasonable weights for eggs and larvae (typical for cunner). This one change dropped the production foregone for tautog from more than 12 million pounds to less than 2,500 pounds. Clearly, the production foregone model is very sensitive to values used for weight in the early life stages when mortality is high.

- Based on these results, we looked at other weights used in the Brayton Point Case Study. We found that they used unreasonably high weights for eggs and/or larvae for many other species. For example, weakfish larvae were assumed to weigh 30 grams each and winter flounder larvae were assumed to weigh 2 - 10 grams each. For many of the other species, larvae were assumed to weigh 0.5 to 1 gram each. Even these values are way too high. Larval fish are most typically in the range of hundredths of grams each.

Clearly, the EPA did not apply reality check tests to the values used in these calculations. The likely result is that the production foregone values are likely to be substantial overestimates for many of these species. Unfortunately, without more information from the EPA it will prove difficult to further evaluate the estimates presented in the NODA. In addition, the recreational fishing valuation results (X-C-4) presented in this section probably grossly overstate flatfish losses. We were not able to locate DCN-1271 in the docket. This document describes the species groupings on which economic values for four broad species groups are based. These groupings likely have little or no relationship to the species actually constituting the entrainment and impingement counts used for the fisheries analyses. For example, Table 1 (below) shows the species groupings EPA used when compiling entrainment data for Seabrook. Entrainment numbers reported as winter flounder by EPA actually encompassed taxa designated in the entrainment database as Atlantic cod/witch flounder, cunner/yellowtail flounder, Pleuronectidae, winter flounder, witch flounder, and yellowtail flounder. Figure 1 shows the estimated entrainment for these taxa at Seabrook. Note that winter flounder was only a small fraction of entrainment attributed to winter flounder by EPA. Furthermore, the vast majority of the entrainment in the cunner/yellowtail flounder category was actually cunner. The facility report describing the entrainment data clearly states that "A comparison of cunner and yellowtail flounder larval abundance indicated that most of the eggs in the cunner/yellowtail flounder group were likely cunner, assuming a relatively similar hatching rate between the two species." (Normandeau Assoc. 1999: p 4-45)<FN18>. While the ratio of cunner to yellowtail flounder larvae varies from year to year, it can be as large as 408:1 (1997: Normandeau Assoc. 1998)<19> Clearly, entrainment numbers for all flounders and especially winter flounder have been grossly overstated. This problem is compounded when the higher per-fish value associated with winter flounder is assigned to these entrainment numbers.

(See Graphs and Tables on Pg 49 - 51)

Footnotes

18 Normandeau Assoc. 1999. Seabrook Station 1998 Environmental Monitoring in the Hampton-Seabrook Area. Prepared for North Atlantic Energy Service Corporation.

19 Normandeau Assoc. 1998. Seabrook Station 1997 Environmental Monitoring in the Hampton-Seabrook Area. Prepared for North Atlantic Energy Service Corporation.

EPA Response

The commenter has noted several results that appear unreasonable. These results were associated with several biological parameters, such as larval weights, that EPA has revised in its analyses subsequent to receipt of these comments and others on similar topics. Please see response to Comment 305.003 for discussion of EPA's production foregone analysis. EPA has also revised its species aggregation scheme, and cunner are no longer aggregated with winter flounder.

Comment ID 316bEFR.306.097

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Northern California Regional Study

Because of the limited time available, we were unable to evaluate to the same level of detail the calculations for the Northern California Study. Based on results of our NAR analyses, we are not confident that we could verify them nor are we confident that they represent a reasonable estimate of I&E losses for the region. Before moving forward with analyses for other U.S. regions, we recommend the development of standard QA/QC procedures to be followed as well as the use of direct and indirect reality checks on the reasonableness of input parameter values and calculations derived from them.

EPA Response

The commenter is incorrect to assume that EPA did conduct QA/QC analyses or "reality checks" of its input data and results. In fact, extensive review was conducted on all aspects of EPA's analyses. See EPA's QA/QC plan for a general discussion of its procedures (Docket #6-1002).

Comment ID 316bEFR.306.098

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Nonuse Benefits

The following are the major summary comments by Dr. Ivar Strand on EPA's nonuse benefits analyses. Dr. Strand's detailed comments are in Appendix B:

In correcting the flaws in the previous analysis, EPA's two applications, as presented in the NODA, make clear the importance of properly estimating non-use values of fish and shellfish populations and also the complete inadequacy of existing research on the topic. The use values associated with the North Atlantic and Northern California regions contained in the NODA are believable and they highlight the fact that nonuse values must be around 20 to 30 times larger than the use values in order for benefits to equal costs. With non-use or passive use values being so pivotal, it is critical that they be estimated well.

EPA Response

The Agency agrees that estimating non-use values is critical to obtaining comprehensive estimates of total resource value such that the resulting total value estimates may be compared to total social cost. Given that ninety eight percent of organisms affected by I&E are not evaluated directly in the commercial and recreational benefits analysis, and the population of nonusers is larger than the populations of users, it is not unrealistic for the total non-use values to be many times greater than use values. For additional details regarding this issue, please see response to comment #316b.EFR.306.315.

Comment ID 316bEFR.306.099

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA's estimates of non-use value in the North Atlantic region raise substantial concerns, the most prominent among them are:

- There is no research that addresses the non-use value inherent to fish and shellfish stocks affected by the proposed regulations. Does the non-use value change with decreases in numbers of fish and shellfish impinged and entrained? Or is it more akin to existence value, with a threshold effect? No one knows but EPA assumes that non-use value changes with decreases in numbers of fish and shellfish impinged and entrained;

EPA Response

This comment repeats #316bEFR.306.007 – please see that comment for the reply.

Comment ID 316bEFR.306.100

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04.01

Peconic-based approach

To obtain non-use values of changes in North Atlantic fish and shellfish stocks, EPA uses a willingness to pay per wetland or eelgrass acre contained in a study of eastern Long Island by Opaluch et al. (1998). In this study, the authors specifically state "we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions (p 5, Opaluch, et al., 1998)";

EPA Response

Please see EPA's response to comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer.

Comment ID 316bEFR.306.101

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

In responding to the valuation questions about wetlands and eelgrass acreage changes in the Opaluch et al. study, the respondents had no information<FN 20> regarding the effect of wetlands and eelgrass acreage on fish and shellfish populations;

Footnotes

20 The respondents were given an illustration of a fish that was associated with eelgrass changes and a picture of a heron next to marsh grasses that was associated with wetlands changes.

EPA Response

This comment repeats #316bEFR.306.007 – please see that comment for the reply.

Comment ID 316bEFR.306.102

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04.01

Peconic-based approach

The population on which the values are derived is quite affluent and resides nearby the resource in question. This is not representative of the North Atlantic population to whom the non-use values were extrapolated. This creates an upward bias in the aggregate of non-use values.

EPA Response

The comment states that the demographics of the Peconic Estuary region are not representative of the demographics of the North Atlantic population used in EPA's benefit transfer. EPA does not agree. Please see EPA's response to comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region.

Comment ID 316bEFR.306.103

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

In transforming the questionable value per acre of wetlands and eelgrass in the North Atlantic into a value per change in fish population, EPA goes through a process that relies on numerous assumptions and judgments. These result in a fundamentally arbitrary and excessively large non-use value.

EPA Response

This comment repeats #316bEFR.306.007 – please see that comment for the reply.

Comment ID 316bEFR.306.104

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Regional-Level Benefit Cost Analysis

The following summarizes Dr. Strand's comments on the regional-level analyses. Details can be found in Appendix B.

Another potential problem in the NODA is the merging of all facilities into an aggregate regional analysis so that benefits are only dependent on the sample of facilities in a region. While a region-based analysis is probably superior to the original EPA method, the heterogeneity in rivers, estuaries and oceans in combination with differences among facilities makes the regional expansion based on a few facilities quite tenuous. If the facilities chosen in the sample are not representative of the region, then a serious bias will exist. Because the data that exist are most likely associated with facilities that have high I& losses, the bias will upward. [detailed comments on extrapolating facility-level impingement and entrainment losses and the effects of multiplicity of conservative assumptions have been previously reviewed and discussed in detail by Drs. Barnthouse and Van Winkle in Appendices A and D, respectively]

EPA Response

It is not true that only "a few" facilities were evaluated in each region. In fact, I&E data from multiple facilities in each region were used to develop each regional estimate. In some cases, all of the facilities with I&E data in a region were evaluated (e.g., Northern California).

It is also not true that EPA's analysis was based only on facilities with high losses; in fact the magnitude of losses varied widely at the facilities evaluated. EPA was, however, limited in its analysis by a lack of facility I&E monitoring data. As facilities go through the permitting process and permitting authorities collect more I&E data, it will become possible to develop more precise regional estimates.

Given that the goal of EPA's analysis was to develop estimates of impacts and benefits at the national scale, EPA believes that it's regional approach provided a reasonable basis for extrapolation. Please see response to Comment 316bEFR.041.041 for additional discussion of EPA's extrapolation approach.

Comment ID 316bEFR.306.105

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 10.02.04
Valuing Forage Species (incl non-use and non-landed)

In the North Atlantic and Northern California regions, the use values associated with impingement and entrainment losses appear miniscule in comparison to the costs of closed-cycle cooling. If this is also true in the remaining regions, then the estimates of the non-use or passive values are critical. However, EPA has not undertaken a stated preference study that will directly address them. Although monetary and time constraints are used to justify the inaction, substantial funds have been devoted to more studies associated with use values. If the use values continue to remain so small relative to costs in the remaining six regions, then EPA should initiate a process to obtain a better understanding and better estimates of non-use values associated with fish and shellfish populations. The traditional way to approach this is a state of the art stated preference analysis.

EPA Response

As this and several other commenters have noted – and as EPA itself has stated throughout – the best (and only direct) method available for developing reliable and defensible 316b-specific estimates of nonuse values is through the careful design and implementation of a stated preference (SP) research method. This could take the form of a contingent valuation method (CVM) survey or other notable forms of SP research (e.g., conjoint analysis).

SP methods of primary research entail the careful design of survey instruments (e.g., questionnaires) that are administered according to quality-assuring protocols to a scientifically-based sample of individuals. The survey instruments are used to elicit respondents' willingness to pay (or other indications of values or preference rankings) for the physical outcomes that are anticipated from the 316b rule.

While there is broad recognition and acceptance that SP methods are the primary research technique available to estimate nonuse values, there are several important practical reasons why EPA has not pursued such an effort for the 316b rulemaking. The design, implementation, and data analysis associated with conducting a high quality SP method application can be complex, time-consuming, and expensive. The method applied to measuring passive use values is controversial within some portions of the economics profession. Any results generated by a 316b application would most certainly generate as much controversy as it added to measuring the desired values.
In addition to the practical realities that make implementation of a state-of-the-art SP research method difficult and expensive, there also are administrative constraints that a federal agency has to address under the Paperwork Reduction Act to develop and field-implement any survey instrument and sampling design. Overall, the expense, administrative burden, and calendar time associated with an Agency effort to develop and field an SP method for 316b was considered to be beyond what was feasible within the various constraints the Agency faces.

The result of the Agency's choice not to pursue a quality SP primary research effort is the approach used to evaluate the high proportion of unlanded fish that are left out of the recreational and commercial benefits analysis. This approach is based on secondary applications and interpretations of other existing research.

As a result of this dilemma, several commenters have either critiqued the various second best methods the Agency has tried to apply in lieu of a primary SP study, or they have suggested the Agency do the primary SP research required, or both. Ideally, the Agency would have the time and resources to pursue a state-of-the-art SP study. Perhaps time and other resources will be available in the future to enable EPA to develop more primary research for benefits analyses of rulemakings under the Clean Water Act.

Please note that for the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN # 6-0003). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis.

Comment ID 316bEFR.306.106

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Break-Even Analysis

The following summarizes Dr. Strand's comments on the break-even analysis. Details can be found in Appendix B.

Perhaps because of difficulties in obtaining relevant non-use values in the North Atlantic, EPA decided to approach this question from a different angle when evaluating the Northern California region. For Northern California, EPA calculated "break-even" nonuse value, the dollar amount of non-use value that would equate the total economic value with the costs of Northern California investment in closed-cycle cooling systems. While this may be useful information, it is not a substitute for credible estimates of the non-use value of the changes in fish and shellfish stocks associated with lower impingement and entrainment in CWIS. We know what the non-use values would have to be, but we still do not know what they are.

EPA Response

The commenters are correct in that the break-even approach does not answer the critical question of how high the values are, but rather indicates how high the values would need to be in order for benefits to equal costs. Ideally, primary research would be available to help answer the "how high are the benefits" question more directly. However, given the reality that such research does not exist and was not feasible for the Agency to pursue within the context of this rulemaking, the break-even approach provides a useful way to provide some "context" within which decision making process.

As EPA's analysis indicates, the direct use benefits estimated for recreational and commercial fishery impacts reflects only a very small portion of the physical injury associated with impingement and entrainment (i.e., EPA's direct use benefits analysis reflects landed fish, and the I&E assessments reveal that these account for less than 2% of the age 1 equivalent fish lost to I&E are fish not landed by recreational or commercial anglers). Accordingly, a comparison of the estimated direct use benefits alone to compliance costs provide an incomplete and potentially misleading. Taking account of the beneficial values (to reflect the value of protecting the predominant share of the I&E-impacted fish) thus becomes a critical component of the benefit-cost analysis for this rulemaking.

As noted throughout EPA's documents and acknowledged by many commenters, estimating nonuse or other values as may be associated with the unlanded fraction of fish loss is an extremely challenging and uncertain exercise, particularly when primary research using stated preference methods was not performed. In lieu of primary research using stated preference methods, the Agency explored other options. EPA described and applied multiple approaches for developing nonuse benefit estimates based on benefits transfer and associated methods. Each of these secondary approaches has conceptual and empirical limitations as recognized and acknowledged by the Agency. Given the uncertainty about the magnitude of values estimated by these or other means, EPA also developed and applied the "break-even" analysis to provide an alternative context with which to consider the potential likelihood that total benefits (including a reflection of values as may be associated with unlanded fish) might justify the regulation's cost.

While this approach of backing out the "breakeven" value per household does not directly answer the question of what nonuse or related values might actually be worth for the 316b rulemaking, these results do frame the question with a useful perspective that appeals to common sense and facilitates policy-making decisions. The break-even approach poses the question: "are the implicit non-use WTP estimates per household plausible, given empirical evidence available from the existing body of empirical research?" The available literature was then reviewed and reported in a manner that EPA believes does provide decision makers with some useful benchmarks and context for considering whether the benefits might equal or exceed costs. That is, the decision makers were not left to guess how high benefits were – rather, they were given some relevant information from the literature to help them place the results in perspective relative to established valuation benchmarks.

Please also see results from the break-even analysis reported in Chapter D1 of the EBA (DCN #6-0002).

Comment ID 316bEFR.306.107

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

Implementation and Other Regulatory Refinements

Definition and Methods for Determining the “Calculation Baseline”

EPA refinement of the theoretical ‘calculation baseline’ definition is an improvement from proposal. Establishing such a baseline provides a reasonable theoretical metric against which credits for existing fish protection can be ascertained. We have only a few comments relative to the proposed definition, as subsequently discussed. We do note, however, that this baseline calculation should likely be an optional and not prescriptive compliance metric. As later discussed, some applicants may wish to pursue the “as built” approach, therefore, provision for flexibility in conducting compliance monitoring should be provided.

The location, orientation, configuration and mesh size all are reasonable theoretical baseline definition components. We suggest EPA consider adding to this definition that flows operate a full capacity, year round. This addition will allow facilities that have scheduled outages for maintenance in accordance with peak entrainment periods to obtain such credit. Some plants may also reduce flows during certain periods as a fish protection approach. Incorporation of the full-flow operation criteria provides a metric against which flow reductions for fish protection can be measured.

EPA Response

EPA has clarified its definition of calculation baseline in today’s final rule (see §125.93). For additional explanation of EPA’s definition of calculation baseline, please refer to EPA’s response to comment 316bEFR.034.013 and the preamble to the final rule.

Comment ID 316bEFR.306.108

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

We also suggest that regulators have additional flexibility to add components to the definition to account for other measures that may have been implemented or installed for improved fish protection. For example, intake screen system operation varies among facilities in ways that significantly affect impingement mortality, including:

- Debris collection from the screenwash sluiceways for disposal before return to the waterbody, thus resulting in complete mortality of impinged fish;

- Debris return to the waterbody through a variety of screenwash and return system designs that may vary widely in the mortality they induce; and

- Operation of traveling screens over a wide range of schedules, ranging from very frequently to very infrequently, resulting in wide variations in the mortality rate of impinged fish (EPRI 2003).

Under the proposed definition of the baseline, a regulator could impose a baseline that includes survival of impinged fish based on existing information about impingement survival rates and factors influencing survival (e.g., EPRI 2003c). This would prevent applicants from receiving credit in the compliance demonstration for existing design and operations that reduce impingement mortality. An unambiguous definition of the baseline should either specify that the baseline intake is one without a fish return system or is one that yields 100% impingement mortality. This baseline definition would be consistent with the intake screen design standards that were in place when §316(b) was enacted in 1972. At that time, fish protection factors were largely unknown, fish protection modifications were not employed, and regulatory emphasis was focused on removal and disposal of debris by water intake screens as a mechanism for improving water quality, not on fish return.

EPA Response

EPA agrees that operational measures are an important part of achieving compliance. Therefore, EPA has included the authority to use operational measures throughout today's final rule as a means of achieving compliance. EPA has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013and the preamble to the final rule.

Comment ID 316bEFR.306.109

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

The “As Built” approach to assessing compliance is a reasonable approach where the efficacy of a technology can be assessed by direct measurement of entrainment and/or impingement survival. Although the use of this approach is more likely for entrainment compliance, there could be instances where the approach would also apply to impingement and its potential application should not be foreclosed. Such an example is direct installation of modified Ristroph screens with a fish return system separate from debris return. In this situation, survival can be directly measured relative to the 80-95% impingement mortality reduction requirement. In general, because of site-specific issues and the nuances of technology deployment and operation, EPA may wish to consider providing maximum flexibility in the design and timing of such studies in accordance with the mitigation option pursued and the information needed to assess fish protection performance.

EPA Response

EPA agrees that the “As-Built” approach is an acceptable method for establishing the calculation baseline. Therefore, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline (see EPA’s definition of calculation baseline at § 125.93).

Comment ID 316bEFR.306.110

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Options for Evaluating Compliance with Performance Standards

EPA's clarification that the proposed performance standards do not apply to "all species and life stages" reflects that such an approach would be virtually impossible to implement. Alternative approaches proposed and for which EPA requests comments are a major improvement; our comments on each are discussed below. In the absence of a definition of AEI that involves protection of aquatic populations and communities, we note that there is not a 'scientifically correct' approach relative to total numbers, total biomass, or the same for some subset of representative important or indicator species (RIS), including the number of RIS selected for assessing technology effectiveness. As we have discussed throughout this set of comments and the comments we have previously submitted, the 'all species approach', the 'representative species approach' and whether total numbers or total biomass should be the metric is a site-specific issue. EPRI recommends that each of these approaches be retained as possible approaches for measuring technology performance on a site-specific basis. As such, maximum technical flexibility will be provided to both the regulator and the permit applicant. Some brief comments on technical issues associated with each are noted below.

EPA Response

In today's final rule, EPA has chosen to not define the term "adverse environmental impact." EPA does not believe that such a definition is necessary for the successful implementation of today's final rule. EPA agrees that Directors should have flexibility in deciding how to determine compliance. In addition, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003.

Comment ID 316bEFR.306.111

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

All Species Versus Representative Species

EPRI has consistently commented that in order to understand the impacts of a CWIS one must understand the local biology. Therefore, relative to baseline characterization, some variation of the 'Representative Species' approach is the most technically defensible. Consultation with state and federal agencies and tribes could identify species of potential concern (recreational or commercial) or that are representative of different fish guilds or life history strategies could be identified for enumeration. Such an identification would support technology selection and would be a requirement for ascertaining the potential benefits that could be derived as a result of installing a technology. There is a long history with such an approach and it can likely be efficiently implemented.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.306.112

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

Assessing the performance of a technology, once installed, can be fundamentally different from the baseline characterization. Now the focus is on overall reduction in impingement mortality and, when applicable, entrainment relative to the proposed standards. Baseline characterization may find that potential CWIS impacts are dominated by one or a few species (or life stage), and measuring numbers or biomass for 'all species' could be an appropriate measure. This would avoid a potentially burdensome process of identifying individual fish and calculating technology performance for each species, or even representative species. Essentially, the all species approach would integrate technology performance across all actual species present. For some technologies that are potentially highly protective (e.g., cylindrical wedge wire screens and aquatic filter barriers) and can be deployed at the site, assessing performance relative to 'all species' would be an efficient and logical process.

EPA Response

EPA disagrees that the focus of the rule is exclusively on overall reduction of impingement mortality and entrainment. In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan. For explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013 and EPA's definition of calculation baseline at § 125.93.

Comment ID 316bEFR.306.113

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

As a result of the baseline characterization and technology assessments, some permit applicants may identify and volunteer a restoration project as the compliance approach. To support such proposals and to later monitor performance, the 'all species' approach with a measure of biomass lost to CWIS versus biomass ultimately replaced by habitat restoration would also be an efficient and logical metric. As a practical matter, direct weighing of eggs and larvae will be very difficult; however, this can be overcome by counting eggs or larvae in a representative density (#s/volume) sample then convert to biomass based on egg and larvae weights reported in the literature. In the absence of literature data for specific species or life stages, direct measurement on representative sub samples could obtain the needed weight data to support the biomass scale up process.

EPA Response

EPA does not require any particular methodology in the final rule. For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Comment ID 316bEFR.306.114

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Relative to establishing the list of 'representative species' or 'critical aquatic organisms', the number of inclusive species should be driven by the distribution of species in the baseline characterization and whether or not they are of commercial and recreational concern to the resource agencies and tribes. This would avoid arbitrarily specifying the number of inclusive species, such as the 10 to 15 noted by EPA. For example, if 99% of the species impinged or entrained were for one species, collecting additional information for other species would be unnecessary relative to eventually assessing the performance of a technology (or for supporting a restoration proposal). Generally, most impingement and entrainment samples (whether by numbers or biomass) are dominated by only a few species. If EPA allows flexibility in selecting inclusive species, EPRI believes that the regulator, resource agencies, applicants and other stakeholders can reach informed decisions relative to target species on which baseline characterization and technology performance can be assessed.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan. For a discussion of how compliance is to be determined, please see EPA's response to comment 316bEFR.017.003.

Comment ID 316bEFR.306.115

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

Numbers of Organisms or Biomass

Some of our comments relative to numbers of organisms or biomass have been noted in the previous section. Additional technical points are subsequently noted such that EPA can consider providing additional options for assessing technology performance. Of particular note, entrainment samples will be overwhelming dominated by eggs and early life stages; however, the vast majority of these will die because of natural mortality. Protecting these early life stages may be extremely difficult, extremely expensive and, in some cases due to site-specific condition, impossible. Relative to our recommendations for an AEI definition, we recommend, relative to measuring effectiveness of impingement and entrainment reduction technologies, that the standard metric of ‘equivalent loss’ be an option in the assessment process. EPA’s proposed regulations requiring substantial reductions in entrainment and impingement losses at existing CWIS are based on the presumption that such losses pose an unacceptable risk to the continued health and well-being of aquatic populations and communities in the water bodies that serve as the source of the cooling water. Consequently, we believe that the measure used to determine compliance with the regulations be a scientifically valid measure of the risk posed by the cooling water intakes. By using such a measure, one can then presume that the reductions in entrainment and impingement loss achieved at a CWIS correspond to a comparable reduction in risk to the aquatic ecosystem.

Equivalent loss models are based on well-accepted scientific principals (life tables) and have a long history of use for assessing the risk of CWIS. In fact, they form the basis for the economic benefits assessment for the current Phase II rulemaking efforts. Equivalent loss provides a mechanism for combining estimates of entrainment and impingement loss across life stages and ages into a common currency (number of adults, number at Age 1, biomass, etc.). Reduction in equivalent loss can then be used to measure the performance of potential intake alternative. Just such an approach is currently embodied in evaluation of an aquatic filter barrier that is a component of a New York State SPDES permit for the Lovett Generating Station. Equivalent loss estimates provide a measure of risk that is more closely linked to the protection objectives of the CWA and §316(b). Yet the information needed for estimation of equivalent losses is more readily available or more easily obtained than other measures of entrainment and impingement risk, such as fractional loss estimates (EPRI 2002a, 2002b). Equivalent loss measures provide applicants with the additional advantage that they are amenable to valuation in the event that cost versus benefit assessment is a desired or necessary part of the compliance demonstration.

Conversion of life stage- or age-specific estimates of entrainment and impingement loss to measures of equivalent loss requires estimates of life stage specific mortality and, in the case of production foregone, growth rates. Fortunately, such information is readily available from prior §316(b) assessments for many of the commonly entrained and impinged species throughout the country. For other species, such information could be obtained from the scientific literature or from other species with similar life history characteristics. Because the assessment of compliance with the entrainment and impingement loss reductions is a comparative one (i.e., alternatives versus a baseline case), the precision of life-stage specific mortality and growth estimates is not as critical for the analysis of compliance with the loss reduction criteria as it might be for assessing adverse environmental impact. Such equivalent loss input parameters should be defined and accepted by both regulatory agency and permit applicant prior to the intake alternatives evaluation. This was the approach used for the permitting of the Lovett Generating Station.

We believe that the approach described above provides a technically sound optional method for determination of compliance with entrainment and impingement reduction requirements under §316(b). This approach will help to ensure that protection is directed towards those species and life stages that are most important for the continued health of the aquatic ecosystems in the source waterbodies. While such an approach might seem technically cumbersome and difficult to employ, this is not the case. Once the input parameters for each of the equivalent loss models are established, generation of equivalent loss estimates is a simple spreadsheet exercise. Further, model input parameters for each representative species can be transferred from site to site. While such an approach necessitates collection of the biological data (e.g., entrainment and impingement monitoring) on a species-specific basis, the cost for such are a relatively small component of the overall sample collection and sorting costs. We believe that such additional costs are more than warranted by the gains in alternative intake evaluation process.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027.

Comment ID 316bEFR.306.116

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

Additional Comments

Site-specific variability in the physical sciences and biology, CWIS operation, and performance of fish protection technologies, as we have long noted in our comments and reports, indicates the importance of providing flexibility in the determination of the species and metrics to be used during both baseline characterization and technology performance assessment. The following additional points are noted for consideration relative to providing flexibility in determining technology performance or in setting standards of performance:

- Exclusion of fish that are moribund or dead on arrival, as discussed in the NODA, is notable and logical. CWIS will act as ‘filters’ and collect moribund and dead fish that occur in the water due to natural causes (e.g., cold shock, low dissolved oxygen) and these organisms should be excluded from performance assessments. Not only should they be excluded, the technology should not be expected to perform at ‘normal’ standards because of clogging of screens, fish return troughs, etc. Essentially, expectation of technology performance to ‘target’ standards should not be expected during episodic fish kills. Standards for determining/identifying moribund and dead fish can be ascertained on a site-specific basis.

EPA Response

With regard to EPA’s approach to the exclusion of moribund or dead organisms from determining compliance, it is generally EPA’s position that naturally dead or moribund organisms should not be factored into the impingement or entrainment rates of a facility. However, EPA has left the final determination on methodology employed to the Director. EPA has included a provision in the Verification Monitoring Plan which allows a facility to exclude moribund or dead organisms. The facility may submit a proposal the Director as part of the Verification Monitoring Plan, that details how naturally moribund fish and shellfish that enter the cooling water intake structure would be identified and taken into account in determining compliance with the performance standards in § 125.94.

Comment ID 316bEFR.306.117

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.04

Determination of compliance

EPRI recommends that in addition to exceptions for moribund and dead fish, similar performance exceptions be made when other episodic physical and biological events occur such as corn shuck loading during harvest seasons, leaf load during fall, woody debris and sediment load during high flow events, and SAV (e.g., eelgrass) loads following storm events. No technology can be expected to perform at expected standards during such events. Similar standards for determining/identifying conditions under which a technology cannot be expected to perform can be established on a site-specific basis.

EPA Response

EPA acknowledges that natural factors may affect the efficacy of any technology. For EPA's position on upset and bypass provisions please see EPA's response to comment 316bEFR.034.017.

Comment ID 316bEFR.306.118

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Exclusions from protecting nuisance and exotic (invasive) species should be a site-specific resource management option.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003.

Comment ID 316bEFR.306.119

Subject Matter Code 21.04

Determination of compliance

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Interannual variability in the numbers and assemblage of aquatic organisms impinged and entrained present challenges for assessing technology performance. Flexibility should be provided in the rules such that the challenges can be addressed. Our previous comments have noted how common it is for fish populations to vary in number and types of species on an annual basis (Sissenwine 1984, Winemiller and Rose 1993, Rose et al. 2001). For example, when performance monitoring is initiated (following collection of baseline data in previous years), the species assemblage and their relative distributions may be completely different than that observed during the baseline characterization. For technologies that reduce the impingement rate it will be difficult to directly demonstrate that the rate, in fact, has been reduced. The technologies that reduce the rate of impingement include, for example, cylindrical wedge wire screens, aquatic fabric barriers, barrier nets, and behavioral barriers (light, sound). This challenge can be overcome using indices of inter-annual relative abundance (such as reviewed at the EPA CWIS Conference, May 6-7, 2003 by Dave Bailey of Mirant Mid-Atlantic for their barrier net performance assessment at the Chalk Point Station on the Patuxent River, Maryland). Other approaches are also possible, the key point, however, is that provision of flexibility in the development and use of metrics will allow the development of technically defensible methods and metrics.

Flexibility will allow for innovation as well as adaptive approaches that address unanticipated conditions. Provision of maximum flexibility, essentially by limiting prescriptive requirements, will allow permit applicants, resource agencies, regulators and other stakeholders to derive scientifically informed approaches toward meeting the objectives of the rule.

EPA Response

EPA understands that natural populations will vary in abundance over the course of a year. For EPA's position on upset and bypass provisions please see EPA's response to comment 316bEFR.034.017. For a discussion of how compliance is to be determined, please see the preamble of the final rule, including its discussion of the availability of TIOPs with the approval of the Director, as well as, EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005.

Comment ID 316bEFR.306.120

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Timelines, Schedules, and Determination

EPRI has only a few comments relative to the compliance timeline and schedule. These included:

- Impingement and, when applicable, entrainment monitoring data will need to be collected and analyzed to support baseline calculations of fish losses. This information will then be used to assess technology and restoration options. This process can take a minimum of one year and considerably longer depending upon complexity of site-specific issues. EPA needs to consider the time required for developing baseline data and analyses relative to the compliance timeline and schedule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.306.121

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 21.09

Permit applications/implementation schedule

EPRI previously noted that a 6-month compliance schedule is not a realistic timeframe for the design and installation of even the simplest impingement reduction technology. Retrofitting traveling screens with fish removal features or fish return systems would require more than 6 months. Efforts would include detailed design, preparation of construction and fabrication drawings and specifications, procurement and fabrication of components, and complete installation. At least one year would be required to complete even simple modifications.

EPA Response

See response to comment 316bEFR.002.021 for a discussion of installing technologies and see the preamble for a discussion of compliance alternatives.

Comment ID 316bEFR.306.122

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 21.09
Permit applications/implementation schedule

Finally, as we verbally noted at the EPA CWIS conference in Arlington, VA (May 6- 7, 2003), there simply is insufficient consulting capacity to address the likely demand for impingement and entrainment monitoring, fish identification (particularly early life stages), assessing, designing and installing technologies, and performing economic analyses in response to the new rule requirements. It may take several years before sufficient capacity exists to meet the demand that will arise. This lack of consulting support capacity should also be considered when establishing the compliance timeline and schedule.

EPA Response

EPA disagrees with the commenter and believes that due to the varied compliance alternatives available to the facilities, demand for consulting support is not expected to occur simultaneously. Additionally, EPA has clarified timing requirements for the submittal of application studies. Please see response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.306.201

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

In its comments on the benefits case study, PISCES claimed that EPA had underestimated entrainment and impingement loss rates, underestimated the impact of impinging age-1 and older fish, used inappropriately low survival rates to scale entrainment losses to age-1 equivalent losses, and underestimated the economic value of entrained and impinged fish. In addition, PISCES argued that habitat restoration and replacement projects should not be used to satisfy the requirements of Section 316(b) because in-kind replacement of entrained and impinged fish cannot be guaranteed.

In reviewing Pisces' comments, I identified several significant errors and misinterpretations, and I find that most of Pisces' major conclusions are incorrect.

-In its analysis of entrainment and impingement loss rates, Pisces used an inapplicable data set and misinterpreted cooling water withdrawal data for the Salem Generating Station. I found no evidence that EPA had underestimated these losses.

-Pisces' assertion concerning the impact of impinging fish older than one year-of age is partially correct. However the conclusion that impingement loss rates, when expressed as age-1 equivalent losses, are nearly as large as entrainment loss rates is based on invalid reasoning and is incorrect.

-Pisces' analysis of variability and bias in estimates of natural survival rates for early life stages of fish is invalid and the conclusion that survival rates for all species should be increased by 25% is incorrect.

-Pisces' "reproductive value" approach to estimating the economic value of fish that die of natural causes ignores density-dependence and would be expected to greatly overstate the actual economic value of unharvested fish.

-Pisces' critique of habitat restoration and replacement projects is one-sided and substantially understates the potential environmental benefits of these projects.

EPA Response

EPA notes this review of comments submitted by Pisces. In regards to the issue of reproductive value, please see response to Comment 316bEFR.206.065.

Comment ID 316bEFR.306.202

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Author Name Doug Dixon & Kent Zammit

Organization EPRI

In the NODA, EPA announced a change in the assumptions made concerning the age distribution of impinged fish and concerning the fraction of forage fish biomass that is converted to harvestable predator biomass (termed “trophic transfer efficiency”). In reviewing the NODA itself and the supporting information provided in the docket, I found significant problems with both of these methodological changes.

-The new assumption concerning impingement age distributions is clearly wrong, is contradicted by data already in the docket, and would greatly overstate the benefits of reducing impingement.

-The new assumption concerning trophic transfer efficiency is inconsistent with the most recent scientific literature and would overstate the benefits of reducing entrainment and impingement of forage fish.

EPA Response

The commenter expresses concern about the method used to interpret impingement records with respect to age distributions. Upon further review, EPA has revised its assumptions about the ages of impinged fish, as detailed in the response to Comment 316bEFR.029.105. For a discussion of EPA's trophic transfer model, please see response to Comment 316bEFR.305.004.

Comment ID 316bEFR.306.203

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

I was greatly impeded in my review by the poor documentation provided in the NODA and in the docket. I was unable to reproduce any of the age-1 equivalent loss, foregone yield, or production foregone estimates provided in the North Atlantic and Northern California case studies. For this reason, I cannot evaluate the quantitative importance of the errors and overly conservative assumptions I identified. In addition to the problems I found in my review, some of the values provided in the benefits tables for these new case studies appear suspicious, (e.g., the extremely high value of tautog production foregone in Table X-7, FR page 13553), however, the information needed to confirm whether errors have been made is unavailable.

EPA Response

The commenters do not specify exactly where they had difficulties in reproducing EPA's results, so EPA is unable to respond to their critique. The difficulties may lie in the fact that there were changes in input data between proposal and the NODA. Regarding the commenters' assertion that EPA's analysis includes "overly conservative assumptions," please see EPA's response to Comment 316bEFR.074.201.

Comment ID 316bEFR.306.204

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 6.01
Overview of I & E effects on organisms

Review of Comments by Pisces, Ltd. on EPA's 316(b) Case Study Methodology

I have reviewed Pisces' analysis with respect to technical accuracy and relevance to the rulemaking process. My comments are organized around five major issues raised by Pisces that directly challenge the basis for EPA's proposed rule. Brief comments are also provided concerning some secondary issues that do not directly challenge EPA's analyses or conclusions but that support the Riverkeeper Organization's contentions concerning the importance of minimizing entrainment and impingement losses.

Major Issue 1: Underestimation of losses due to underestimation of expected future water withdrawal rates.

Pisces argued (Section 1.4) that impingement and entrainment vary nonlinearly with flow, and that, because of recent increases in flow rates, EPA's estimates of future entrainment and impingement loss rates are biased low.

Pisces cited a paper by Kelso and Milburn (1979) as support for the proposition that impingement and entrainment are nonlinearly related to flow. These authors examined entrainment and impingement data for 37 power plants located on the Great Lakes, and developed empirical equations relating flow rate, entrainment, and impingement. Both equations are both power functions, implying that entrainment and impingement increase exponentially with flow. Clearly, since the data relate to the Great Lakes and are more than 25 years old, the equations themselves are irrelevant to evaluation of EPA's analysis. Moreover, as is shown in Figure 1, the quantitative significance of the nonlinearity described by Kelso and Milburn (1979) is trivial. Figures 1a and 1b plot entrainment and impingement rates calculated from the equations provided in the Pisces analysis over an arbitrary range of 500 to 1600 gallons per second (the actual range of flows used is irrelevant – the plots would look the same over any range of flows). Along with curves calculated using the power functions from Kelso and Milburn (1979), each plot shows a linear approximation calculated by drawing a straight line connecting the two ends of the curves. It is clear that the degree of non-linearity is small. For any given flow rate, the differences between the curves and the lines are probably much smaller than the uncertainty (not discussed by Pisces) in the impingement or entrainment rate expected at any given flow. Moreover, at every flow rate, the linear approximations overestimate the loss estimates obtained using the power functions.

Pisces also stated that EPA underestimated losses by failing to account for increases in the mean flow at many plants. The report illustrates this contention through an analysis of withdrawal rate data for Salem. According to Pisces, EPA should have used the estimated withdrawal rate for 1998, which was very high, rather than a long-term average withdrawal rate. This particular example is clearly inappropriate, because the principal use for these data in EPA's analysis was to calculate entrainment and impingement loss rates, measured as fish per unit flow. The loss rates were then scaled to other facilities using estimated withdrawal rates for those facilities. In any case, 1998 withdrawals are probably not representative of future operations at Salem, because this particular year immediately followed a two-year shutdown of both units for a major facility upgrade. Representative future withdrawal rates would have to be adjusted for periodic refueling and maintenance shutdowns.

[see hard copy for figure]

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used in EPA's benefits analysis that I&E are proportional to flow. EPA agrees with the commenters' conclusion that the data in the paper cited by Pisces indicate that for any given flow rate, the difference between the curves and the lines are probably smaller than the uncertainty in the I&E rate expected at any given flow. EPA also agrees with the commenters' observation that EPA used Salem flow data to calculate average annual I&E rates as fish per unit flow and that 1998 flow data were not appropriate for this purpose.

Comment ID 316bEFR.306.205

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Major Issue No. 2: Underestimation of impingement due to age 1 assumptions

Pisces claimed that EPA underestimated effects of impingement losses “both in terms of their impact on the populations and relative to entrainment” by assuming that all impinged fish are age 1. Pisces supported this argument with a series of calculations (sections 1.5 and 1.6) in which, instead of assuming that all impinged fish are age 1, actual age distribution of the impingement counts provided in the Salem filing (as reproduced in EPA’s input spreadsheet for Salem) were used to convert age 1 and older impingement losses into age-1 equivalents. The results of these calculations were especially dramatic for white perch, because white perch up to eight years old are impinged at Salem.

Pisces is correct in stating that the appropriate approach for calculating age-1 equivalents is to scale all of the age groups to age 1 using estimates of the fraction of fish expected to survive from age 1 to the age at which impingement occurred (e.g., for eight-year-old fish, the fraction expected to survive from age 1 to age 8). I was able to reproduce Pisces’s calculations, and in doing so I found that Pisces’s survival rates for age groups 1 through 7 are incorrect. These values were apparently taken from EPA’s input data spreadsheet for Salem. This spreadsheet contains an erroneous formula for calculating total mortality rates from estimates of age-specific natural mortality and fishing mortality rates. The error inflates the total mortality rate estimates for adult fish, and consequently inflates the estimated numbers of age-1 equivalents for fish that are age 1 and older.

Although the calculations presented in Pisces’s analysis are correct in principle, the interpretation of the results by Pisces is incorrect. For the purpose of impact assessment and benefits analysis, scaling older fish backwards to age 1 is not equivalent to scaling younger fish forward to age 1. For age 0 fish, the scaling adjusts losses of eggs, larvae, and juveniles to a common future age, prior to the age at which the fish may be expected to reproduce or to be harvested. These estimates can then be used to calculate expected harvest or reproduction that would have occurred at future ages, had these fish not been entrained or impinged. The same procedure cannot be applied to age-1-equivalent estimates derived from backward-scaling of losses that occur at older ages. The reason for this is that no reproductive potential or opportunity for harvest is lost prior to the age at which a fish is actually impinged. For example, each eight-year-old white perch is, according to Pisces, equivalent to 13,572 age-1 white perch (the correct value is 5,961 EPRI APPENDIX A 6 age-1 equivalents). This means that, for every 13,572 (5,961) white perch alive on their first birthday, only 1 would be expected to survive to age 8 years. The 13,571 (5,960) fish that did not survive would have died of natural causes (most likely due to consumption by predators) or would have been harvested prior to the age at which the impinged fish was lost. No foregone yield or reproduction would accrue due to the deaths of these fish.

In Table 6 of its analysis, Pisces calculated numbers of equivalent 1-year olds, by age group, for the total numbers of all RIS fish species collected over all available years of sampling at Salem. Figure 2 of my comments compares estimates of equivalent 1-year olds (recalculated using correct mortality rates), yield foregone, and production foregone for each white perch age group. The following equations were used to make these calculations:

[see hard copy for equation]

All parameters in the above equations except for the loss rates were taken from Appendix L, Tab 18 of the Salem filing (PSEG 1999). Figure 2 shows that white perch impinged at an age of eight years, which account more than 75% of the age-1 equivalent losses as calculated using Pisces' method, account for only 7% of the total yield foregone and for less than 2% of the total reproduction foregone. It is true that assuming that age 1 and older fish are impinged at age 1 underestimates the yield and reproduction foregone due to impingement, however, the magnitude of the bias is much smaller than is implied in Pisces' analysis. Pisces's assertion that impingement losses – when measured in terms that are relevant for impact assessment and benefits analysis – are similar in magnitude to entrainment losses is erroneous.

[see hard copy for figure]

EPA Response

Regarding EPA's assumptions on the age distribution of impinged fish for its final analysis for the Phase 2 rule, please see response to Comment 316bEFR.029.105

Comment ID 316bEFR.306.206

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 10.01.02.01
EPA methods: age 1 equiv, yield, prod foregone

Major Issue No. 3: Effect of survival rate on age 1 equivalent calculations

In Section 1.6.2, Pisces argued that survival rates used by EPA in scaling losses of early life stages to age-1 equivalents were too low. Support for this argument included (1) a comparison of striped bass and cunner survival rates used by EPA to other published values (2) a sensitivity analysis demonstrating that increasing the assumed survival fractions increases the estimates numbers of age-1 equivalents, (3) an assertion that EPA's survivorship estimates already include effects of power stations and therefore are probably biased high, and (4) an assertion that for this reason all of the survivorship estimates should be increased by 25%.

The fact that survival rates of early life stages are highly variable and difficult to measure is well known. Table 1 compares empirical estimates of survival rates from five different studies of bay anchovy, one of the most frequently studied of all fish species vulnerable to entrainment and impingement. This table shows that the actual range of variation in estimated values is much greater even than is suggested in Pisces's comments. This variability does not imply, however, that EPA systematically underestimated or overestimated survival rates as compared to published studies.

It is definitely not true that the estimates used by EPA in general include station mortality. This could be the case only for survival estimates derived from site-specific studies of populations susceptible to station impacts. However, survival estimates used in 316(b) demonstrations are only rarely based on site-specific data. In the great majority of studies, survival estimates are derived from available scientific literature.

Even if the estimated survival rates did include station mortality, it is not true that conditional mortality rates are "often in the 10%-25% range." Such rates have been observed only at a few sites (most notoriously, the Delaware Estuary and the Hudson River) and for only the most susceptible species at those sites. Values this high are not representative of all sites or species nationwide. Hence, there is no justification for increasing the survival rate estimates used in the age-1 equivalent calculations.

[see hard copy for table]

EPA Response

EPA agrees with most of this comment. However, with respect to conditional mortality rates, EPA notes that such rates are unavailable for most facilities and species. Therefore, it is unknown how representative rates of 10-25% may be.

Comment ID 316bEFR.306.207

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Major Issue No. 4: Calculating the worth of commercial species impinged and entrained

Pisces asserted that EPA had underestimated the economic value of entrained and impinged fish species by neglecting to value those fish that would have died of natural causes rather than being harvested. Pisces's argument is based on "reproductive value," defined as the expected contribution of a fish at any given age to future generations of fish. If the reproductive value of each egg is defined to be 1.0 (since at equilibrium one egg will be produced in each generation for each egg produced in the previous generation), then the reproductive value of a fish at any given age is given by:

(See Appendix A pg 8 for Formula)

For age a = 1 year, Equation (3) calculates the number of eggs expected to be produced over the lifetime of each age-1 equivalent fish. When applied to age-1 equivalent fish, reproductive value as defined in Equation (3) is identical to reproductive potential as defined in Equation (2) divided by the age 0 survival rate.

As noted by Pisces, the economic benefits model used by EPA calculates the expected lifetime yield from each 1-year-old equivalent fish, and then assigns an economic value to that yield. Pisces used Equation (3) to assign values for those fish that die of natural causes rather than being harvested. Pisces calculated the number of eggs that would have been produced by the unharvested fish, multiplied this value by the fraction of eggs expected to survive to age 1, and then calculated the value of these second-generation 1-year-olds using EPA's model.

Pisces provided numerical calculations for striped bass and for 11 species entrained and impinged at Pilgrim. The survival and fecundity values for striped bass appear to have been taken from Setzler-Hamilton et al. (1980) and do not match values used by EPA or by PSEG (1999). It is not clear whether the age-specific fecundity values were adjusted to account for sex ratio (which they should have been). However, the principal problem with the approach is with the validity of the multi-generational extrapolation. Pisces's approach assumes that recruitment is directly proportional to egg production, i.e., there is no density-dependence. Numerous recent studies, as reviewed by Rose et al. (2001), have shown that density-dependent recruitment in marine fish species is the rule rather than the exception; evidence for density-dependence in striped bass is especially strong. For this reason, Pisces's approach should overestimate next-generation reductions in harvest. In a population that is relatively stable from generation to generation, there would be little or no net loss to the next generation because reduced egg production due to the losses would be balanced by improved reproduction or survival of those fish that were not entrained or impinged. Even if a reduction in recruit production due to entrainment and impingement did occur, any reduction in value assigned to these foregone future fish would have to be converted to net present value using an appropriate discount rate.

Pisces's comment simply reflects an alternative and highly conservative assessment approach, not an error on the part of EPA.

EPA Response

EPA comments on the general issue of reproductive value in responses to Comment 316bEFR.206.065.

Comment ID 316bEFR.306.208

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Major Issue No. 5: Biological issues implicit in habitat replacement

Section 5.1 of Pisces' comments consists primarily of a one-sided value-based argument (non-scientific) against Peg's Estuary Enhancement Program and other similar restoration projects. However, three important and arguably valid points are raised on page 55:

- Habitat equivalency analysis is primarily aimed at offsetting past losses or damage, rather than continuing loss

- Considerable uncertainty exists as to whether equivalence can be focused on actual species harmed; and

- Sufficient habitat to offset losses or damage may often be unavailable.

The first two points raised by Pisces are technically correct but irrelevant. Since cooling water withdrawals do not affect the ability of habitat to perform its normal ecological function, the concept of habitat equivalency is inapplicable to 316(b) issues, regardless of whether the damage is past or continuing. In addition, it should be obvious that habitat restoration projects cannot possibly be designed to provide specific numbers of specific fish species. Successful projects can enhance the productivity and diversity of entire ecosystems, however, the numbers or biomass of individual species that will be produced by any given project cannot be confidently predicted. Even the most aggressive proponents of habitat restoration make no such claims. In raising the issue of in-kind replacement as a defect in EPA's proposed rule, Pisces has simply erected a convenient straw man to knock down.

With regard to point no. 3, Pisces is probably correct that lack of suitable quantities of habitat will often prevent companies from using restoration as a means of satisfying the rule. However, this does not mean that these activities should not be pursued where feasible.

Regardless of the objections raised by Pisces, habitat restoration is a worthwhile activity that can provide a wide variety of tangible environmental benefits. The most obvious of these benefits include enhanced production of all types of aquatic biota, provision of habitat for wildlife, and increased opportunities for aesthetic enjoyment and education. Benefits of restoration can be expected to continue long after the retirement of all of the facilities subject to the proposed rule. In contrast, long-term monitoring studies have provided at best equivocal evidence that fish populations have been adversely affected by entrainment and impingement losses. Reducing those losses may produce no measurable environmental benefits.

EPA Response

For a discussion of uncertainties associated with restoration measures, see EPA's response to comment 316bEFR.206.055.

For a discussion of the use of out-of-kind restoration in the context of the final rule, see EPA's response to comment 316bEFR.206.055.

EPA agrees that although space limitations may make restoration infeasible for some permit applicants, for other permit applicants, this will not impede their consideration of restoration measures.

For a discussion of the role of ancillary benefits, see EPA's response to 316bEFR.032.011.

For a discussion of adverse environmental impacts deriving from impingement and entrainment by cooling water intake structures, see EPA's response to comment 316bEFR.207.015.

Comment ID 316bEFR.306.209

Subject Matter Code 6.05
Impacts to T&E species

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Other issues

Impacts on threatened and endangered species. The need for additional reductions in losses to protect T&E species is raised in Section 7.1 of Pisces' comments. However, these species are already protected by the Endangered Species Act. Operators whose facilities have the potential to entrain or impinge T&E species are already required to have consultations with the appropriate agencies, and to obtain certification that they are not harming these species.

EPA Response

EPA agrees that the requirements of today's rule should not be construed to preclude or deny the protection of Threatened and Endangered species by the Endangered Species Act.

Comment ID 316bEFR.306.210

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Problems in calculating age-1 equivalents. Section 1.5 (page 8) correctly notes that the validity of the calculations is limited by the quality of available data on stage-specific losses and survival rates. As noted above, there is no indication that EPA systematically overestimated or underestimated these values.

EPA Response

EPA acknowledges the commenter’s support of EPA's age 1 equivalent calculations.

Comment ID 316bEFR.306.211

Subject Matter Code 10.01.03

Data Issues

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Trends in abundance of fishes. Section 1.7 (pages 22-26) notes that, because of improved water quality and in some cases improved fisheries management, the abundance of some fish species has increased. Any such increases would likely result in increased entrainment and impingement losses. This, according to Pisces, means that the economic benefits of reducing the losses might have been underestimated if the available data were collected in the 1970s. On the other hand, some species have declined since the 1970s (Atlantic tomcod in the Hudson River is cited as an example). In these cases, using older data means that the potential impacts of entrainment and impingement on the declining species may have been underestimated. This comment is clearly an example of "spin" and not a technical comment on the benefits analysis. Since the benefits analysis is a national aggregate, as long as the increases and decreases are roughly balanced there would be minimal effects on the net results.

EPA Response

EPA's estimates of current (baseline) I&E may be over- or underestimated if fish abundances have declined or increased since the data used by EPA were obtained. It is unknown if potential increases or decreases would be roughly balanced and therefore would have minimal effects on EPA's results. Unfortunately, EPA's analysis was constrained by the available data, which rarely provide information for determining if and how fish stocks may have changed as a results of I&E.

Comment ID 316bEFR.306.212

Subject Matter Code 10.01.03

Data Issues

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Increased species richness and fish/crustacean abundance following plant closure. I have previously read through the Henderson et al. Hinkley Point monitoring report that is cited in Section 1.7.2 as support for the proposition that reducing losses through plant closures is beneficial to fish populations. Effects of reduced withdrawal of cooling water from the Bristol Channel are confounded with effects of improved water quality and regional oceanic temperature increases that have occurred over the same time period. Although the authors claim that within two more years they will be able to test whether station closures have contributed to the observed increases, they provide no indication of how they will perform the test.

EPA Response

EPA would be interested in any data that could resolve this question. Unfortunately, long-term monitoring before and after an impact at both control and impacted sites is usually required to detect ecological effects, particularly at the population or higher levels of biological organization (see Schmitt and Osenberg, "Detecting Ecological Impacts," DCN # 2-019A-R21). Such data are seldom available and are difficult to obtain.

Comment ID 316bEFR.306.213

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Inflated estimates of foregone yield due to impingement

In the NODA, EPA states that:

In the case studies prepared for proposal, EPA determined that all impinged fish are age 1 because of a lack of data on the actual ages of impinged fish. As several commenters pointed out, this biases estimates low because impinged fish may include older individuals that are closer to harvestable age. This is confirmed by data on the ages of impinged fish presented in studies conducted at Salem (PSEG, 1999) and Millstone (Northeast Utilities Environmental Laboratory, 1992). To address this concern, the current studies relax the assumption that all impinged fish are age 1, and assume instead that the ages of impinged fish are 1 and older, and follow an age distribution that is implied by the associated survival rates. This approach takes into consideration the common observation that relatively few older, larger fish are impinged. The effect of this adjustment is that a higher proportion of impinged fish are assumed to survive until harvest. As a result of this adjustment, the estimate of foregone yield associated with impingement increases by a factor ranging from about three to ten, depending on a species' age-specific survival rates. [NODA, section X.B.3.b(4), 68 Fed. Reg. 13,546, col. 2]

The adjustment made by EPA is based on erroneous assumptions concerning the age composition of typical impingement collections. Because of these errors, EPA's adjusted estimates greatly overstate the expected foregone yield due to impingement. Studies of the ages of impinged fish have consistently shown that:

-Most impinged fish are younger than one year of age, and not one year old or older as assumed by EPA.

-The vulnerability of most species to impingement decreases with age, so that EPA's use of survival rates to estimate the age composition of impinged fish usually overstates the relative contributions of older fish to impingement losses.

The importance of these errors is demonstrated below, using the data for Salem provided in Docket No. 4-2051 to the Proposed Rule. The Salem data are used for this demonstration because, unlike the other input data files provided by EPA, the impingement data for Salem include a breakdown by life stage and age class. Figure 3 plots age distributions of fish impinged at Salem from 1990 through 1998 for three representative species: weakfish, striped bass, and white perch. The actual age distributions are compared to the distributions implied by EPA's original (proposed rule) and revised (NODA) assumptions concerning the age distributions of impinged fish. For all three species, the impingement totals are comprised primarily of fish in the juvenile 1 and juvenile 2 life stages. Only 0.2% of weakfish, 15% of striped bass, and 26 % of white perch were age 1 or older. For only one of the species listed in the Salem input file, bay anchovy, do age 1 and older fish make up more than half of the total impingement losses. Figure 3 shows that, contrary to EPA's assumption in the NODA, no weakfish older than age 1 and no striped bass older than age 2 were reported in impingement collections at Salem from 1990 through 1998. White perch up to age 8 are impinged at Salem, however, even for this species EPA's assumed age distribution greatly overstates the proportion of fish impinged at ages older than age 1.

As in my comments on the Pisces report (above), I used Equation (1) to calculate the foregone yield due to fish impinged at each age or stage. This is the same yield equation used by EPA [see NODA, section X.B.3.b(1), 68 Fed. Reg. 13,545-46]. The total foregone yield due to impingement is obtained by summing the stage and age-specific values over all stages and age classes. Results of these calculations are shown in Figure 4. For all three species, foregone yield estimates calculated using the NODA assumptions are inflated compared to estimates calculated using actual age distributions For weakfish, the NODA value is inflated by a factor of 70 times over the value calculated using actual age distributions. For striped bass and weakfish, assuming that all impinged fish are age 1 also greatly overestimates foregone yield. Only for white perch does the age-1 assumption underestimate foregone yield, and the difference in this case is only about 20%.

The age distribution of fish impinged at Salem is probably typical of estuarine facilities, and perhaps most facilities. Very small fish have lower swim speeds and smaller energy reserves than larger fish, and are therefore more vulnerable to being trapped and impinged. Moreover, a large fraction of the species impinged in high numbers at Salem and other estuarine facilities spend most of their life cycles at sea. These species include anadromous species such as striped bass, American shad, alewife, and blueback herring; and estuarine-dependent species such as weakfish, spot, Atlantic croaker, and Atlantic menhaden. For all of these species, EPA's original approach to calculating foregone yield due to impingement almost certainly would have overstated the potential reduction in harvest; EPA's revised approach greatly overstates this reduction.

Relatively few of the species addressed in the case studies (e.g., white perch and bay anchovy) are estuarine-resident throughout their life cycles and, therefore, vulnerable to impingement at all ages. However, the revised approach still would overestimate foregone yield because it assumes that all impinged fish are at least one year old.

The extent to which the above comments apply to EPA's estimates of production foregone due to impingement is unknown, because EPA has provided no documentation of the method used to calculate production foregone for harvested species. Although Chapter 5 of the original case study report states that the production foregone model was applied only to forage species, both the original case study and the new regional case studies documented in the NODA (Tables X-6, X-8, X-20, and X-22, 68 Fed. Reg. 135,52-53, 13561-62) include estimates of production foregone for impinged fish belonging to harvested species. If the same assumptions used to calculate yield foregone for these species were also used to calculate production foregone, then the production foregone estimates would be similarly biased.

[see hard copy for figures]

EPA Response

Please see EPA's response to 316bEFR.029.105 concerning EPA's assumptions about the age of impinged fish.

EPA revised its trophic transfer assumptions for its final analysis for the Phase 2 rule. Please see response to Comment 316bEFR.305.004.

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Estimation of Trophic Transfer Efficiency

In the case study performed to support the proposed 316(b) Phase II Existing Facilities Rule, EPA used a trophic transfer model to estimate the yield of harvested species foregone due to entrainment and impingement of forage species. EPA's model assumed that 20% of forage species biomass is directly consumed by harvested species. EPA assumed that the remaining 80% is consumed by intermediate predators, which are then consumed by harvested species. EPA assumed that the trophic transfer efficiency for the direct pathway is 9%, and that the transfer efficiency for the indirect pathway is 0.9%. These values imply a net transfer efficiency, considering both direct and indirect pathways, of 2.5%.

In the NODA (section X.B.3.b(2), 68 Fed. Reg. 13,546, col. 1), EPA stated that it had revised the trophic transfer model and was now assuming a net trophic transfer efficiency of 20%. The change, according to the NODA, was "based on an additional review of the scientific literature." The change reflects a questionable review of the scientific literature and could lead to overestimation of the estimated benefits of reducing entrainment and impingement of forage fish.

The following issues are relevant:

-The trophic transfer efficiency is derived from an unreferenced source and is at the high end of the range of accepted values.

-The modified approach assumes that 100% of forage fish biomass is consumed by economically valuable species.

With regard to the first issue, the only citation provided in the NODA to support the new value is to "Reed et al. (1994)." The reference cited by EPA is the documentation report for NOAA's Type A Natural Resource Damage Assessment model for the Great Lakes. This model was developed to facilitate calculation of natural resource injuries and service losses cause by spills of oil or hazardous substances. Rather than providing a detailed review of the literature on trophic transfer efficiency, the NOAA report simply states that a range of values between 10% and 30% has been estimated by various authors, provides a brief list of citations, and states that the "preferred" value is 20%. The most recent of the papers cited in the report was published in 1987. Pauly et al. (1995) published a more recent and more thorough review of the literature on trophic transfer efficiency. These authors compiled 140 estimates of trophic transfer efficiency from 48 trophic models of aquatic ecosystems. They found that, although the range of values was very wide, the mean value was 10% and only a few of the values were 20% or higher. It appears from Pauly and Christensen's study that the value chosen by EPA is at the upper end of the range of accepted values and probably overstates the average trophic efficiency across all aquatic ecosystems.

With regard to the second issue, although the actual percentage of forage species that are consumed by harvested species is unknown, it is certain that a large fraction of forage species production goes to unharvested species, including invertebrates such as jellyfish. In the Lake Turkana food web described by Pauly and Christensen (1995), for example, approximately 60% of pelagic forage fish biomass is directly consumed by the top-level predators (tigerfish and Nile perch). The remaining forage biomass is consumed by catfish, which are then consumed by Nile perch. EPA's original assumption concerning the fraction of forage fish biomass directly consumed by economically valuable species may be either an underestimate or an overestimate of the actual average value; the new assumption clearly is an overestimate.

EPA claimed in the NODA that the effect of the change in trophic transfer assumptions insignificant because foregone yield attributable to losses of forage fish is only a small component of the total foregone yield due to entrainment and impingement. EPA has not provided supporting analyses to verify this claim. However, the change in assumptions results in a factor-of-eight increase in all estimates of yield foregone due to losses of forage species. The difference might well be significant for facilities at which entrainment and impingement losses consist primarily of forage species.

EPA Response

Please see EPA's response to Comment 316bEFR.305.004 regarding trophic transfer efficiency.

Comment ID 316bEFR.306.301

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Although the NODA is incomplete (the new "regional analyses" has only two of the eight regions completed), it does make a number of general methodological statements that will presumably guide future analyses of the remaining six regions. My comments therefore are limited to USEPA's methodological statements and to the analyses of the two regions.

There are several promising changes in the methodological statements, including the recognition of stated preferences as the only generally accepted method with a potential for estimating nonuse values of reduced impingement and entrainment (I&E) losses. Implicit in this seems to be a rejection of the Habitat Replacement Cost and the Societal Revealed Preference approach to estimating total value. Discounting future gains and proper accounting for harvest changes in improved commercial and recreational stocks are clearly actions that make USEPA's analysis better.

In correcting the flaws in the previous analysis, the NODA's two applications make clear the importance of properly estimating non-use values of fish and shellfish populations and also the complete inadequacy of existing research on the topic. The use values associated with the North Atlantic and Northern California regions contained in the NODA are believable and they highlight the fact that nonuse values must be around 20 to 30 times larger than the use values in order for benefits to equal costs. With nonuse or passive use values being so pivotal, it is critical that they be estimated well.

EPA Response

In the cost-benefit analysis for the cost-benefit analysis for the final 316(b) Phase II rule, the non use benefits do not need to be 20 to 30 times larger than use values in order for benefits to equal costs. As reported in Chapter D1 of the EBA, in the North Atlantic use benefits are estimated to be $3 million with total social costs of $31.7 million. In California use benefits are estimated to be $6.9 million with total costs of $22.8 million. Thus, in final analysis non-use benefits would need to be approximately 2 to 9 times larger than use benefits in order for benefits to equal costs.

Please see response to EPA's response to comments on the feasibility of doing original state preference work in the response to comment #316EFR.306.105.

Comment ID 316bEFR.306.302

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

USEPA's estimates of non-use value in the North Atlantic region raise substantial concerns, the most prominent among them are:

-There is no research that addresses the non-use value inherent to fish and shellfish stocks affected by the proposed regulations. Does the non-use value change with decreases in numbers of fish and shellfish impinged and entrained? Or is it more akin to existence value, with a threshold effect? No one knows but USEPA assumes that non-use value changes with decreases in numbers of fish and shellfish impinged and entrained;

EPA Response

As part of the final 3169(b) rule analysis, EPA conducted a literature search of the Natural Resource Damage Assessment (NRDA) Literature in order to identify studies where: (a) respondents expressed non-zero willingness-to-pay (WTP) to prevent the mortality of individual aquatic or bird species resulting from "human-activity;" and (b) the valuation scenario indicated that species population-level effects were not expected as a result of the hazard(s) described in the valuation scenario; or respondents were told that it is unclear whether or not the hazard(s) may result in population-level effects.

In NRDA cases, there are often short-term losses to species with large populations, such as seabirds, shorebirds, or fish. The dollar values of interim losses pending natural recovery or restoration must be estimated. In some cases, there may also be losses to endangered species, which would affect long-run populations of these species. Consequently, while some NRDA studies estimate values for losses to threatened or endangered species, where population-level effects are significant, the majority of studies focus on estimating people's willingness to pay for short-term losses of small numbers of fish or birds.

In the case of impingement and entrainment (I&E) at power plants, there are ongoing losses of individual fish. However, it is possible that there are no population-level effects on some fish species. If I&E were eliminated, these species would likely recover naturally in a time period similar to the recovery of equivalent losses of fish caused by an oil or chemical spill. Therefore, the damage assessment approach of valuing short-term losses to individual species that will recover naturally is also appropriate to estimating I&E losses for fish species that do not suffer population-level losses.

The findings of the NRDA studies indicate that people have significant values for small, temporary losses to bird and fish species that are not threatened or endangered. This implies that people responding to these surveys are willing to pay to prevent the loss of individual birds or fish, when the loss of these individuals do not affect the long-term population level of the species. In addition to short-term losses of individuals, with no population effect, respondents to some of the studies presented here were asked to value losses to endangered species where these losses would negatively impact species population. As one would expect, people were also willing to pay for population-level losses.

See also the June 2, 2003 memorandum to L. Tudor “Description of Natural Resource Damage Assessment Studies that Present Willingness to Pay Estimates for Preventing Species Mortality.” (DCN #6-2502).

Comment ID 316bEFR.306.303

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04.01

Peconic-based approach

To obtain non-use values of changes in North Atlantic fish and shellfish stocks, USEPA uses a willingness to pay per wetland or eelgrass acre contained in a study of eastern Long Island by Opaluch et al. (1998). In this study, the authors specifically state ”we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions (p 5, Opaluch, et al., 1998)”;

EPA Response

EPA disagrees with the comment. For EPA’s response regarding the soundness of value estimates from the Peconic study, please see the response to comment #316bEFR.304.002.

Comment ID 316bEFR.306.304

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

In responding to the valuation questions about wetlands and eelgrass acreage changes in the Opaluch et al. study, the respondents had no information<FN 1>regarding the effect of wetlands and eelgrass acreage on fish and shellfish populations;

Footnotes

1 The respondents were given an illustration of a fish that was associated with eelgrass changes and a picture of a heron next to marsh grass that was associated with wetlands changes

EPA Response

This comment repeats #316bEFR.306.007 – please see that comment for the reply.

Comment ID 316bEFR.306.305

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

The population on which the values are derived is quite affluent and resides nearby the resource in question. This is not representative of the North Atlantic population to whom the non-use values were extrapolated. This creates an upward bias in the aggregate of non-use values.

EPA Response

For EPA's response regarding comparisons of population demographics between the study region and policy region, please see the response to comment #316bEFR.304.004.

Comment ID 316bEFR.306.306

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

In transforming the questionable value per acre of wetlands and eelgrass in the North Atlantic into a value per change in fish population, USEPA goes through a process that relies on numerous assumptions and judgments. These result in a fundamentally arbitrary and excessively large non-use value.

EPA Response

This comment repeats #316bEFR.306.007 – please see that comment for the reply.

Comment ID 316bEFR.306.307

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Perhaps because of their difficulties in obtaining relevant non-use values in the North Atlantic, the USEPA decided to approach this question from a different angle when evaluating the Northern California region. For Northern California, the USEPA calculated "break-even" non-use value, the dollar amount of non-use value that would equate the total economic value with the costs of Northern California investment in closed-cycle cooling systems. While this may be useful information, it is not a substitute for credible estimates of the non-use value of the changes in fish and shellfish stocks associated with lower impingement and entrainment in CWIS. We know what the nonuse values would have to be, but we still do not know what they are.

EPA Response

For EPA's response to comments on the break-even analysis, please see the response to comment #316bEFR.306.106. Please also see Chapter D1 of the EBA (DCN #6-0002).

Comment ID 316bEFR.306.308

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

The NODA has reopened the comment period on all aspects of the April 9, 2002 proposal. Given the uncertainty regarding how the remaining six regions are to be analyzed, I thought that it might be useful to reiterate my concerns regarding the Habitat Replacement Cost (HRC) and Societal Revealed Preference (SRP) methods. Even though USEPA states "Stated preference methods, or benefit transfers based on stated preference studies, are the only generally accepted techniques for estimating non-use values" (Tudor, et al., March 12, 2003a; Tudor et al., March 12, 2003b), the NODA contains no direct repudiation of HRC or SRP methods. For the numerous reasons previously discussed in my comments and those of others (e.g., Stavins 2002) on the proposed rule, the HRC and SRP method should not be advocated nor used by the USEPA as they are conceptually incorrect and could lead to extremely inefficient policy choices. USEPA
should make this clear for the record.

EPA Response

While EPA acknowledges that believes that analyses of replacement costs do not provide benefits estimates, EPA does believe that they are useful tools for evaluators to use in the decision-making process.

However, EPA does not use the Habitat-based Replacement Cost (HRC) method in the cost benefit analysis for the final Section 316(b) Phase II rule. Please see the document entitled "Habitat-based Replacement Cost Method" (Docket # XX) for additional discussion of the HRC method. Please also see EPA's response to comment #316bEFR.005.035.

EPA does not use the Societal Revealed Preference (SRP) method in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP, please see the response to comment #316bEFR.005.006

Comment ID 316bEFR.306.309

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Another potential problem in the NODA is the merging of all facilities into an aggregate regional analysis so that benefits are only dependent on the sample of facilities in a region. While a region-based analysis is probably superior to the original USEPA method, the heterogeneity in rivers, estuaries and oceans in combination with differences among facilities makes the regional expansion based on a few facilities quite tenuous. If the facilities chosen in the sample are not representative of the region, then a serious bias will exist. Because the data that exist are most likely associated with facilities that have high I& losses, the bias will upward.

EPA Response

See response to Comment 316bEFR.306.104.

Comment ID 316bEFR.306.310

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.06

General Comments on Valuation Approaches

In the North Atlantic and Northern California regions, the use values associated with impingement and entrainment losses appear miniscule in comparison to the costs of closed-cycle cooling. If this is also true in the remaining regions, then the estimates of the non-use or passive values are critical. However, USEPA has not undertaken a stated preference study that will directly address them. Although monetary and time constraints are used to justify the inaction, substantial funds have been devoted to more studies associated with use values. If the use values continue to remain so small relative to costs in the remaining six regions, then USEPA should initiate a process to obtain a better understanding and better estimates of non-use values associated with fish and shellfish populations. The traditional way to approach this is a state of the art stated preference analysis.

I believe that developing a defensible stated preference analysis of non-use values associated with individual stocks of fish is critical to the USEPA. I realize that carrying out such a survey may not be possible because of the deadlines imposed by the court. However, the NODA makes clear that the USEPA proposal rests on the estimation of non-use values, a grossly inadequate part of the NODA analysis.

EPA Response

EPA does not agree that it is essential to conduct an original stated preference study of non-use values. For EPA's response to the issue of conducting an original stated preference survey, please see response to comment number 316bEFR.306.106.

Comment ID 316bEFR.306.311

Subject Matter Code 10.02.06

General Comments on Valuation Approaches

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA has issued the Notice of Data Availability associated with the standards for the location, design, construction and capacity of cooling water intake structures (CWIS) of existing power plant facilities. USEPA has revised substantially its approach to estimating benefits from the preferred option of closed-cycle cooling associated with two regions (the North Atlantic and Northern California) and briefly outlined its approach to the other regions.

While the NODA has made substantial improvements in the use of valuation concepts (such as using discounting and not using costs as benefits) over the original proposal (Proposed Regulations for Cooling Water Intake Structures at Phase II, Existing Facilities, EPA ICR No. 2060.01), the empirical data supporting the NODA are grossly inadequate. The major problem is in USEPA's attempt to quantify non-use values associated with reduced losses from impingement and entrainment in CWIS. I will go through the complete benefit section of the NODA, but focus on its non-use valuation aspects.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values. The Agency, however, has explored several methods that indicate the potential significance of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.306.312

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Use Benefits from Marketed Goods

The change in the return to commercial fishers (from a range of 40-70 % of new revenues to 0-40 % of new revenues) when there is no expected change in fish price from the proposed action is reasonable (NODA, page 107). Fisheries are substantially different but what is likely common among them is that the immediate return will be larger than the more distant (in time) returns. While the immediate effect might be higher than the new range, the long-term effect might be lower and approach 0. USEPA's approach is probably a reasonable compromise, given the fisheries involved.

For cases when there is an expected price change, the Bishop and Holt approach (2003) appears promising even though the final results need peer review and the illustrations seem terribly dependent on having a fishery with a transferable quota. Without the transferability, there is good reason to believe that the long-run average costs of fishing will increase as an "Olympic" fishery races to get the new fish. This eliminates both the long-run surplus to the fishermen and the consuming/post-harvesting participants.

Regarding the general problem of incorporating fisheries management regimes into the analysis, I would recommend that this is a continuing problem for many EPA regulations and requires a specific study that would extend beyond the time line of this proposed regulation.

EPA Response

This comment does not disagree with the approaches taken by EPA to analyze commercial fishing benefits for the final rule. For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.306.313

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Indirect Use Benefits from Non-Marketed Goods

The process suggested uses a 5-year historic catch per hour as the measure of abundance and measures the value of fish from an estimated coefficient (say θ) associated with how the catch rate influences site choice. In the Northeast analysis, the USEPA may use the formula for the value of additional fish based on (See Appendix B pg 6 for Formula) , where Δq is total new fish and $\beta\$$ is the coefficient on cost. If this is used, then the fish per hour changes must be considered differently from total fish changes. You have to reduce the coefficient on the fish per hour by the average number of hours fished. This is the only way that the monetary units (which are on the basis of trips) are in same units as the number of fish. An alternative way of looking at it is that the additional fish are going to increase the hourly catch in proportion to the average number of hours fished. An original catch of 100 fish in 5 hours (20 fish per hour) is augmented with say 10 additional fish from the proposed regulations. Although the total goes up by 10 fish, the catch per hour only goes up by 0.2 fish/hour. The Northern California analysis appeared correct but the North Atlantic analysis was unclear to me.

EPA Response

The commenter states that EPA's approach to calculating the measure of fish abundance and the value of fish presented in the NODA was not clear to him.

EPA's analysis uses fish per hour values for catch rates and for increases in catch rates. All catch rates in the models are average number of fish caught per hour for each site and species. The only exception is the North Atlantic model developed by Hicks et al. (1999, DCN #4-1603). Hicks et al.(1999) uses a 5-year historic catch per trip as a measure of fish abundance at a given site.

In calculating welfare estimates for increases in catch rates, EPA estimated the change in utility for a given percent change in catch rates. Thus, a percent change in catch per hour was applied to each site and each species. For example, if catch rates were estimated to increase by ten percent, the catch per hour for each site was multiplied by 1.10. Since catch rates were already in the model as catch per hour, no additional adjustment is necessary. EPA used the same method for the North Atlantic region. The only difference is that the percent change in catch rate is applied to historic catch per trip.

When EPA calculated welfare for an increase in catch of one fish per trip, the one fish per trip was divided by the average duration of a trip before being added to the average catch rate per hour. For example, if the average trip was four hours long, EPA added .25 fish (1 fish/4 hours) to each site's catch rate. In calculating welfare for an increase in catch of one fish per trip for the North Atlantic region, no adjustment was necessary; EPA simply added one fish to the average catch per trip. See Chapter 4 in Parts B through H of the Regional Case Study Report (DCN #6-0003) for detail.

Comment ID 316bEFR.306.314

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.06

General Comments on Valuation Approaches

Non-use Valuation

USEPA's statements in the NODA such as "Stated preference methods, or benefit transfers based on stated preference studies, are the only generally accepted techniques for estimating non-use values" (Tudor, et al., March 12, 2003a; Tudor et al., March 12, 2003b) are reassuring. In concept, the approaches to address nonuse values used in the NODA are a major improvement over the original proposal. They do not use costs as benefits. Unfortunately, they still do not provide adequate information regarding non-use values of reduced I&E losses. The studies used for the North Atlantic region simply are too inaccurate and the error inherent in USEPA's manipulation of the data renders the results meaningless. The break-even analysis in the Northern California region does not yield any information on household's non-use values. What is missing from the NODA is an credible assessment of the non-use value of reduced losses from impingement and entrainment in CWIS.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values for national benefits analysis. The Agency, however, has explored several methods that indicate the potential significance of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

North Atlantic

EPA's Approach to Non-Use Valuation

I will not address in detail the recreational and commercial harvest benefits estimates in the North Atlantic because they are miniscule in comparison with either the costs of closed-cycle cooling or the non-use values estimated for the North Atlantic. The use benefits are 1/22 of the CWIS costs and 1/30 of the non-use values (NODA, Table X- 46). The small ratio of use to non-use value is derived in a large part because the USEPA's per-household non-use value of a wetland or eelgrass acre is about 20 times the per-household use value (NODA, Table X-34). This is somewhat shocking when taken in comparison with values reported by Tudor et al. (2003b). In a summary of existing studies reporting both use and non-use values, Tudor et al (Appendix A) show that around 90 % of the nearly 30 studies estimate a non-use value/household that is less than 3 times the use value/household. The average ratio of non-use value/household to use value/household is around 1.8 the use value/HH, one-tenth of the value that is presented for the North Atlantic. The three largest relative non-use values are from one study (Croke et al. 1986). When that study is dropped, the average falls to about 1.3.

Given that total non-use values are pivotal and that the relative non-use values appear out of character with the literature, focus will be given to how the non-use values were created and the pitfalls in the analysis. The process uses the estimate of non-use value/ (reduced I&E loss) times the reduced I&E losses to produce a total non-use value (Tudor, 2003a). But the process of obtaining an estimate of non-use value/ (reduced I&E loss) is complex and requires detailed explanation.

The USEPA uses existing literature, Opaluch, et al. (1998) and Johnston et al. (2001), in an attempt to estimate the expressions of equation (5.). Both studies are fundamentally stated preference studies although one is called contingent choice (Opaluch et al.) and the other is called conjoint analysis (Johnston et al). USEPA uses the data and results from these two studies to develop their non-use values.

The analysis begins using the data in Opaluch et al. (1998) to estimate the total non-use value per household per acre of wetlands and eelgrass. This is despite an explicit warning by the authors: "we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions (p. 5, Opaluch, et al., 1998)".

There are likely a number of reasons for this warning but it is particularly meaningful given the use that USEPA intends to make of the data. Opaluch et al. warned of using the wetlands and eelgrass values/acre but USEPA's intended use goes beyond that to an estimate of a value per fish and shellfish arising from a wetland change. There was no information given to the respondents regarding how these wetlands on eastern Long Island affected fish populations. When choosing to allocate money between a policy to protect wetlands and one to protect eelgrass, the respondents had only a rudimentary picture of a heron and marsh grass as information about the wetland and a fish in water as information about eelgrass. To assume, as USEPA does, that that respondents can translate that drawing of wetland or eelgrass bed into the same amount of fish as biololgists have now done is technically indefensible. However, there are other problems, perhaps as serious as this one.

(See Appendix B ph 7-8 for tables and formulas)

EPA Response

For EPA's response to comments regarding using habitat values to estimate values for fish and similarity between the study and policy resources, please see the response to comment #316bEFR.307.061.

For EPA's response to comments regarding the connection between values for habitat and values for fish and shellfish and respondents perception of the role of habitat in fish production, please see the response to comment #316bEFR303.020.

For EPA's response to comments regarding the soundness of the original study for benefit transfer, please see the response to comment #316bEFR.304.002.

Given that ninety eight percent of organisms affected by I&E are not used, and the population of non-users is larger than the population of users, it is not unrealistic for total non-use values to be many times greater than use values. In general, it is not unreasonable to expect that non-use values greatly exceed use values for some resources. For example, non-use value losses from the Exxon Valdez oil spill greatly exceed use value losses. (For detail see (1) Carson, Richard T., Robert C. Mitchell, W. Michael Hanemann, Raymond J.Kopp, Stanley Presser, and Paul A. Ruud. "A Contingent Valuation Study of Lost Passive Use Values Resulting from the Exxon Valdez Oil Spill," A Report to the Attorney General of the State of Alaska, November 10, 1992; and (2) Molly McCommon. "Evaluation of Environmental Damages of the Exxon Valdez Incident." Presented at the conference on Issues Concerning Incidents on Tanker Routes, Tokyo, Japan, February, 2003.)

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Definition of Non-users

The definition of non-users is absolutely critical when developing non-use values. A definition of users that is too restrictive causes a serious overestimation of non-use benefits. It arises because the difference between the total value of the non-user group and the total user group is reduced when users are switched to the non-user group. Because use value is the difference between the total value of the two groups, by placing users into the non-user group the estimate of non-use value increases. The upward bias is spread across everyone because everyone is assumed to have the same non-use value.

USEPA derives a total value of wetlands (willingness to pay for all wetland services, Tudor et al. 2003a, p.10) for users and nonusers. Definitions of nonusers and users of wetlands are made; users are residents/second-home owners who fish or shellfish and non-users are all others. No information on the number of respondents in each category is provided. However, going back to original report on which the data was based, the authors state "almost all of the respondents (97%) participate in at least one of the listed activities (fishing, shellfishing, walking/hiking, swimming, other beach use, boating, artwork, other), and 81% participate in at least one activity in the Peconic estuary. Swimming is the most popular activity. (Opaluch et al. p. 108-109)." Fishing (40.4%) is the fourth most popular activity in the Peconic and shellfishing (27.0%) is the fifth most popular. Because I do not have the data, I can but venture a guess that less than 50% of the respondents are considered users. I would also venture a guess that at least 80% of the respondents consider themselves users of the wetlands. Simply driving by and enjoying a gorgeous expanse of wetland would be a use. Hikers and swimmers are certainly wetland users.

If the USEPA definition of a user is too restrictive, then it is not surprising that the values per household for non-users are almost equal to the values of users. It is also probable that this error in judgment will make the ratio of non-use to use values per household out of line with the literature. That non-use value dominates the use value may be a matter of definition of the groups.

Consider an example using four categories with 100 respondents whose willingness to pay for wetland protection is known:

(See Page 9 Appendix B for Table)

If a correct definition of user is used that includes swimmers along with fishers and shellfishers, then the total non-use value is $100 [100x1.] while the total use value is $360 [40x4. +50x4.]. The ratio of non-use to use value per respondent is .25 [1/4].

Now suppose that we take the USEPA approach and define fishers/shellfishers as the only users of the wetland. With this definition, the average respondent's total value is $5 for users and is $4.33 [260/60] for non-users. The $4.33 is also the average non-use value for the user group. The total non-use value over all respondents is then $ 433 [100x4.33]. The use value per respondent is defined as the difference between the average user's total value and the average non-user's total value. The user value per respondent is $.67. The total use value for the sample is only $26.80 [40x.67]. The ratio of non-use to use value per respondent is 16.2 [433/26.8].

This illustration underscores how critical the definition of non-user is. In the illustration, the ratio of nonuse to use values per respondent changed from .25 to 6.5 and the ratio of total non-use to total use values go from .03 to 16.65. In essence, the ratios go from being similar to those in the literature to being substantially higher. By narrowly defining the user category, the difference in total value between user and nonuser is reduced. Because the nonuse value is directly related to the difference between the two while the use value is inversely related to that difference. Without the data, I cannot tell specifically the effect of the narrow definition of use; however, I expect that it is great.

EPA Response

The comment states that the definition of non-users is critical when developing non-use values. The comment implies that EPA's estimates are biased upwards because by their definition of non-users. EPA disagrees. For EPA's response to comments regarding the definition of users vs. nonusers, please see comment #316bEFR303.020.

Comment ID 316bEFR.306.317

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04.01

Peconic-based approach

The Share of Wetland Non-use Value Attributable to Fishing and Shellfishing

The nonuse value of a wetland, as described above has to be reduced to the share that is attributable to fish and shellfish. USEPA uses data from Johnston et al. to determine that share. Their model uses responses from Rhode Island residents<FN 2> that stated their preferences regarding plans for wetlands that improved bird populations, fish habitat, shellfish habitat, and mosquito control. In deriving the share associated with gains to fish (0.256) and shellfish (0.278), USEPA assumes that the only products of wetland restoration are the four just listed. A fifth category of services (such as storm protection) was not specified but was assumed to capture any residual share. USEPA apparently also ignores the fact that they are determining the share of total value, not nonuse value, of a wetland. Each assumption raises concerns.

By assuming so few uses of wetland restoration, a serious overestimate of the share of value attributable to fish and shellfish can arise. That is, if 30% of the value was attributable to other factors (such a scenic amenities), then the share that should be attributed to fish is 0.179 (0.256*(1-0.3)). This is something that USEPA might want to consider.

By not addressing the issue of non-use values, I believe that the share that USEPA attributes to fish and shellfish is irrelevant. Consider the illustration in the previous section. The share of total value associated with fish and shellfish users is about 36% but we have no information about the contribution that fish and shellfish make to the non-use value. It is unfortunate but the information in Johnston et al. (2001) does not address the share of non-use value associated with fish and shellfish.

Footnotes

2 The sample was selected from individuals who were willing to be respondents in a survey associated with environmental issues. The lack of random selection of the sample undoubtedly influences the results.

EPA Response

Regarding the allocation of wetlands values to different services, this comment by the authors is based on arbitrary assumptions unsupported by the focus groups that supported the Johnston et al. (2002) survey and results, upon which the value proportions are estimated (DCN #6-3151). For EPA's response to comments regarding the allocation of values for various wetland services using the Johnston, et al. study, please see the response to comment #316bEFR.303.021.

Comment ID 316bEFR.306.318

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04.01

Peconic-based approach

General Impression of the Non-use Valuation Process

If USEPA is going to rely, as they should, on stated preferences, then the current process is indirect and fraught with the potential for error. The notion that the original respondent in the Peconic Bay study (Opaluch et al. 1998) had the non-use values per fish that arise from USEPA's process is not technically defensible and would not pass professional review. I've discussed the problems with the economic parameters but the error in them may be small compared with the error in determining ecological link between wetlands and fish production. Are we to believe that these respondents knew the number of fish (as determined by USEPA) an acre of wetland would provide? A well designed contingent valuation study directed to determining the non-use values related to I & E losses would help resolve many of these problems.

EPA Response

Please see EPA's response to comment #316bEFR.307.061 regarding using habitat values to estimate values for fish.

Comment ID 316bEFR.306.319

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

The Northern California Study

Once again, the estimated use values are extraordinarily small compared with a non-use value that would equate benefits with costs. Non-use values would have to be over 30 times greater than use values for benefits to equal costs. Recognizing the issue and recognizing “the uncertainties of providing estimates of the magnitude of non-use values (NODA, page 188)”, the USEPA chooses to compute a break-even value per household in the Northern California region. One presumes that decisions makers use this information by judging whether the break-even value is within the realm of possibility for households in the region.

While it is information, I am not sure that decision makers are more able than anyone else to decide the non-use values. USEPA loses technical credibility when it ignores the complete lack of relevant non-use data and ask others to determine it in some haphazard manner. A defensible contingent valuation of non-use values associated with reduction in impingement and entrainment is critical to the USEPA’s proposed Phase II rule. It will require great care because of the possibility that non-use values per household in this situation may be quite small. Eliminating the “good feeling” or “warm glow” associated with stating a preference (and willingness to pay) for environmental improvement is critical as is determining the extent of the market. It will also have to have sufficient spatial variation to capture regional and waterbody influences on the nonuse values. Addressing whether or not the size of fish and shellfish stocks influence the willingness to pay is critical. USEPA is under court order with regard to timing but I think USEPA will have made an enormous mistake if it does not approach this difficult but essential task. As I wrote in my last set of comments eight months ago, I believe that developing a defensible contingent valuation of non-use values associated with reduction in impingement and entrainment at power plants is critical to the USEPA Phase II rule. It might require pooling talent from consultants with experience in designing non-use studies (such as Michael Hanemann, Ian Bateman, Ron Cummings or Bill Devousges) to get an objective study. It is doubtful that use value studies will make the case for using the closed-cycle cooling option. At the same time, the current analysis of non-use values
does not make the case.

EPA Response

Closed cycle cooling is not required by the regulation.

As noted in the response to comment 316bEFR.306.301 and in Chapter D1 of the final EBA (DCN #6-0002), in the final cost-benefit analysis non-use benefits would need to be on the order of 4 times use benefits to equate total social benefits and costs.

EPA concurs that the estimation of nonuse values is an extremely challenging, complex, and controversial matter.

For EPA’s response to the issue of conducting an original stated preference survey, please see response to comment number #316bEFR.306.105. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.306.320

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.01

Recreational Fishing Benefits

Regarding the recreational fishing analysis for Northern California, it is far better than previous RUM models done by USEPA for the proposed rule. I do have a concern about using the catch rate of all species for non-targeting anglers. This presumes that the value to a non-targeting angler for an additional striped bass is the same as for a white croaker. The biased introduce by this assumption is not clear to me, though.

EPA Response

In the coastal region RUM models, EPA used average catch rates for all species caught by no target anglers to model the "no target" catch rate. Therefore, each no target angler is assumed to face a catch rate at each site that is the average for all species that have been caught in the past by no target anglers at that site. Intuitively, this makes sense, as no target anglers, by definition, will catch whatever bites. This implies that, in the model, all fish caught by no target anglers are assigned equal values, based on the assumption that no target anglers choose a site based on average catch rates for fish caught by no target anglers at that site. Presumably, if no target anglers had a preference for a particular species, they would target that species.

In terms of welfare estimation, using a single average catch rate for no target anglers does result in equal value estimates for different species, so that, as the comment states, the value for an additional striped bass is the same as that for an additional white croaker. However, calculating an average value does not introduce statistical bias to the model, it simply means that it is not possible to estimate differences in value across species for no target anglers. It is possible that striped bass and white croaker have the same value for no target anglers. It is also possible that one species is more valuable than another. However, the model estimates an average value for all species caught by no target anglers, rather than values for individual species. While the model is not biased, it might result in slightly different total values for I&E reductions than a model with separate catch rates by species for no target anglers, depending on the species affected and how each species affects the average value per fish for no target angler. In addition, by using average catch rates for no target anglers for each site, EPA's model allows for more substitute sites with positive catch rates for each no target angler. This is likely to result in lower values than a model with fewer substitute sites per angler. EPA believes that it has chosen the best model for no target anglers. Overall, this is a minor issue, and estimating separate values by species for no target anglers is not likely to improve the model or results.

See response to comment 316bEFR.041.451 for additional details.

Comment ID 316bEFR.306.401

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Doug Dixon & Kent Zammit

Organization EPRI

The costs of major retrofit projects at existing, operating power generating facilities are fundamentally site specific in nature. In the absence of detailed studies at individual sites, it is impossible to make generalized statements about the costs of retrofit with any degree of precision. EPRI studies have demonstrated the high degree of variability in the costs resulting from site-specific factors.

EPA Response

See responses to comments 316b.EFR.306.031 and 316b.EFR.306.038.

Comment ID 316bEFR.306.402

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The outage times required for units to install recirculated cooling are not trivial, and certainly could have impact on grid reliability in the case of the All Cooling Tower Option.

EPA Response

The Agency acknowledges that the outage times from recirculating cooling tower retrofits are not trivial. The Agency does not base the requirements of the final rule, in part, based on the potential for impacts on grid reliability due to construction downtimes.

Comment ID 316bEFR.306.403

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

In typical retrofit circumstances, the cooling tower would have to be sized for the higher flow rates associated with once-through cooling. Redesign and conversion of the cooling system to accommodate the lower flows and smaller towers of a typical recirculating system would entail extensive revisions to the plant cooling system, more extensive outages, and an overall increase in capital cost over the unoptimized system.

EPA Response

The Agency agrees with the comment regarding the sizing of retrofit cooing towers to higher flow-rates associated with once-through cooling.

Comment ID 316bEFR.306.404

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA estimates of retrofit costs are lower than the estimates prepared by engineering firms for nearly every one of 50 site-specific studies EPRI obtained, sometimes by a factor of more than x2.

EPA Response

EPA has not adopted cooling towers as the basis for the final rule requirements.

Comment ID 316bEFR.306.405

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Locating a cooling tower at an existing site is not always easy, possible, or cheap, and can include the need for long circulating water lines, additional land purchases, etc.

EPA Response

EPA has not adopted cooling towers as the basis for the final rule requirements.

Comment ID 316bEFR.306.406

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 19.0

Dry Cooling

EPA was prudent in its determination that wet cooling is not a reasonable alternative for retrofit to existing facilities. In addition, I would add that the retrofit of dry cooling to existing plants would be even more problematic, increases technical complexity, costs, and efficiency penalties, and most assuredly would require extended outages.

EPA Response

The final rule is not based on dry or wet cooling tower technologies. Therefore, the commenters concerns have been met.

Comment ID 316bEFR.306.407

Subject Matter Code 1.01

Comment period

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Comments on Material in "Section 3: Data Availability"

It is stated that Synapse was “not able to gain access to critical analyses and data” and therefore it was “impossible to identify let alone assess …individual facility and firm level costs…” We believe that it was possible to “determine which individual facilities and firms would be affected by the alternative regulatory options” on the basis of criteria given in the Federal Register [2] combined with utility plant and unit information available in the public domain through, for example, the Utility Data Institute.

EPA Response

This comment is not sufficiently clear to allow EPA to provide a response.

Comment ID 316bEFR.306.408

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

However, the additional point that “there is insufficient non-CBI<FN 1> information to allow any detailed plant or firm-specific assessment of the analyses provided by EPA” is worthy of comment and relevant to much of what follows.

It is most important to recognize that costs of major retrofit projects at existing, operating power generating facilities are fundamentally site specific in nature. In the absence of detailed studies at individual sites, which are often appropriately held to be privileged in the current competitive utility business environment, it is impossible to make generalized statements about the costs of retrofit with any degree of precision. EPRI was able to obtain access to such studies for the purpose of commenting on the proposed rule and the results of that analysis [3] demonstrate the high degree of variability in the costs resulting from site-specific factors.

Therefore, it is not particularly useful or illuminating to debate modest disagreements in cost or to put a great deal of weight on the importance of small differences between individual site costs and cost estimates derived from generalized algorithms or correlations. It is only major differences, supported by consistent trends over a wide range of plants, which can be expected to be significant. In this light, many of the points raised in Synapse document, particularly those in Section 6, "Cost Estimates," are of little importance

Footnotes

1 "Confidential Business Information"

EPA Response

The Agency agrees with the principle of the comment that precision of cooling tower retrofit cost estimates cannot be made with a great deal of precision. The Agency knows of only four cases where cooling tower retrofit project has been conducted. Of these four, the Agency was only able to obtain details on the costs incurred at two cases. Each of these cases is significantly less in cost than those presented by the commenter for the 50+ cases of "hypothetical" planned retrofits included in their appendix C (see response to comment 316b.EFR.208.002). Thereby, it can be inferred that the range of costs likely for cooling tower retrofit projects would be extremely wide, should the costs in the referenced comment prove to be true, as those have been for the two documented cases in EPA's record (see DCN 4-2526).

The Agency disagrees with the assertion by the commenter stating, "it is not particularly useful or illuminating to debate modest disagreements in cost...derived from generalized algorithms or correlations." While broad-brush reviews of costs are extremely important, it is sometimes in the analysis of and debate over "modest disagreements in cost" that important facts can be revealed and learned. In the context of the point to which the commenter is referring, that made by Synapse that "there is insufficient non-CBI information to allow any detailed plant or firm-specific assessment of the analyses provided by EPA," the Agency disagrees. Other commenters have pointed out that sufficient information was provided in the NODA, and sufficient publicly available information exists in the Energy Information Administration databases that allows for thorough review of the Agency's

NODA cost estimates. Also, sufficient information was provided for other commenters to critique in detail EPA's revised approach to costing in the NODA, to which the referenced commenter (Synapse) provided no substantial comments.

Comment ID 316bEFR.306.409

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

Comments on Material in “Section 4: Reliability Impacts”

Outage Time Required for Wet Tower Retrofits

EPA asserted in the Technical Development Document [4] that much of the preparatory and construction work required to retrofit a once-through cooled plant to a cooling tower could be performed while the plant is on-line, requiring outage time only for the final tie-in of the circulating water lines to the new tower. therefore, it was assumed (and it was alleged to be a conservative assumption) that the parts of the retrofit activity that required the plant to be off-line could be accommodated during the course of routinely scheduled maintenance outages extended by one month.

While this may be the case in some instances, there are numerous documented studies in which the anticipated outage time was expected to be much longer. These include studies performed by experienced A&E firms for PSE&G’s Salem Plant [5], as well as four other plants. Table 1 below lists these several stations and the estimated extended outage time determined to be required for a retrofit.

(See Table, Appendix C Page 6)

Reasons for the necessity for required outages beyond the one-month extension include

- The installation of underground circulating water lines frequently encounters interferences with existing utilities which must be disconnected during the installation period

- The need to reinforce existing condenser water boxes renders the condenser inoperable for long periods The need to reinforce existing circulating water lines renders the condenser inoperable during the work period.

- Existing cooling water intakes and discharge facilities may need to be shut down in order to reconfigure them to accommodate the lower flow rates. In most situations these activities are extensive and time-consuming.

While it is not possible to estimate realistically the average amount of lost capacity during the several years over which the many retrofit operations would take place given an “all cooling towers” option, it is reasonable to expect that, in a region such as the West which has recently experienced capacity shortfalls, that an extended outage of a major facility (such as San Onofre) for several months could exacerbate an already marginal situation.

EPA Response

The final rule is not based on cooling tower technologies, in part, due to the uncertainty inherent in construction downtimes. Therefore, the commenters concerns have been met.

Comment ID 316bEFR.306.410

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Outage Time Required for Dry Cooling Retrofits

The Synapse report goes on to extend the outage time discussion to include dry cooling and asserts that such retrofits would also have little effect of available system capacity.

Two points are noteworthy. First, in the context of effects on national capacity, this is not an issue worth discussing. EPA has already quite correctly determined that dry cooling is not “a reasonable option for a national requirement not for sub-categorization under this proposal” and that such a requirement “would have a significant detrimental effect on electricity production…” [9]

This is an appropriate conclusion, in my view, even for new facilities, but especially so for retrofits at existing plants for several reasons, specifically:

- Retrofit to dry cooling at an existing plant would require the use of indirect dry cooling (where the steam is condensed in conventional water-cooled condensers and the hot cooling water is circulated through an air-cooled heat exchanger) rather than direct dry cooling where the steam is condensed directly in an air-cooled condenser (ACC).

- The use of direct systems in retrofits is precluded due to the extreme difficulty of modifying the turbine exhaust area, removing the existing shell-and-tube condenser, and ducting the large volume of steam out to an ACC.

- Indirect systems carry severe economic penalties, even in comparison to direct dry cooling, because of the additional temperature differences between the condensing steam and the ambient air imposed by the heat transfer resistance of the existing condenser and the temperature rise of the circulating cooling water. This is evidenced by the fact that direct systems are always the system of economic choice among dry systems at new facilities where the freedom to choose an appropriate turbine and to optimize the cooling system for plant characteristics is available.

- Existing plants, originally designed for once-through cooling are almost certainly equipped with steam turbines for which the maximum allowable turbine back pressure is 5 in Hga or less corresponding to a condensing temperature no greater than 134 F. For an indirect dry cooling system, with a condenser terminal temperature difference of 7 F, a cooling water temperature rise of 20 F and a probable minimum temperature difference across the air cooled hear exchanger of 25 F, the plant would be required to curtail load at ambient temperatures above 82 F. At new plants, where extended back pressure turbines and the use of ACC’s may permit operation at temperatures well over 100 F, the capacity and operating penalties can be important. Under retrofit constraints, they would be completely unacceptable.

EPA Response

EPA agrees with the comment, which supports its conclusion to not include dry cooling technology as a basis for the final rule.

Comment ID 316bEFR.306.411

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Second, it remains to consider whether retrofit to dry, although unacceptable as a national requirement, might be the “appropriate cooling technology for some facilities” as EPA suggests, for example “facilities that are repowering and replacing the entire infrastructure…”

Several considerations are important.

- Even under the most favorable conditions, the costs are significantly higher than for a comparable plant with recirculating wet cooling. A few plants, both actual and proposed, are sometimes offered as examples of situations where dry cooling has been or could be the cooling technology of choice. However, even in those situations such as Morro Bay (an ocean-side plant in Central California), Athens (a plant on the Western bank of the Hudson river in upstate New York) or Crockett (a plant on the San Francisco Bay), where the conditions for dry cooling are as favorable as they can ever be (low annual average temperatures, low maximum temperatures during cool, fog-shrouded summer months; combined cycle plants where only 1/3 of the plant capacity requires cooling for steam condensation; and plants designed and optimized from the beginning for dry cooling with extended back pressure turbines), the estimated cost differentials are significant ($52 million more for dry cooling vs. once-through cooling out of $800 million at Morro Bay; and $20 million more for dry cooling vs. hybrid cooling (already a significantly more costly option than wet cooling at Athens). If similar comparisons were applied at steam plants (not combined cycle) with existing (not optimized) turbines and in less favorable climates (as would be the case for most inland plants in most parts of the country), the differentials would be much greater.

- Finally, to return to the question of outage times, attempts to retrofit to direct (ACC) systems would entail very long outages to accommodate the removal of the existing condenser and the installation of the steam duct under the turbine exhaust shroud, the structural modification to the turbine hall and the removal, relocation and reinstallation of much of the major equipment such as feedwater pumps----none of which can be done while the unit is on-line. Since such retrofits, if done at all, would be extremely rare, it is likely true that the effect on national generating capacity would be small. However, for the individual plant it would represent an important revenue loss and, in the unlikely event that it were done on a large base-loaded facility, the effect on local capacity could be important. A retrofit to an indirect system might well require outage times more comparable to those needed for wet cooling tower retrofits, but with unacceptably high cost and performance penalties.

EPA Response

EPA agrees with the comment, which supports its conclusion to not include dry cooling technology as a basis for the final rule.

Comment ID 316bEFR.306.412

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Percent capacity simultaneously out of service

Synapse calculates that only 0.5% of the national generating capacity would be out of service at any one time during the 5 year period allowed for compliance. This figure derives from the EPA estimate that approximately 33% of the capacity would be subject to retrofit requirements, that additional outage periods of only one month would be required to accomplish the retrofit and that the projects would be scheduled to take place uniformly over the five year period. Therefore, 33% for one month spread over 60 months (33% divided by 60) approximates 0.5% at any one time.

These assumptions are questionable. The examples given in Table 1 above suggest that an average of 6 months of retrofit-related outage time rather than one month might be required. This alone would increase the average simultaneous outage rate to 3%. Furthermore, reason dictates that perfectly uniform scheduling is unattainable. During likely occurrences where the affected capacity was only 2 to 3 times the average, the affected percentage would rise to 6 to 9%, which, if it occurred during peak periods, would be an important consideration for system reliability.

EPA Response

EPA notes that for the NODA analysis, EPA changed from 1 month to 7 months, the length of the outage period for nuclear facilities estimated to install a cooling tower. EPA therefore agrees that the estimate of 0.5% probably understates retrofit-related outage time. EPA also agrees that a perfectly uniform schedule of compliance and outages is highly unlikely. However, EPA notes that whether an affected percentage of 6% or 9% might cause reliability concerns will depend on the timing of the outages (i.e., if it is during peak or off-peak times) as well as the reserve margin in the NERC region.

Comment ID 316bEFR.306.413

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Preferential scheduling to off-peak seasons

Synapse further suggests that rather than assuming "that the extra downtime needed to connect the new cooling towers would be spread evenly throughout the year…it is far more likely that the extra downtime would be preferentially scheduled to occur during the off-peak seasons when system loads are lower and capacity reserves are reserve margins are significantly higher."

This is likely true, but the argument cuts both ways. If all the outages are scheduled during off-peak periods (say, for simplicity, during one-half of the year) then the 60 month period shrinks to 30 months and the percent of capacity simultaneously out of service doubles (on average assuming one month outages) from 0.5% to 1%. Assuming the more realistic outage duration of six months and the inevitability of non-uniform scheduling, the expected simultaneous outage percentages given above increase from 6 or 9% to 12 or 18%. Even during off-peak seasons, these numbers have important reliability implications.

EPA Response

The Agency has not based the final rule on cooling towers, in part, due to the uncertainty associated with connection outages and the potential impact on electricity reliability. However, the Agency disagrees with the commenter that it would be feasible or likely that a coincidence of construction projects would all occur simultaneously. The Agency notes that construction schedules would in large part be influenced by the time when permits are renewed. Because of this fact, it is improbable, in the Agency's view, that mass-simultaneous outages would occur. Further, the Agency has allowed considerable flexibility in permit compliance schedules for the final rule precisely to accommodate concerns about the small potential outages expected for the intake technology retrofits associated with the technologies forming the basis of the final rule. The Agency refers to the Chapters B-1 and B-3 of EBA for the final rule for results of the Agency's assessment of compliance years and modeling of the energy market.

Comment ID 316bEFR.306.414

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Net plant capacity reductions

Synapse asserts, based on Table B8-3 of EPA's Economic and Benefits Analysis (EBA) [6] that the implementation of the All Cooling Towers Option reduces the total national generating capacity by only 0.4% (3,380 MW out of 922,740 MW) and suggests that this "would not have a significant impact". However, it should be noted that Table B8-3 displays the aggregate result of "closures, additions, repowerings and energy penalties" which tends to obscure the effect of energy penalties from cooling system retrofits. If the individual contributions are tabulated separately using information available on Tables B8-2, B8-4 and B8-5 from the same EBA [6], one finds that the 3,380 MW deviation from the base case results from the sum of the energy penalties plus

7,120 MW more additions (125,990 vs. 118,870 base),
4,120 MW more re-powering (22,650 vs. 18,530 base) and
3,640 MW more closures.

These items would lead to an increase of 7,600 MW {7,120 + 4,120 -3.640 = 7,600} implying a decrease due to energy penalties of 10,980 MW (7,600 + 3,380 = 10,980) or 1.2% of national installed capacity rather than 0.4%. This is consistent with the energy penalty analyses presented in Chapter 5 of EPA's Technical Development Document. [4]

While this amount may also be considered small on a national average basis, one additional point should be considered. The energy penalty used to develop this estimate is an annual average penalty. (See Table B1-1 from [6].) Therefore, this penalty is consistent with the performance of the plant at the annual average wet bulb climate conditions at the individual sites. During the hottest and most humid times of the year when the power demand is at its peak in most regions, the wet bulb temperature is typically 10 to 15 F higher than the annual average value. Using the graphs in the EPA Technical Development Document [4], this corresponds to a turbine backpressure increase of 0.5 to 0.75 in Hga (Fig. 2, Chap. 5, Ref. [4]) and an accompanying 1 to 2% loss in output. (Fig. 1, Chap. 5, Ref. [4]). Therefore, if the annual average penalty is 1.5 to 1.75%, the penalty at peak load times could be 2.5 to 3.75%. In some parts of the country, this shortfall could be important to system reliability.

EPA Response

The commenter is correct in pointing out that energy penalties are responsible for reductions in available capacity. EPA agrees that energy penalties should be included in an overall assessment of the impact of section 316(b) policy options.

EPA also agrees that use of an annual average penalty might have underestimated the loss in output. For more information on this topic, please refer to the response to comment 316bEFR.041.822 in subject matter code 9.03.

Finally, EPA notes that whether certain penalty might cause reliability concerns will not only depend on the load but also on the reserve margin in the NERC region.

Comment ID 316bEFR.306.415

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Condenser upgrades

Synapse suggests that credit for improved plant and hence system reliability should be taken for the result of condenser upgrades. This is alleged on the basis that plants which upgrade their condensers as part of the cooling system retrofit will experience fewer tube failures and lower forced outage rates in the years after the retrofit than had previously been the case.

In fact, the opposite may be true. Although condenser problems are not a major source of forced outages at any time, it is the case that they are more likely to experience problems just after installation and initial operations than later in their operating life. Most of the early problems are leaks in tube-to-tube sheet joints resulting from flawed assembly. Once these are detected and repaired, the condenser operates extremely reliably in most cases for the remaining life of the plant. [7]

EPA Response

EPA agrees with the comment. In addition, the Agency responds to the suggestion by Synapse to credit condenser tub improvements in response to comment 316b.EFR.404.058.

Comment ID 316bEFR.306.416

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Comments on Material in “Section 5: Capacity Retirements”

Economic benefits from investment in plant

In Section 5, Synapse expresses doubt that the cost of retrofit would lead to the retirement of plants. As evidence, it is noted that a $36 million investment at the Vermont Yankee Power Plant, which increased the power level by 13%, would result in a net present value benefit of $56 million. However, the situation for cooling system retrofit is quite different. The estimated cost to retrofit Vermont Yankee [8] is $77.4 million and results not in power level increase but a modest (1 to 2%) output decrease leading to a net present value loss.

It might be argued that a cooling system retrofit would extend the operating life of pants that would otherwise not be allowed to continue operation under some regulatory scenarios. While it is likely that plants with long remaining life, high efficiency and high capacity factor will elect to retrofit, older plants with little utilization and poor efficiency would be unable to realistically expect to recover the investment required to retrofit over a limited remaining life and would be retired. Such plants may represent a relatively small fraction of the existing fleet. However, they are also likely to be precisely those plants called upon at periods of peak demand or under exigent circumstances when other more efficient base load plants are in forced outage or to provide voltage support during conditions of unusual grid operation. While difficult to quantify, the loss of these plants may have important effects on system reliability out of proportion to their fraction of installed capacity.

EPA Response

EPA agrees with this comment. EPA notes that this comment refers to retrofitting cooling towers. The final Phase II rule does not require the retrofit of cooling towers. EPA notes that whether the loss of generating capacity might cause reliability concerns will depend on the reserve margin in the NERC region.

Comment ID 316bEFR.306.417

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.02

Economic impacts on consumers/households

Comments on Material in “Section 6: Cost Estimates”

Costs of compliance are minor

In Section 6, it is asserted that the costs of retrofit are minor in comparison to overall costs; specifically that the annual (2001) cost of $2.3 billion established by EPA for the All Cooling Tower option amounts to only 0.1¢/kWh out of an average cost of 8.46¢/kWh and adds only $0.28 per month to the average residential electricity bill. While the arithmetic is correct, several points are noteworthy. The annual cost of $2.3 billion is made up of (from Table B7-12 in [6])

(See Table 2 Appendix C pg 12)

Other studies, analyzed and reported by EPRI [3] consistently define capital costs in the range of 2 to 2.5 times those estimated by EPA. As discussed above, probable outage times range from 2 to 10 time the one month outage assumed in the Connection Outage costs in the table above. Using an average outage of 6 months, these costs approach $700 million.

Accepting the recurring and permitting costs as given, this would raise the annual cost to approximately $3.8 billion. On a consistent basis this raises the monthly increase in residential bills to $0.46. While this is still a minor monthly expense for nearly all households, in aggregate, it represents a considerable sum.

It is misleading, we believe, to dismiss the importance of truly large sums spent by an industry or by society as minor by spreading them over a large population. For example, current debate over competing tax bills argue over differences of $100. billion over 10 years. While this difference amounts to less than $4.00 per capita per month, it is alleged to have critical impact on the future of the Nation’s economic health.

EPA Response

See 087.004.

Comment ID 316bEFR.306.418

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Cost of compliance are overstated

In the remaining parts of Section 6, Synapse argues that the costs of compliance that have been dismissed as “minor” are nonetheless overstated and several instances are presented to support this contention.

Amortization period

EPA amortizes the capital costs of cooling towers over a 30-year life. Synapse argues that they have a longer life and that a longer amortization period should be used which would significantly reduce the annualized cost. Two points are noteworthy.

- People in the field commonly speak of 20-year towers or 30-year towers---not 40- or 50-year towers. The CTI literature has many discussions of tower rebuilds or even collapses for towers less than 30 years old. Economic analyses of the lifetime cost of cooling systems routinely include substantial refurbishment costs for wet towers at 10-year intervals. While it may be that the current generation of FRP towers will have longer life with less maintenance, there is no currently available data to confirm this.

- Even if one accepts a longer amortization period of, say, 50 years, the effect on annualized cost is small. From p. B1-15 of the EBA [6].

Annualized Cost = Capital Cost x {[r x (1 + r)^n]/[(1 + r)^n – 1]}

Using a discount rate of r = 7%, the amortization factor for n = 30 years is 0.0806 and for n = 50 years is 0.0725 or about 10% less. Since the capital cost represents only about 30% of the total cost (see Table 2 above), the reduction would less than 3% of an amount already asserted to be minor.

EPA Response

EPA notes that the final Phase II rule does not contain requirements to retrofit cooling towers.

EPA generally agrees with this comment and notes that it supports EPA’s analyses. EPA’s cost estimates included O&M costs to refurbish cooling towers at approximately 10-year intervals. This assumption was generally supported by industry comments.

Please also refer to the response to comment 316bEFR.087.013 in subject matter code 9.0.

Comment ID 316bEFR.306.419

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 9.0
Costs

Circulating water flow in closed cycle cooling

In a second point, Synapse correctly points out that EPA sized the cooling tower for retrofit to the same circulating water flow used in the pre-retrofit once through cooling system. This results in a tower that is larger and more expensive than if the entire cooling system were re-configured at a circulating water flow rate which had been optimized for a re-circulating cooling system with a wet cooling tower. Indeed, EPA did not re-optimize the cooling system nor did any of the individual plant studies with a very few exceptions. The reasons are these.

Although Synapse apparently fails to recognize it, re-configuring the cooling system to an optimized flow rate, requires major changes throughout the cooling system. Reducing the flow rate, while allowing the use of a smaller cheaper tower, requires that the condenser be modified in order to maintain tube side water velocities and the corresponding heat transfer performance. This normally requires changing the tube bundle from a one-pass to a two pass arrangement with an accompanying major re-arrangement of the inlet and outlet nozzles and piping connections. Doing this frequently requires significant structural work on the turbine building in order to gain access to the condenser, disconnecting, removal and reinstallation of major equipment and a significant extension of the outage time while the condenser is being modified.

Performing such a re-optimization of the design will reduce future operating costs but at the expense of substantially increased capital costs for the retrofit. As a result, it would only be considered on large, base-loaded plants with long remaining life and would be wholly inappropriate for smaller, older plants with lower capacity factors. In the case of the Salem Nuclear plant for which a retrofit cost analysis was conducted and published [5], the re-optimization was recommended and added $70 million to the initial cost of the retrofit.

EPA Response

The Agency agrees with the comment. See response to comment 316b.EFR.404.058 for the Agency's response to the referenced comment by Synapse.

Comment ID 316bEFR.306.420

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.0

Costs

Tower materials of construction

Synapse notes that EPA cost data shows that fiberglass reinforced plastic (FRP) are slightly less expensive than the redwood towers chosen by EPA as the basis for their cost estimates. Examination of the cost curves on Chart 2-1 of the Technical Development Document [4] demonstrates that this is a “distinction without a difference”. The difference in cost between the two fitted curves is approximately 2.3% and, by inspection, less than the fine structure scatter in the data points from which the curves were derived. Since the cost of the tower itself is typically 20 to 30% of the total retrofit cost (Appendix B in [3]), this difference, even if it were assumed to be consistent and robust, would lead to a total cost difference of only about 0.5%. This is equivalent to the difference in national capacity that Synapse dismissed as inconsequential in their discussion of system reliability. We suggest that you can’t have it both ways. If a difference is insignificant when it opposes an argument, then it should be insignificant when it supports an argument.

EPA Response

The Agency agrees with the comment and finds that it is an accurate description of the Agency’s data. See response to comment 316b.EFR.404.058 for the Agency's response to the referenced comment by Synapse.

Comment ID 316bEFR.306.421

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.0

Costs

EPA estimates vs. case studies

Synapse observes “the equations used by EPA to quantify the capital cost of a new cooling tower produce cost estimates that ‘in almost all cases’ exceeded the actual project costs.” They then suggest that EPA should either revise their correlating equations to “more accurately reflect the actual costs of building a tower” or “not apply a 20 percent ‘retrofit factor’ when quantifying the cost of adding a cooling tower at an existing facility.” Several points should be considered.

- An agreement between correlating equations derived from generalized cost algorithms and actual project costs of the level of accuracy displayed in Chart 2-7 [4] is remarkably good. No correlation of any type should be expected to capture project-to-project differences for activities as complex as power plant construction with great precision.

- The decision of whether to adjust the correlation to represent some lower bound, a best fit or a likely upper bound is a judgment to be made based on the objective of the correlation. EPA’s choice reflected a choice to display a likely upper range of costs that would be encountered in installing recirculating cooling systems at new facilities and was identified as such.

- However, to suggest that this choice of correlating equation for new plants should in some way replace the “retrofit factor” for installing similar systems at existing plants is to misunderstand the reason for the retrofit factor. It is not a “contingency” margin intended to allow for project-to-project variability, which, although expected, cannot be specifically identified and planned for at the outset. Rather, it is intended specifically to account for the obvious differences between conducting a project at a “greenfield” site and at an operating facility where existing structures, utilities and necessary activities interfere with access, erection, installation, delivery, storage and all other aspects of the project.

- Finally, whereas Synapse suggests that “the combined use of both the existing equations and the 20 percent retrofit factor leads to unreasonably high estimates for the capital costs of adding a new cooling tower at an existing facility”, quite the contrary is true. Comparisons with both data from site-specific case studies at 50 sites and with other correlations developed by skilled, experienced engineering firms show clearly that the EPA estimates for retrofits underpredict site-specific estimates in essentially every case and on the average by a factor of more than x2.

EPA Response

The Agency generally agrees with the commenter’s conclusions regarding the EPA new facility cooling tower cost curves. In addition, the Agency agrees with the commenter's statements about the purpose of a retrofit factor and the inappropriateness of Synapse’s suggestion to remove the factor from cooling tower estimates (see response to comment 316b.EFR.404.058).

The Agency notes that it is has not based the requirements of the final rule on cooling tower retrofits for existing facilities. See response to Comment ID 316bEFR.208.002.

Comment ID 316bEFR.306.422

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.0

Costs

Location of cooling tower

Synapse asserts that the assumption that 2,000 to 4,000 feet of piping for make-up and blowdown to the cooling tower is excessive and would “apply in only a limited number of cases”. While there are doubtless sites at which shorter lines world be adequate, the assumption does not appear to be unreasonable. One of the major issues in any retrofit is the siting of the cooling tower itself. At plants originally designed for once-through cooling the site could often be arranged quite compactly. There would have been no need to allow for unimpeded air flow to a tower or to protect switchgear from drift and plumes from a tower. Therefore, when a tower must be added, it is often necessary to locate it quite far from the main plant buildings for the above reasons. In a brief survey of utilities reported by EPRI [3], at 46 out of 56 plants surveyed said that extensive separation distance between the plant and turbine hall would be required in a retrofit. Additionally, 31 of the 56 plants indicated that they would have to acquire additional property in order to have a place to locate a tower. In specific studies at large nuclear stations, the siting of the tower over 2,000 feet from the turbine hall was required in three out of four cases. [5, 6, 8]

EPA Response

The Agency notes that the commenter’s conclusions regarding the distance of make-up and blowdown piping distances supports the Agency’s rebuttal of the same comment (see response to comment 316b.404.058).

Comment ID 316bEFR.306.423

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Cost of foregone Sales

Synapse objects to the use of “annual average sales figures and annual average wholesale prices” to calculate the cost of foregone electricity sales during the connection outage. It suggests that this overstates the outage costs and that sales and price data from off-peak seasons should be used.

First, earlier in their comments Synapse urges that the outages be spread evenly over the 60-month period allowed for retrofit in order to minimize the effect on system reliability. Again, you can’t have it both ways.

Nonetheless, if it were to be assumed that all retrofits would be done during off-peak seasons, then the use of off-peak data would be appropriate. However, these distinctions are insignificant compared to the understatement of outage costs which results from the use of a one month outage duration when numerous detailed studies (See Table 1 above) indicate that outages of two to ten times this long will realistically be required.

EPA Response

EPA generally agrees with this comment. While EPA acknowledges that the difference in average prices and off-peak prices can be important, it is not clear that all installation downtimes could realistically be scheduled during off-peak times. This is especially the case in regions where more than one facility might experience an installation downtime during the same year. As a result, EPA developed an estimate that recognizes that some retrofits might occur during times that are not considered off-peak. This will especially be the case for downtimes that have longer durations. For example, for the NODA analysis, EPA revised its assumption of the downtime required to install cooling towers at nuclear facilities from one month to seven months. Clearly, a seven month downtime cannot be scheduled during off-peak times alone. EPA also revised its downtime assumptions for compliance technologies other than cooling towers. For the analysis supporting the final rule, such downtimes range from 2 to 11 weeks. Again, it would be difficult to assume that an 11-week downtime can be scheduled during off-peak times only in all cases. EPA therefore believes that its approach to estimating the cost of downtime is appropriate.

Comment ID 316bEFR.306.501

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.02

Fish Population Modeling

Benefits expected by EPA are not realistic. The benefits expected by EPA in their 316(b) rule making for Phase II existing facilities are not realistic for two reasons. First, empirical evidence is not available from any field study during the past three decades indicating I&E losses are the sole cause, or even the primary cause, of changes at the population, community or ecosystem levels. Second, theoretical considerations and real-world experience relating to direct mortality losses, such as I&E and fishery losses, clearly indicate that managing fish populations by managing direct mortality on early life stages is not as effective as managing fishing mortality. Thus, detecting effects at the population and higher levels (much less, economic benefits for humans) caused by reductions in I&E losses seem highly unlikely, even with extensive multi-year monitoring studies.

EPA Response

Please see EPA's response to Comment 316bEFR.306.092, which is identical to this comment.

Comment ID 316bEFR.306.502

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA's assumptions concerning entrainment survival and compensation are not appropriate in the context of EPA's regional—national cost-benefit analysis. Two assumptions made by EPA in its regional-national cost-benefit analysis are not supportable because we know, with 100% certainty, that they are both inconsistent with scientific evidence. EPA assumes 0% entrainment survival for all life stages of all fish species at all facilities under all operating and environmental conditions for all years. EPA also assumes zero compensatory offset of I&E losses for any population of any species at any facility under any operating or environmental conditions in any year. Furthermore, adoption of these two assumptions, without any characterization of uncertainty, results in providing decision-makers, all stakeholders and the public with inflated estimates of I&E losses and inflated estimates of benefits of reducing these losses. In the context of site-specific 316(b) determinations, these two assumptions may be reasonable. However, for EPA's regional-national analysis these two assumptions apply to ~550 facilities and hundreds of fish populations under all conditions, and in this context EPA's two assumptions are not scientifically supportable.

In estimating regional I&E losses and benefits of reducing these losses, the focus is on a population of 550 facilities and hundreds of fish populations under a broad range of conditions. EPA's analysis is designed to compare the national benefits and national costs of the proposed rule as applied to this population of facilities and associated fish species. As part of such an analysis, EPA is mandated by its own policies to characterize the uncertainties in both benefits and costs. EPA did not do this in either the proposed rule or the NODA. EPA's assumptions concerning entrainment survival and compensation are two of the most troubling examples.

Having calculated total regional impingement and entrainment losses by waterbody type and species or species group, EPA's next step should have been to consider uncertainty relating to entrainment survival and compensation. Use of fuzzy numbers is an effective and simple method for representing uncertainty in entrainment survival and compensation in EPA's benefits analysis. For both entrainment survival and compensation, the fuzzy-number approach provides for acknowledging EPA's reasons for adopting the simplistic and convenient assumptions of 0% entrainment survival and 0% compensatory offset. However, the approach also acknowledges that:

- EPA has an obligation to characterize uncertainty.

- With 100% certainty we know that some entrainment survival and some compensatory offset will occur among the hundreds of fish populations experiencing I&E losses at the 550 facilities covered by EPA's rule making for Phase II existing facilities.

- Ignoring these realities results in inflated estimates of I&E losses (especially entrainment losses) and benefits of reducing these losses.

EPA Response

This comment is identical in nature to comment 316bEFR.306.506, please see response to that comment.

Comment ID 316bEFR.306.503

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA has failed to adequately characterize uncertainties. EPA's regional and national benefit analysis is unavoidably based on many decisions, assumptions and information sources, and it involves many computational steps. In addition, the analysis requires extrapolation on a grand scale both ecologically and economically. Uncertainty, whether due to unavoidable variability or other sources of uncertainty, is associated with every decision, assumption, and information source incorporated in the analysis and with every additional computational step and level of extrapolation. Consequently, uncertainty is guaranteed to monotonically increase throughout EPA's analysis.

I propose seven inequalities involving I&E losses, complexity of EPA's analysis framework, benefits, costs, and uncertainty. These inequalities have several advantages over a detailed quantitative uncertainty analysis that attempts to cope with the many individual steps in EPA's analysis. They are simple and easy to understand, and they all make a macro-level claim. In addition, they are not likely to be controversial because in the context of EPA's analysis they can be easily verified or, in the case of the uncertainty inequalities, are likely to be accepted. Alone or in combination, these inequalities highlight important issues and make powerful statements in the simple manner that should appeal to decision-makers and non-technical people. Based on these inequalities, it is clear that EPA's cost-benefit analysis for reducing entrainment losses is less convincing than its case for reducing impingement losses. This is an important conclusion to be able to reach because it should condition the vigor with which EPA is justified in requiring costly technological requirements to reduce entrainment losses compared to impingement losses.

EPA Response

See Chapter A6 and Chapter A10 and the regional reports contained in the Phase II Regional Analysis Document (DCN #6-0003)for discussions of omissions, biases, and uncertainties in relation to EPA's analysis.

The commenters don't define the "seven inequalities" they refer to, so EPA is unable to respond to this part of the comment.

Comment ID 316bEFR.306.504

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01

Ecological Evaluation Methodology

EPA Inflates Benefits of Reducing I&E Losses by Compounding Precautionary Assumptions. EPA has made precautionary assumptions at multiple steps in both its biological evaluation of I&E losses and its estimation of the benefits of reducing these losses. Several biological examples are highlighted elsewhere in my review, including 0% entrainment survival and 0% compensatory offset. Without these multiple precautionary assumptions, the economic benefits analysis would be very different. However, EPA has not acknowledged that it is relying on a precautionary approach, has not justified the need for this approach, and has not quantified the magnitude of the inflationary bias created by adopting this approach.

EPA Response

Please see Chapter A7 of the Regional Analysis Document (DCN #6-0003) and response to Comment 316bEFR.306.506 regarding EPA's conclusions about entrainment survival.

Please see EPA's response to Comment 316bEFR.025.015 regarding compensation.

Also, please see response to Comment 316bEFR.074.201, which refutes the claim that EPA has included "multiple conservatisms" in its analysis, and response to Comment 316bEFR.005.026 regarding the term "precautionary approach."

Comment ID 316bEFR.306.505

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Benefits Expected by EPA Are Not Realistic

To set the stage for addressing this concern, I cite EPA text from four EPA documents that characterize the environmental and economic benefits that EPA expects will follow from its rule for Phase II existing facilities.

NODA, Summary of Proposed Rule for Existing Facilities. Key phrases used by EPA to characterize its expectations for environmental benefits are: reducing harmful effects of entrainment and impingement; decrease in expected mortality or injury to aquatic organisms; protect ecosystems in proximity to CWIS; preserve aquatic organisms, including T&E species and the ecosystems they inhabit; and benefits may [emphasis added] also accrue at multiple ecological scales including population, community, or ecosystem levels.

Case Study Analysis, Chapter A9: Economic Benefit Categories and Valuation Methods. EPA postulates the following chain of 'potential' or 'expected' benefits [emphasis added]:

"Valuing the changes in environmental quality that arise from the §316(b) regulations for existing facilities is a principle desired outcome for the Agency's policy assessment framework. Changes in the CWIS design or operations reduce I&E rates. These changes in I&E can potentially yield significant ecosystem improvements in terms of the number of fish and other aquatic organisms that avoid premature mortality. This in turn is expected to increase the numbers of individuals present, increase local and regional fishery populations, and ultimately contribute to the enhanced environmental functioning of affected waterbodies (rivers, lakes, estuaries, and oceans) and associated ecosystems. The economic welfare of human populations is expected to increase as a consequence of the improvements in fisheries and associated aquatic ecosystem functioning" (p. A9-1).

Economics and Benefits Analysis (EBA), Chapter A2: Need for the Regulation. In support of these expectations, EPA comments as follows:

"Review of the available literature and section §316(b) demonstration studies has identified numerous documented cases of impacts associated with I&E and the effects of I&E on individual organisms and on populations of aquatic organisms. [EPA cites three cases in terms of direct E&I losses (numbers or weight).] The yearly loss of billions of individuals is not the only problem. Often, there are impacts to populations as well. [EPA cites one study involving population projections from a computer simulation model. EPA cites a second study (San Onofre Nuclear Generating Station (SAIC, 1993)) quantifying both losses at the individual level and decreases in the densities of two fish species within three kilometers of the facility relative to densities in control areas.]" (p. A2-8)

Case Study Analysis, Part F: Brayton Point, Chapter F1: Introduction. Although only I&E impacts are to be considered under Section 316(b), EPA indicates its awareness that fish and shellfish populations in the vicinity of a power plant may be exposed to major environmental stresses in addition to I&E

losses. In addition to surface water withdrawals by CWIS and discharge of heated water, EPA discusses habitat alteration (e.g., water pollution, dredging, coastal development, and other environmental stressors that have nearly eliminated eelgrass in Mount Hope Bay), overfishing, pollution (e.g., Narragansett Bay and Mount Hope Bay must assimilate high levels of industrially derived toxic pollutants, nutrients, and wastewater from the area's 33 wastewater treatment facilities), and weather patterns (e.g., warmer winter water temperatures resulting in loss of the usual winter-spring diatom bloom and perhaps contributing to increased predation rates by shrimp on larval winter flounder) (pp. F1-6 & F1-7).

Benefits expected by EPA are not realistic for the following two reasons:

(a) Lack of empirical evidence. Empirical evidence is not available from any field study during the past three decades indicating that I&E losses are the sole cause, or even the primary cause, of changes at the population, community or ecosystem levels. This lack of empirical evidence does not mean that I&E losses are not having any negative effects at the population and higher levels. It does mean, however, that for any existing facility some variation of the Brayton Point story (mentioned above) involving other major environmental changes has and is continuing to occur. In some situations, reductions in other stresses will complicate interpretation of monitoring data (e.g., substantial improvements in water quality and the ban on commercial and recreational fishing for striped bass in the Hudson River, NY). EPA's one and only example of effects of empirical evidence I&E losses at the population level (i.e., San Onofre Nuclear Generating Station, cited above) is misleading. While the observed decreased densities of two fish species within three kilometers of the facility relative to densities in control areas likely was due to operation of this facility, the fundamental problem was the negative effects of the thermal discharge on the kelp beds in the vicinity of the facility. The resulting reduction in suitable habitat for these two fish species was the primary cause of the observed spatial differences in densities of these two species.

(b) Theoretical considerations and real-world experience relating to direct mortality losses. I&E losses are examples of direct mortality losses, analogous to losses associated with fishing mortality.<FN 1> Examples abound illustrating that overfishing can be a primary cause of decline in fish populations, in some cases with observable effects at the community level and even the ecosystem level. Examples also abound that regulating fishing mortality is an effective tool for managing fish populations and that a reduction in fishing mortality can allow an overfished population to recover. However, theoretical considerations and real-world experience relating to direct mortality losses, such as I&E losses, clearly indicate that managing fish populations by managing direct mortality on early life stages is not as effective as managing fishing mortality. The logic underlying this claim is simple. First, by the time a fish enters the fishery, natural mortality rates are much lower compared to the high natural mortality rates of age-0. Typically, annual probability of survival for age-0 fish compared to fish in the fishery differ by a factor of 10^4 to 10^7.<FN 2> Second, the ratio of age-specific annual instantaneous fishing mortality rate to age-specific annual instantaneous total mortality rate is much higher than the ratio of age-0 annual instantaneous I&E mortality rate to age-0 total annual instantaneous mortality rate. Thus, reducing age-specific fishing mortality a given percentage, compared to reducing age-0 I&E mortality a given percentage, results in a greater percent reduction in total mortality and thus an increased probability of increasing abundance.

EPA's 'potential' and the 'expected' outcomes have a low probability of being realized. The combination of items (a) and (b) above strongly suggests that detecting effects at the population and higher levels (much less, economic benefits for humans) caused by reductions in I&E losses seems highly unlikely, even with extensive multi-year monitoring studies.

Footnotes

1 Assessing direct mortality losses versus habitat loss involve different ecological conceptual frameworks. Assessing consequences of direct mortality losses requires evaluating the cause-effect linkage from the individual level up to the population level, and possibly up to the community and ecosystem levels. Assessing the consequences of habitat loss requires evaluating the cause-effect linkages between direct impacts at the ecosystem level and subsequent effects down to the community, population, and individual levels. The first conceptual framework is bottom-up, while the second is top-down.

2 See EPA's Appendix 1: Life History Parameter Values Used to Evaluate I&E in the North Atlantic Region.

EPA Response

It is difficult to determine the relative importance of multiple environmental stressors on populations, communities, or ecosystems, and therefore the impact of any one stressor can be difficult to determine. However, contrary to the commenter's assertions, EPA notes that there are cases in which the evidence suggests that there are significant population-level impacts of I&E and thermal discharges. For example, fish populations in Mt. Hope Bay, Massachusetts have declined substantially, and extensive analysis by EPA Region 1 indicates that this results in large part because of the operation of the Brayton Point Station. Despite decreased fishing, many species have shown no sign of recovery. The San Onofre case is another example. Contrary to the commenter's assertion, facility reports demonstrate that decreased fish densities were not simply due to the negative effects of the thermal discharge on kelp beds.

Difficulties with detecting ecological effects at higher levels of biological organization, including power plant impacts, are discussed in detail in a recent book by Schmitt and Osenberg, "Detecting Ecological Impacts" (DCN #2-019A-R21). The authors note that a "before-after-impact-control" study design is the best way to detect such effects.

Comment ID 316bEFR.306.506

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

EPA's Assumptions Concerning Entrainment Survival and Compensation Are Not Acceptable in the Context of EPA's Regional—National Cost-Benefit Analysis<FN 3>

Two assumptions made by EPA in its regional-national cost-benefit analysis (CPA) are not supportable because we know, with 100% certainty, that they are both inconsistent with scientific evidence. EPA assumes 0% entrainment survival for all life stages of all fish species at all facilities under all operating and environmental conditions for all years. EPA also assumes zero compensatory offset of I&E losses for any population of any species at any facility under any operating or environmental conditions in any year. Furthermore, adoption of these two assumptions, without any characterization of uncertainty, results in providing decision-makers, all stakeholders and the public with inflated estimates of I&E losses and inflated estimates of benefits of reducing these losses.

For site-specific 316(b) determinations, it may not be reasonable to expect the permitting authority to accept an applicant's claim of entrainment survival greater than 0% for a life stage and species unless supported by credible results from a credible entrainment survival study at that facility, including an evaluation of variability and other uncertainties. Similarly, it is not reasonable to expect the permitting authority to accept an applicant's claim that I&E losses for a specific population have been offset by compensation unless long time series of credible monitoring data exist from both the facility and source waterbody, including annual estimates for spawning stock, recruitment, and other factors that may be affecting that population. Thus, for site-specific determinations and in the absence of monitoring data indicating otherwise, EPA's two assumptions may be justified. However, for EPA's regional-national analysis these two assumptions apply to ~550 facilities and hundreds of fish populations under all conditions. In this context EPA's two assumptions are not supportable or acceptable.

EPA justifies these two assumptions in chapters A6 and A7 (March 2003 version) of the Benefits Case Studies. EPA's justification for assuming 0% entrainment survival is based on its review of 36 entrainment survival studies suggesting that:<FN 4>

- Proportion alive in the samples is highly variable and unpredictable among species, among facilities, and among years at a given facility;

- Some species are more sensitive than others (e.g., herrings and bay anchovy compared to striped bass);

- Few studies could conclusively document and quantify the specific stressors causing the observed mortality, and no rigorous, validated method or model was put forward that would allow survival rates to be accurately predicted;

- Studies cover very few species, primarily in a single geographical region of the country, thus providing no basis for prediction to other species in other parts of the country;

- A finding for one facility cannot be considered to be valid for another facility, since many site-specific and facility-specific factors can affect the magnitude of mortality that occurs;

- Usefulness of all the findings is further compromised by the numerous factors that can influence the representativeness, accuracy, and precision of the survival estimates presented and that are often not rigorously accounted for in the studies (e.g., high control mortalities, omission of fragmented or unidentifiable organisms, and uncertainty regarding post-discharge survival).

In spite of the above reservations, EPA does concede that “it may be true that not all organisms are necessarily killed as they pass through the cooling systems of all facilities under all operating conditions” (p. A7-50). Given this admission, however, EPA’s final conclusion remains (Benefits Case Studies, Part A: Evaluation Methods, Chapter A7: Entrainment Survival, March 11, 2003, p. A7-51):

“Overall, the unreliability, variability and unpredictability of entrainment survival estimates evident from EPA’s review of the entrainment survival studies supports the use of the assumption of zero percent survival in the benefits assessment because there is no clear indication of any defensible estimate of survival substantially different from zero percent<FN 5> to use to calculate benefits for this rule.”

See Item II. A for additional comments on entrainment.

EPA’s justification for assuming no compensation is based on the low predictive capabilities of fish population models, the difficulty of identifying specific mechanisms of density dependent response, and the difficulty of estimating the magnitude and timing of compensation for specific populations in specific waterbodies. As indicated below, however, one does not need to use fish population models and does not need to know specific mechanisms or magnitude and timing of compensation for specific populations in specific waterbodies in the context of estimating regional and national E&I losses and benefits. See Item II.B for additional comments on compensation.

In estimating regional I&E losses and benefits of reducing these losses, the focus is on a population of 550 facilities and hundreds of fish populations under a broad range of conditions. EPA’s analysis is designed to compare the national benefits and national costs of the proposed rule and its various options as applied to this population of facilities and associated fish species. As a component of such an analysis, EPA is mandated by its own policies to characterize the uncertainties in both benefits and costs. EPA did not do this in either the proposed rule or the NODA. EPA’s assumptions concerning entrainment survival and compensation are two of the most troubling examples.

Clearly, in calculating impingement and entrainment losses by waterbody type and species or species group for its regional case studies, EPA assumed that absolutely no entrainment survival or compensation occurs. This is evident from the information in Table X-6 through Table X-9 for the North Atlantic Region (NAR). The values in these four tables, for age-1 equivalents, fishery yield foregone, and production foregone, represent EPA’s estimated impingement and entrainment losses for the 21 in-scope facilities in the NAR (19 estuarine, 2 ocean), calculated assuming 0% entrainment survival and 0% compensatory offset.

Having calculated total regional impingement and entrainment losses by waterbody type and species or species group, EPA's next step should have been to consider uncertainty relating to entrainment survival and compensation. Use of fuzzy numbers is an effective and simple method for representing uncertainty in entrainment survival and compensation in EPA's benefits analysis:

"A fuzzy number represents an uncertain number, i.e., a number whose value is not precisely known….Fuzzy numbers arise as a refinement of intervals which are rather crude encapsulations of uncertainty. For instance, intervals seem to imply that, although we cannot give a number's value exactly, we can give exact bounds on the number. Fuzzy numbers generalize intervals in a way that eases this paradox. A fuzzy number can be thought of as a nested stack of intervals at infinitely many levels of confidence about uncertainty. These levels of confidence range between 0 (corresponding to the most conservative, widest interval) and 1 (the narrowest interval, which assumes we're really [relatively] good at making measurements). By definition, all fuzzy numbers must reach [a confidence level of] one and must be convex (single humped). The [Y-axis] scale between 0 and 1 is said to measure the possibility [or confidence, consensus or belief] that a number is within the interval at a particular [possibility] level. This introduces the notion that possibilities can be graded…. Fuzzy numbers and their arithmetic provide a simple and workable methodology that is valid for handling non-statistical uncertainty in calculations….Triangular fuzzy numbers [are specified by] three scalars. For example, the fuzzy number [1, 2, 3] represents a number whose value is certainly somewhere between 1 and 3 and about which our best guess is 2. Trapezoidal fuzzy numbers…are specified by…four scalars….The fuzzy number [1, 2, 3, 4], for instance, represents a number whose value we optimistically think is somewhere between 2 and 3, but we know for certain is between 1 and 4" (EPRI, 1999, p. 5-21).<FN 6>

For entrainment survival, I propose that EPA define a trapezoidal fuzzy number of the form [0, p2, p3, p4], where p is % entrainment survival. Figure 1 illustrates the general shape for such a fuzzy number. I have not suggested specific values for p2, p3 or p4 in order to focus attention on the method. Note that p1 = 0 is EPA's assumption of 0% entrainment survival; it is the lower bound and correctly has a possibility of zero. Alternatively, it would be more realistic to define two such trapezoidal fuzzy numbers. Based on life history, taxonomy, and a critical evaluation of results of existing entrainment survival studies, each species or species group could be classified into one of two classes: relatively low risk and high risk of mortality if entrained. The two fuzzy numbers could differ in some or all of the values for p2, p3 and p4.

(See Graph on Page 10 of Appendix D)

Figure 1. General shape for a trapezoidal fuzzy number for % entrainment survival. To avoid controversy and focus attention on the method, values for p2, p3 or p4 are not proposed. Note that p1 = 0 is EPA's assumption of 0% entrainment survival; it is the lower bound and correctly has a possibility of zero.

For compensation, I propose that EPA define a trapezoidal fuzzy number in a similar manner, where in this case p is % compensatory offset of I&E losses. In this case, p1 = 0 is EPA's assumption of no compensatory offset, and again p1 is the lower bound and correctly has a possibility of zero. Again it would be more realistic to define two such fuzzy numbers as I propose for entrainment survival, although for different reasons. In the case of compensation, one fuzzy number would apply to entrainment losses and the second to impingement losses. More specifically, entrainment losses are more likely to be offset by compensation than impingement losses because a longer period of time remains during which compensatory mechanisms are most likely to be operative [see Item II.B.1, EPA's quote from Myers (2001)]. For both entrainment survival and compensation, the fuzzy number approach provides for acknowledging EPA's reasons for adopting the simplistic and convenient assumptions of 0% entrainment survival and 0% compensatory offset. However, the approach also acknowledges that:

EPA has an obligation to characterize uncertainty.

With 100% certainty we know that some entrainment survival and some compensatory offset will occur among the hundreds of fish populations experiencing I&E losses at the 550 facilities covered by EPA's rule making for Phase II existing facilities.

Ignoring these realities results in inflated estimates of I&E losses (especially entrainment losses) and benefits of reducing these losses.

If EPA adopts this suggestion, EPA needs to carefully consider selecting a credible process for determining values for these fuzzy numbers.

Footnotes

3 See Item II.A for additional comments on entrainment and Item II.B for additional comments on compensation.

4 These six concerns, while not unreasonable, set a very high standard for acceptance/rejection of results for field studies. EPA did not apply analogous standards to all its own analyses, EPA's extrapolations from case study facilities to the regional level being a prime example.

5 EPA's standard for substantially different from zero percent [sic; substantially greater than zero] is not indicated.

6 EPRI. 1999. RAMAS Risk Calc: Risk Assessment with Uncertain Numbers. EPRI, Palo Alto, CA. CM-113048.

EPA Response

To calculate the environmental benefits associated with the reduction of entrainment due to the implementation of technology to comply with this rule, EPA used the assumption that all organisms passing through a facility's cooling water system would experience 100 percent mortality. EPA believes that this assumption is supportable.

The benefits assessment used a regional approach which relied on data from several facilities within each region. A lack of facility-specific data relating to entrainment survival was the impetus of this assumption. Given the lack of facility-specific entrainment survival data, EPA conducted a detailed review of 37 entrainment survival studies conducted at 22 individual power producing facilities in order to determine if entrainment survival was generally predictable and if the various results could be synthesized in a manner to apply the general results to the facilities used in the regional benefit estimates. The review of the studies showed that while a few individuals may be alive in samples collected near the discharge of the facility and may survive entrainment, the proportion surviving is highly variable and unpredictable. These studies did not support predictions of entrainment survival for the range of species, life stages, seasons, regions and facilities involved in EPA's benefits estimates. In addition, the methods employed in the studies had the potential for high bias such that the survival estimates reported by the studies were most likely overestimates. If the potential for high bias was eliminated from these studies, then the proportion of organisms shown to survive entrainment would most likely be indistinguishable from zero. Also, in the studies reviewed the majority of organisms entrained appear to experience little to no survival. The conclusion of this review was that the reported study results do not provide support for the selection of an estimate of entrainment survival substantially different from zero percent to be used as a defensible and nonarbitrary assumption to calculate benefits for this rule.

EPA agrees with the commenters that this conservative assumption does simplify the national benefits assessment. EPA agrees that presenting sensitivity analysis and discussing uncertainty is generally important, however, due to the high variability and unpredictability in the entrainment survival estimates from the studies the Agency reviewed, EPA saw little utility in performing a sensitivity analysis using unreliable, and thus arbitrary, numbers as the commenter suggests with such a large range of possible entrainment survival values (essentially from 0 to 100 as reported by the studies).

Chapter A7: Entrainment Survival from the Case Study Analysis for the Section 316(b) Phase II Existing Facilities Rule provides more detailed information on the scientific basis for this position. For information regarding compensation assumptions in the benefits analysis, please see the response to comment 316bEFR.025.015.

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Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

EPA Has Failed To Adequately Characterize Uncertainties

In its regional—national cost-benefit analysis, EPA has failed to adequately characterize uncertainties. EPA's benefit analysis is unavoidably based on many decisions, assumptions and information sources, and it involves many computational steps and levels of extrapolation. This situation is not qualitatively unique to 316(b) rule making for Phase II existing facilities. However, this situation perhaps is quantitatively unique in the extent to which the analysis requires extrapolating from a small sample to a more heterogeneous large population. The small sample consists of EPA's nine case studies with facilities located on nine different waterbodies in different regions of the United States and the fish populations experiencing I&E losses at these facilities. In addition, the quantity and quality of I&E monitoring data among the facilities in the nine case studies is variable. The more heterogeneous large population consists of ~540 additional facilities located on many different waterbodies throughout the United States and the hundreds of fish populations experiencing I&E losses at these facilities. The only site-specific datum used in estimating I&E losses for the additional 540 facilities, other than region and waterbody type, is the design intake flow or capacity (MWE). Thus, ecologically, EPA's benefit analysis requires extrapolation on a grand scale.<FN 7>

Economically, EPA's benefits analysis also involves extrapolation and assumptions on a grand scale. The analysis requires estimating the dollar value of regional E&I losses and of reducing these losses. The methods used to convert 'fish currencies' (number and pounds) to dollars range from direct methods (e.g., market value per pound of fish for commercial fisheries) to indirect methods relying on estimates of human behavior, benefits transfer, and stated preferences for recreational fisheries and nonuse benefits.

Uncertainty, whether due to unavoidable variability or other sources of uncertainty, is associated with every decision, assumption, and information source incorporated in the analysis and with every additional computational step and level of extrapolation. Consequently, uncertainty is guaranteed to monotonically increase throughout EPA's analysis (Figure 2).

In spite of this reality, EPA has avoided quantitatively or even qualitatively characterizing the uncertainty in its estimates. EPA is providing decision-makers and all stakeholders (including the public) with a package of single-number estimates of benefits and costs at the regional and national levels for various regulatory options. Is it acceptable for EPA to not characterize the uncertainty associated with estimates produced by this complex multi-tiered edifice? Even for EPA the answer to this question has to be "No," because EPA's most recent policies clearly require that the agency characterize uncertainty associated with analyses designed to support agency decisions.

(See Graph on Page 12 of Appendix D)

Figure 2. Framework for qualitatively visualizing proposed inequalities involving EPA's cost-benefit analysis. The left Y axis applies to the inner triangle and represents the cumulative increase in the

complexity of EPA's analysis framework. Complexity includes number of computational and extrapolation steps and number of decisions, assumptions and information sources used in the analysis. The right Y axis applies to the outer triangle and represents the cumulative increase in uncertainty. The bottom point of both triangles represents the starting point for the analysis, i.e., the raw/original I&E monitoring data for EPA's nine case studies.

Note that, because of compounding effects, the cumulative increase in uncertainty accumulates faster than the cumulative increase in complexity.

I propose the following inequalities involving I&E losses, complexity of EPA's analysis framework, benefits, costs, and uncertainty. Figure 2 is designed to help the reader better visualize and understand these inequalities.

Definitions:
U = uncertainty
N = complexity of EPA' analysis <FN 8>
B = benefits ($)
C = costs ($)
E = entrainment losses (number, lbs.)
I = impingement losses (number, lbs.)
RE = reduced entrainment losses (number, lbs.)
RI = reduced impingement losses (number, lbs.)
BRE = benefits of reducing entrainment losses ($)
BRI = benefits of reducing impingement losses ($)

E&I losses (as age-1 equivalents):
E > I, i.e., estimated losses due to entrainment are greater than estimated losses due to impingement.
Complexity of EPA's analysis framework:
NE > NI, i.e., greater complexity for entrainment than impingement.

Benefits and costs:
BRE > BRI, i.e., estimated benefits of reducing entrainment are greater than estimated benefits of reducing impingement.
CRE > CRI, i.e., estimated costs of reducing entrainment are greater than estimated costs of reducing impingement.
Uncertainty:
UE > UI, i.e., uncertainty in estimated entrainment losses is greater than uncertainty in estimated impingement losses.
UB,RE > UB,RI, i.e., uncertainty in estimated benefits of reducing entrainment losses are greater than uncertainty in estimated benefits of reducing impingement losses.
UB > UC, i.e., uncertainty in estimated benefits is greater than uncertainty in estimated costs.

Many methods are available for characterizing uncertainty, as summarized in a recent EPRI report (EPRI 1999).<FN 9> Although EPA's analysis could be classified as between a "best-estimate analysis" and a "worst-case analysis," or labeled as a "precautionary-approach analysis," EPA has not characterized the uncertainty associated with its single number estimates of benefits and costs. Interval analysis, fuzzy arithmetic, what-if analysis, and sensitivity analysis are methods that could be considered (EPRI 1999). However, it is not obvious to me that this would be particularly constructive, given the complexities and multiple sources of uncertainties most of which reflect ignorance rather than variability.<FN 10>

The above inequalities have several advantages over a detailed quantitative uncertainty analysis that attempts to cope with the many individual steps in EPA's analysis. These inequalities are simple and easy to understand, and they all make a macro-level claim. In addition, they are not likely to be controversial because in the context of EPA's analysis they can be easily verified or, in the case of the three uncertainty inequalities, are likely to be accepted.

Alone or in combination, these inequalities highlight important issues and make powerful statements in the simple manner that should appeal to decision-makers and non-technical people. The following sequence is one statement that uses all seven inequalities:

E > I, and thus BRE > BRI.
However, UE > UI (because NE > NI), and CRE > CRI.
Furthermore, UB,RE > UB,RI, and UB > UC.

In words, estimated losses (as age-1 equivalents) due to entrainment are greater than estimated losses due to impingement, and thus estimated benefits of reducing entrainment are greater than estimated benefits of reducing impingement. However, uncertainty in estimated entrainment losses is greater than uncertainty in estimated impingement losses (because more steps for E than I), and estimated costs of reducing entrainment are greater than estimated costs of reducing impingement. Furthermore, uncertainty in estimated benefits of reducing entrainment losses is greater than uncertainty in estimated benefits of reducing impingement losses, and uncertainty in estimated benefits is greater than uncertainty in estimated costs.

Bottom line: Based on the above reasoning, EPA's cost-benefit analysis for reducing entrainment losses is less convincing than its case for reducing impingement losses. This is an important conclusion to be able to reach because it should condition the vigor with which EPA is justified in requiring costly technological requirements to reduce entrainment losses compared to impingement losses.

(See Appendix D page 13 for variables)

Footnotes

7 See Items II.G and III.E for concerns related to EPA's extrapolation method and reliance on precautionary assumptions.

8 Complexity represents number and type of decisions, assumptions, information sources, computational steps, and extrapolation levels.

9 EPRI. 1999. RAMAS Risk Calc: Risk Assessment with Uncertain Numbers; EPRI, Palo Alto, CA. CM-113048.

10 EPRI (1999) describes two basic kinds of uncertainty. Ignorance includes measurement error, indecision about the mathematical form of an equation or model, and confusion about the appropriate level of abstraction in formulating the problem. Ignorance is a subjective kind of uncertainty but has the potential of being reduced. Variability includes temporal stochasticity, spatial variation, and heterogeneity among individuals. Variability is objective (i.e., it exists whether or not humans observe it); it cannot be reduced, although it can be better characterized (p. 2-11).

EPA Response

See Chapter A6, Chapter A10 and the regional reports contained in the Phase II Regional Analysis Document (DCN #6-0003) for discussion of omissions, biases, and uncertainties in relation to EPA's analysis. Also, please see EPA's response to Comment 316bEFR.041.843.

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Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 10.01
Ecological Evaluation Methodology

EPA Inflates Benefits of Reducing I&E Losses by Compounding Precautionary Assumptions

EPA has made precautionary assumptions at multiple steps in both its biological evaluation of I&E losses and its estimation of the benefits of reducing these losses. Several biological examples are highlighted elsewhere in my review, including 0% entrainment survival and 0% compensatory offset. Without these multiple precautionary assumptions, the economic benefits analysis would be very different. However, EPA has not acknowledged that it is relying on a precautionary approach, justified the need for this approach, or quantified the magnitude of the inflationary bias created by adopting this approach.

How much difference can compounding of precautionary decisions and assumptions make? A lot, just as it does with compounded taxes and fees. As an example, for a sequence of 10 decision points with the same inflationary bias associated with each decision, the final inflation factor is 260% for a 10% bias (= 1.10^10) and 620% for a 20% bias (= 1.20^10). Others have brought this problem to EPA's attention.<FN 11>

Footnotes

11 Burmaster, D.E., and R.H. Harris. 1993. The magnitude of compounding conservatisms in Superfund risk assessments. Risk Analysis 13:131-134; Perry, E. 2002. Comment on Multiplicity of Conservative Choices. Appendix B to EPRI Comments on EPA Proposed Phase II Section 316(b) Rule for Existing Facilities.

EPA Response

Please see response to Comment 316bEFR.074.201, which refutes the claim that EPA has included "multiple conservatisms" in its analysis, and response to Comment 316bEFR.005.026 regarding the term "precautionary approach."

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Regional Benefits Approach

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Additional Comments Relating to Entrainment

EPA retained inflated entrainment losses in calculating regional losses. EPA inflated entrainment losses based on greater than 0% entrainment survival from the case study facilities in order to extrapolate to other facilities in the region with no entrainment survival studies. I accept this as a reasonable approach. However, it appears that EPA retained these inflated entrainment losses when summing over all facilities in the region to estimate regional losses. EPA neither mentions nor quantifies this bias.

EPA Response

Please see Chapter A7 of the Phase II Regional Study Report (DCN #6-0003) for a discussion of EPA's position on entrainment survival and response to Comment 316bEFR.306.506..

Comment ID 316bEFR.306.510

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Credible entrainment survival studies. For site-specific determinations, EPA notes that the proposed rule language does not preclude the use of estimates of entrainment survival when presenting a fair estimation of the monetary benefits achieved through the installation of BTA, instead of assuming 0% survival. This statement implies that EPA is aware that credible entrainment survival studies are possible. Thus, if EPA is going to allow results from such studies to be included in permit applications, they are obligated to set minimum data quality objectives and standards.

EPA Response

For information about the consideration of entrainment survival in determining compliance, please refer to sections VIII and IX in the preamble to the final rule. In the final rule, EPA does not intend to set minimum data quality standards for these studies and expects the Director to perform such reviews on a case-by-case basis.

Comment ID 316bEFR.306.511

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.02

Fish Population Modeling

Additional Comments Relating to Compensation

EPA's justification for not representing compensation in its regional—benefits analysis is not adequate (Case Study Analysis, Chapter A6). I start by extracting material from four sections of Chapter A6 to characterize EPA's mindset regarding compensation and fish population modeling. I have italicized selected text in each section and then added my comments on the italicized text at the end of each section. I have indicated by "(Ref.)" when EPA supports its text with references.

Section A6-1. Background. "Compensation refers to the theoretical ability of a population to offset (compensate for) increased mortality (Ref). While considered likely to operate in most biological populations, compensation and other density dependent processes are difficult to observe and measure. When modeling population dynamics, this makes it difficult to identify underlying mechanisms of density dependent response and to estimate the magnitude and direction of population changes…."

My comment: Compensation is operative in the long term in every population or the population will become extinct. In addition, it is not necessary to model population dynamics, identify underlying mechanisms, or estimate the magnitude of population changes in order to represent both the consequences and uncertainty of compensation in EPA's regional—national benefits analysis. See Item I.B above for possible approach.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.306.512

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.02

Fish Population Modeling

Section A6-3. Use of Stock-Recruitment Models to Evaluate CWIS Impacts. "In a recent paper prepared for the Utility Water Act Group for the §316(b) rulemaking, Myers (2001) noted that the life stage at which power plant mortality occurs in relation to the timing of any compensatory response will strongly determine the degree of impact. If compensation operates in a population and power plant mortality occurs before compensation, the impact on equilibrium spawner biomass and fishery yield may be small. However, if power plant mortality occurs after compensation on juveniles, there can be a more rapid decrease in equilibrium spawner biomass with plant mortality."

My comment: I agree with Myers' point concerning the importance of the timing of any compensatory response relative to the life stage at which entrainment or impingement losses occur. This is why in Item I.B, I recommend specifying two fuzzy numbers for % compensatory offset, one for entrainment losses and the second for impingement losses.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.306.513

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.02

Fish Population Modeling

Section A6-4. Uncertainty in Stock-Recruitment Models. "In practice the use of stock recruitment curves to set fish levels, or to determine how much I&E a population can withstand, is complicated by the many physical and biological factors that can cause the stock-recruitment relations and potential compensatory reserve to vary over time (Ref.)….Because the relationship between spawners and recruits may itself vary, applying fixed rules for achieving constant fisheries yields or taking of young by CWIS can have very different effects, depending on whether population size is high or low."

My comment: Applying fixed rules for taking of young by CWIS at a specific facility is not the issue in EPA's regional—national benefits analysis. Again, what is at issue in EPA's analysis is representing the consequences and uncertainty of compensation. See Items I.B and I.C.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.306.514

Subject Matter Code 10.01.02.02

Fish Population Modeling

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Section A6-5. Precautionary Approach. “EPA is concerned that even in fish populations where compensatory processes are thought to operate, it has proven extremely difficult to estimate the magnitude of compensation and the form of compensatory response (Ref.). This is a particular concern for commercially exploited marine species….Given the many [commercially exploited marine] fish stocks are at risk, EPA has adopted a “precautionary approach” in evaluating CWIS impacts because of the many uncertainties associated with modeling compensation and stock-recruitment relationships….In the context of the §316(b) rulemaking, EPA notes that most CWIS cause substantial losses of aquatic organisms, and EPA believes that it is not appropriate to assume that these impacts are unimportant unless population-level consequences can be demonstrated….EPA believes that the many uncertainties associated with modeling stock recruitment relationships and potential compensation justify this approach, in keeping with a precautionary approach to environmental decision-making.”

My comments: First, that many commercially exploited marine fish stocks are at risk is a weak justification for adopting a precautionary approach for all fish species in all waterbody types, especially forage species. Second, population-level consequences primarily because of overfishing have been demonstrated numerous times. Population-level consequences primarily because of I&E losses have never been demonstrated. This difference suggests that a lower level of risk applies to consequences of I&E losses compared to fishing and again calls into question EPA’s justification for adopting a precautionary approach. See Item 1.D.

EPA Response

Please see responses to Comment 316bEFR.005.026 on the term "precautionary approach," Comment 316bEFR.005.009 on fish population modeling, Comment 316bEFR.025.015 on compensation, and Comment 316bEFR.306.092 on detecting ecological impacts.

Comment ID 316bEFR.306.515

Subject Matter Code 10.01.02.02

Fish Population Modeling

Author Name Doug Dixon & Kent Zammit

Organization EPRI

EPA's regional—national benefits analysis ignores two realities concerning compensation. We know with 100% certainty that the assumption of no density-dependent compensation in response to I&E losses for any population of any fish species at any of the 550 Phase II existing facilities at any time is incorrect. It is a simplifying assumption and eliminates the need to further consider a difficult, but critically important, reality. Based on both empirical evidence and theory, we know that compensation in fish populations usually occurs during early life stages. More specifically, entrainment losses are more likely to be offset by compensation than impingement losses. See Item 1.B.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.306.516

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.06

General Comments on Valuation Approaches

Need for Regional Analyses for Entrainment Alone and Impingement Alone

For each of its eight regions, EPA should provide benefits analyses for entrainment alone and impingement alone, before combining results. Results from analyses structured in this manner will better allow all parties to compare the cost effectiveness of reducing impingement losses vs. reducing entrainment losses.

EPA Response

EPA disagrees that regional analyses should be conducted for entrainment and impingement alone. Some of the EPA analyses rely on non-linear valuation functions (e.g., recreational fishing benefits). Thus, estimating benefits for impingement and entrainment alone first and then combining these results would produce different benefit estimates compared to the total entrainment and impingement reduction approach used by the Agency in the final 316b regulation.

Comment ID 316bEFR.306.517

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Need for Peer Review of Ongoing Restoration Projects

The practice of having a restoration plan undergo an independent peer review prior to the plan's submission to the Director is appropriate (Section IX.B.3). I would suggest, in addition, that independent peer reviews be required at 5-year intervals after the start of any restoration project. Without such periodic reviews it is unlikely that the successes and failures of restoration projects as a mitigation measure can be evaluated in a credible manner. Costs for such reviews should be included in EPA's cost-benefit analysis.

EPA Response

The final rule gives the permitting authority the flexibility to determine the need for an independent peer review. EPA encourages the use of independent peer review to bring current expertise to bear on consideration of a restoration measure.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

For a discussion of EPA's costing of restoration measures, see the preamble to the final rule.

Comment ID 316bEFR.306.518

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Uncertainty for Extrapolations in the Interior Region

EPA identified eight study regions based on similarities in the physical characteristics of the affected water bodies, aquatic species present in the area, and characteristics of commercial and recreational fishing activities in the area (Section X.B.2). The Interior region contains 372 of the 548 facilities. EPA needs to characterize the high heterogeneity that unavoidably must exist among these 372 facilities and evaluate the extent to which this heterogeneity may compromise credibility of extrapolations.

EPA Response

In an attempt to expand its coverage of this region, EPA's final analysis contains information on facilities in the Inland Region in addition to those evaluated for proposal. In addition, the recreational benefits analysis is now specific to the Inland Region. See the Regional Analysis Document for further information (DCN # 6-0003).

Comment ID 316bEFR.306.519

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Sensitivity Analysis of Representative Life History Parameters Is Needed

EPA acknowledges that life history data are very limited for many of the species that are impinged and entrained (Section X.B.3.a). To overcome this limitation, EPA uses the available life history data for closely related species to construct tables of representative life history parameter values for different species groups for each region.<FN 12> EPA's approach seems reasonable.

However, uncertainties associated with this approach should be addressed. Regional estimates of impingement and entrainment losses and benefits will be sensitive to the representative life history parameter values selected, especially to the life-stage-specific values for eggs, larvae and juveniles. Consequently, a sensitivity analysis for this step in the computational chain of estimating regional losses and economic benefits is needed.

Footnotes

12 As an example, see Life History Parameter Values Used to Evaluate I&E in the North Atlantic Region. Appendix 1 to §316(b) Regional Case Studies, Part B: North Atlantic.

EPA Response

Please see Chapter A6 of the Phase II Regional Analysis Document (DCN #6-0003) for a discussion of uncertainty in relation to EPA's analysis. Also, please see EPA's response to Comment 316bEFR.041.843.

Comment ID 316bEFR.306.520

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02.07

Regional Benefits Approach

Precautionary Bias in Extrapolation Method for I&E Losses Should Be Evaluated

EPA's equation for I&E extrapolation within each region is [Section X.B.3.b.(3)]:

(Total losses @ case study facility/Flow @ case study facility) * Total flow in region = Total regional losses.

Implicit in this simple model is the assumption that, on average, the ratio of total I&E losses to intake flow at a case study facility (or facilities for some regions) is similar to that for all the other facilities in the region where I&E losses are estimated using the above equation. For the North Atlantic Region, Brayton Point is the only estuarine case study facility, results from which are extrapolated to 18 other estuarine facilities using this equation. Thus, the opportunity for bias in either direction is evident.

However, EPA's use of this simple model is likely precautionary because the case study facilities are all examples of sites where impingement and entrainment loss rates (number lost/MGD intake flow) were relatively large. Because these large losses were of regulatory concern, these facilities were required to monitor the losses, which in turn created the data sets that resulted in EPA selecting these facilities for case studies. The likely bias resulting from this assumption would result in an overestimate of regional losses and benefits. EPA should seek appropriate data sets to evaluate the extent of this likely bias.<FN 13>

Footnotes

13 Appropriate data sets are available from select facilities on the Hudson River, Chesapeake Bay, and perhaps other regions. The Atlantic States Marine Fisheries Commission's Power Plant Panel is evaluating this same potential concern in its study of cumulative impacts of power plant impingement and entrainment: a case study for Atlantic menhaden.

EPA Response

Please see response to Comment 316bEFR.041.041 on EPA's regional extrapolation procedures. EPA has discussed numerous types of uncertainty associated with its analysis, including the possible problems associated with regional extrapolations. Please see Chapter A6, Chapter A10, and the regional reports contained in the Regional Analysis Document (DCN# 6-0003) for a discussion of uncertainty in the context of EPA's analysis. Please see response to Comment 316bEFR.005.026 regarding the term "precautionary approach."

Comment ID 316bEFR.306.521

Subject Matter Code 7.02
Performance standards

Author Name Doug Dixon & Kent Zammit
Organization EPRI

EPA's Preferred Option Would Reduce I&E Losses Less Than 30% in NAR

For the North Atlantic Region (NAR), the values in Table X-10 indicate that EPA's preferred option would reduce I&E losses less than 30% (Section X.C.4). I was expecting EPA's preferred option to reduce I&E losses 50 % or more. Using the values for flatfish, however, the decrease is less than 30% (3.64%/12.5% = 91,995 fish/315,703 fish = 29.1%). The values in Table X-40 illustrate a similar pattern. Presumably, the explanation lies in the definition of the baseline. EPA needs to clarify this issue. EPA's proposed rule is indeed an expensive solution, especially for reducing entrainment, if it removes only 30% of an impact that EPA views as being so environmentally damaging.

EPA Response

Please see response to comment 316bEFR.307.064.

Comment ID 316bEFR.306.522

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.02

Benefit Estimation Methodology

Fish Currencies, Monopoly Money, and Justification for EPA's Rule

EPA uses three models to characterize I&E losses at case studies facilities (Chapter A5). I&E losses and reductions in these losses for EPA's preferred alternative are expressed in three fish currencies: age-1 equivalents, foregone fishery yield, and forage fish production foregone. These three fish currencies facilitate comparison and ranking of alternative regulatory options and decisions—on a relative scale. The conversion of any of these fish currencies to monetary benefits in dollars unfortunately camouflages the reality that one is now dealing with monopoly money, especially when ~99% of the total economic benefit is due to nonuser benefits. Although among alternative regulatory options the relative dollar rankings for benefits may still be reasonably valid, it is the absolute dollar value for these benefits that are compared to costs in the final cost-benefit analysis used by EPA to justify their rule for Phase II existing facilities.

EPA Response

EPA agrees with the commenter that the metrics used to evaluate I&E (age 1 equivalents, foregone fishery yield, and production foregone) "facilitate comparison and ranking of alternative regulatory options and decisions on a relative scale." The Agency, however, points out that the cost-benefit analysis (i.e., comparison of the absolute value of costs and benefits) yield results that cannot be used, in isolation, for decision-making, because the calculations of benefits are often incomplete.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to uncertainty in monetizing national benefits associated with non-use values for the final rule. Thus, the Agency was not able monetize benefits for 98.2% of the age 1 equivalent losses of all commercial, recreational, and forage species (with the exception of some indirect benefits of forage on harvestable species production). (The percentages by region are as follows: California 95.2%, North Atlantic 99.0%, Mid Atlantic 98.4%, South Atlantic 98.1%, Gulf of Mexico 95.8%, Great Lakes 99.8%, and Inland 99.9%.) This means that the benefit analysis represents the benefits associated with less than 2% of the total age 1 equivalents lost due to impingement and entrainment by cooling water intake structures (CWISs)." Thus, the Agency considered all of the relevant data in the § 316(b) rulemaking process, not just absolute value of costs and benefits.

The Agency has explored several approaches that indicate the potential significance of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapter A12,Non-Use Meta-Analysis Methodology, and Chapters C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment

#316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. See also DCN # 6-2500 for the peer review report. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

For EPA's response to comments on the use of benefit cost test in the context of the 316(b) regulation please see the response to comment #316bEFR.005.020.

Comment ID 316bEFR.306.523

Subject Matter Code 10.03.05

Brayton Point

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Logic for Omitting the Last Decade of I&E Data at Brayton Point Is Faulty.

Pisces argues (Section 1.2) that EPA was reasonable in omitting the most recent decade of I&E data at Brayton Point because fish populations were severely depressed, numbers impinged steadily declined, and thus mean I&E values will be underestimates. Such an omission might be defensible if I&E losses at Brayton Point were considered one of the primary causes of the decline in fish and shellfish populations. However, they are not.

Why have the fish and shellfish populations in Mount Hope Bay declined over the past decade? EPA (Case Study Analysis, Part F: Brayton Point, Chapter F1: Introduction) indicates its awareness that fish and shellfish populations in the vicinity of Brayton Point are exposed to major environmental stresses in addition to I&E losses. In addition to surface water withdrawals by CWIS and discharge of heated water, EPA discusses habitat alteration (e.g., water pollution, dredging, coastal development, and other environmental stressors that have nearly eliminated eelgrass in Mount Hope Bay), overfishing, pollution (e.g., Narragansett Bay and Mount Hope Bay must assimilate high levels of industrially derived toxic pollutants, nutrients, and wastewater from the area's 33 wastewater treatment facilities), and weather patterns (e.g., warmer winter water temperatures resulting in loss of the usual winter-spring diatom bloom and perhaps contributing to increased predation rates by shrimp on larval winter flounder).

Although I&E losses at Brayton Point cannot be ruled out as a contributing cause, the clear regional trend in warming water temperature and decline in many fish and shellfish populations suggests other primary causes for the decline. Thus, a less protective and more realistic analysis would have been to include all the years for which data were available, rather than disregarding the last decade's I&E losses. Omitting the past decade of data inflates I&E losses at this case study facility, and this inflationary effect is magnified in EPA's process of extrapolating from Brayton Point to the other 18 estuarine facilities in the North Atlantic Region. See Item II.G.

EPA Response

EPA concurs with the analyses and conclusions of EPA Region 1 that there have been significant declines in finfish populations in Mt. Hope Bay as a result of the operation of BPS.

EPA disagrees with the commenters assertion that the omission of the past decade of data inflates EPA's estimate of average annual I&E at BPS. EPA only evaluated 1974-1983 data for this facility for several important reasons: (1) year-round entrainment sampling of all species began in 1972 and ended in 1984; BPS began entrainment monitoring again in 1993, but only for winter flounder, (2) 1984 and 1985 were not considered because of the use of "piggyback" cooling during some of this time, (3) Unit 4 did not go into service until 1974, so data from 1972 and 1973 were not included, and (4) this time period is prior to a dramatic decline in fish populations beginning in 1985. EPA believes all of these reasons justify its selection of data to evaluate for the purposes of estimating the total average annual I&E at BPS.

Comment ID 316bEFR.306.524

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Correction of EPA's Assumption Concerning Age at Impingement Is One-sided

EPA assumed at proposal that all fish killed by impingement were age 1 at time of death. Pisces (Sections 1.5.1 and 1.6) is correct in principle in pointing out that this assumption results in an underestimate of age-1 equivalents because impingement losses include older fish for some species. However, Pisces' one-sided approach to correcting EPA's assumption that all fish killed by impingement were age 1 at time of death. The majority of fish killed by impingement at most facilities are age 0. Assuming that all age 0 impingement losses were actually killed at age 1 likely results in a much greater overestimate of impingement losses, and of monetized benefits of reducing these losses, than the underestimate caused by not considering impingement losses of older fish.

EPA Response

Please see EPA's response to 316bEFR.029.105 concerning the age of impinged fish.

Comment ID 316bEFR.306.525

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Sensitivity Analysis of Effect of Survival Rates on Age-1 Equivalents

Pisces raises a valid point in Section 1.6.2, i.e., estimates of age-1 equivalent losses are sensitive to the survival rate estimates used to calculate age-1 equivalents. However, they illustrate this point in a biased manner. First, they select two examples where published estimates of age-specific survival were available that were higher than those used by EPA. For striped bass at Salem the EPA values on average are 48% of the NOAA values (Table 10), and for cunner at Seabrook the EPA values on average are 72% of the values quoted by Horst (Table 11). Pisces makes no effort to evaluate why these differences might exist, but rather assumes that the non EPA values are the standard. Second, Pisces then proceeds in Table 12 to present the results of a unidirectional sensitivity analysis for striped bass, weakfish, and croaker. Column 1 is labeled “Variation in estimate” and the table caption states “The effect of changing estimates of survival….” Column 1 should be labeled “Increase in estimate” and the table caption should state “The effect of increasing estimates of survival….”

EPA Response

Please see Chapter A6 of Part A of the Regional Analysis Document (DCN# 6-0003) for a discussion of uncertainty in the context of EPA’s analysis.

Comment ID 316bEFR.306.526

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Two Overly Precautionary Suggestions

Two examples of Pisces' conservation precautionary approach are as follows:

- In the final paragraph of section 1.6.2, Pisces proposes that "…it would seem reasonable to err on the side of caution [emphasis added] and increase all the estimates [of I&E losses] by 25%."

- Pisces' thesis is that EPA's method of calculating the worth of commercial species impinged and entrained "only considers the immediate loss and places a value on only a proportion of the number killed. This is felt to be an extremely significant omission, liable to underestimate the value of fish killed severely" [i.e., underestimate severely, not killed severely] (Section 2). Pisces then proposes a model and includes examples of how to estimate future losses into the next generation.

Both of Pisces' suggestions are examples of a precautionary approach. See Item I.D above.

EPA Response

Please see response to Comment 316bEFR.330.028 regarding the first point made by the commenter. In regard to reproductive value, please see EPA's response to Comment 316bEFR.206.065.

Comment ID 316bEFR.306.527

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 10.03.08

Extrapolation Methods

Examples of Implications of Extrapolations from Case Studies to Other Facilities

Pisces' bottom line, effectively illustrated by the bar graphs in Figure 6 through Figure 9, is: "As can be seen from these examples, extrapolating the catch of fish from one station is prone to many errors" (Section 1.8, last paragraph). Pisces chose to highlight an example that would significantly underestimate the number and value of the fish killed, i.e., extrapolating from Salem in the Delaware Estuary to power plants in the Hudson Estuary. A more balanced presentation by Pisces would have acknowledged that extrapolation can also result in significantly overestimating the number and value of the fish killed. See Item II.G above.

EPA Response

EPA agrees with the commenter that extrapolations can under- or overestimate true values. However, EPA also notes that such under- or overestimates may not be significantly different from the true estimate.

Comment ID 316bEFR.306.528

Author Name Doug Dixon & Kent Zammit
Organization EPRI

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Two Conceptual Frameworks for Considering Habitat Replacement As a Mitigation Measure

Pisces' lengthy evaluation of habitat replacement (more than 20% of its report) is informative and raises issues of legitimate concern that require further discussion and evaluation. Pisces lists methods of aquatic habitat creation and restoration/modification, and labels each method as a "habitat measure," a "species-related" measure, or both. Only six of the 19 methods are species related measures, while 14 are habitat measures, including wetland creation and restoration. I&E losses constitute a direct source of mortality, analogous to fishing mortality. Thus, I&E losses represent a species-related impact, and the most direct and equivalent approach for mitigating a species-related impact is with species-related measures, not habitat measures. It can be argued that indirectly such losses constitute a potential impact on a fish community and perhaps the habitat (and the same applies to commercial & recreational fisheries). However, the primary focus of 316(b) assessments in the past has always been on the species experiencing the losses, whether estimating the risk of AEI or the economic value of these losses.

Much of the appeal of habitat-related measures for many stakeholders (and not just the permit applicant) is the opportunity to provide (in the words of PSEG) "long-term, broad-based benefits for the natural resources and people of the region" (p. 59). Pisces comments that "these are valid and valuable ideals, but it is far from certain that they are a true replacement for losses, and so it can be argued that they should not be used as a bargaining chip to enable utilities to reduce their commitment to solving the primary environment problems [emphasis added], impingement and entrainment."

Bottom line: Pisces' conceptual framework for evaluating habitat replacement as a mitigation measure for I&E losses leads to the answer that true ecological equivalence is impossible, and thus habitat replacement is not an acceptable mitigation measure for I&E losses. An alternative conceptual framework for evaluating habitat replacement as a mitigation measure for I&E losses is as follows:

- Empirical evidence over three decades is weak from a scientific perspective in indicating that I&E losses are primary environmental problems or that reducing I&E losses will result in any of the population, community or ecosystem level benefits predicted by EPA's analysis;

- Empirical evidence over three decades is strong in indicating that I&E losses are a primary environmental problem for some stakeholders and thus for many regulators, including EPA;

- Empirical evidence is steadily increasing to indicate that habitat replacement can enhance the productivity and diversity of entire ecosystems; and

- Ecological equivalency can be viewed as a scientific, sociopolitical, and regulatory issue, and not just a scientific issue.

Bottom line: By saying 'Yes' to some form of habitat restoration as an appropriate mitigation measure for I&E losses, rather than focusing solely on reducing I&E losses, EPA's rule making for Phase II existing facilities has the potential of going from an overall lose-lose policy to a potential overall win-win for regulators, Phase II existing facilities, other stakeholders, and more importantly for aquatic resources and society.

EPA Response

For a discussion of the uncertainties associated with restoration measures and the use of restoration measures to address species other than those that are impinged and entrained, see EPA's response to comment 316bEFR.206.055.

EPA disagrees with the commenter's statement about the nature of empirical evidence available on the environmental problems associated with impingement and entrainment losses. For additional discussion of adverse environmental impact from cooling water intake structures, see EPA's response to comment 316bEFR.207.015.

EPA agrees with the commenter that impingement and entrainment losses are a primary environmental problem for some stakeholders. EPA also believes that habitat restoration can enhance the productivity and diversity of some ecosystems.

For the purpose of the requirements for restoration measures described in the final rule, including sections 125.94 and 125.95, ecological equivalency is viewed as a scientific issue.

For additional discussion of the role of restoration measures in the final rule, see EPA's response to comment 316bEFR.060.023.

Comment ID 316bEFR.306.601

Author Name Doug Dixon & Kent Zammit

Organization EPRI

Subject Matter Code 12.0

Impingement and Entrainment Assessments

EPRI submitted with its comments (OW-2002-0049, 5-1.6 in the docket or 316bEFR.306 in this database) a report entitled "Evaluating the Effects of Power Plant Operations on Aquatic Communities: Summary of Impingement Survival Studies."

EPA Response

EPA is in receipt of the attachment.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

David E. Bailey

On Behalf Of:

Hunton & Williams obo Utility Water Act Group

Author ID Number:

316bEFR.307

Comment ID 316bEFR.307.001

Subject Matter Code 7.02
Performance standards

Author Name David E. Bailey
Organization Hunton & Williams obo Utility Water Act Group

The performance standards, which are ranges of percentage reductions in impingement mortality and entrainment, should be treated as "targets" and not numerical permit limits.

EPA Response

For a discussion of the role of performance standards and how compliance is to be determined, see response to comment 316bEFR.063.005 and the preamble to the final rule.

Comment ID 316bEFR.307.002

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

Because of the variability and site-specificity of entrainment and impingement, the cost-benefit and cost-cost tests for when costs are "significantly greater" are very important.

EPA Response

The Agency agrees with the comment and notes that it has included cost-benefit and cost-cost tests in the final rule with the "significantly greater" metric.

Comment ID 316bEFR.307.003

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

For purposes of the cost-cost test, EPA should present the costs that EPA considered so as to allow them to be compared to site-specific costs at actual facilities.

EPA Response

See response to comment 316b.EFR.410.001.

Comment ID 316bEFR.307.004

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

"Significantly greater" should mean greater by any amount, taking into account the precision and uncertainty of the estimates of costs and benefits.

EPA Response

See response comment 316b.EFR.006.003.

Comment ID 316bEFR.307.005

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA’s estimates of the national and regional costs and benefits of the proposed rule have improved in some ways but are still inadequate. EPA’s analysis vastly overstates the non-use benefits of the proposed rule. But EPA’s apparent abandonment of the Habitat Replacement Cost (HRC) and Societal Revealed Preference (SRP) methods is a great improvement and ought to be confirmed.

EPA Response

EPA does not use the Habitat-based Replacement Cost (HRC) or Societal Revealed Preference (SRP) methods in the cost benefit analysis for the final Section 316(b) Phase II rule.

Please see the document entitled "Habitat-based Replacement Cost Method" (Docket # XX) for additional discussion of the HRC method.

Please also see EPA’s response to comments on the HRC (#316bEFR.005.035) and the SRP (#316bEFR.005.006).

Comment ID 316bEFR.307.006

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.01.02

Methods to Evaluate I&E

EPA's estimates of how many fish would be saved by the proposed rule have errors in both the weights and ages of fish.

EPA Response

Without examples, EPA cannot respond to this comment other than to say that EPA believes that it is incorrect and misleading to describe the weights and ages of fish used by EPA as "errors." In fact, EPA has made considerable effort to identify the best available biological data for its evaluations of impingement and entrainment. EPA consulted with local fisheries experts and conducted as thorough a review of the biological literature as possible to obtain the best available life history data. When possible, EPA used life history data recommended by local technical advisory committees and provided in current facility studies (e.g., EPA used the same life history data used by Salem and by Brayton Point in their recent permit renewal applications). However, the fact remains that despite this considerable effort to obtain the best available data, parameters such as fish weights and ages are not well known for many species.

Comment ID 316bEFR.307.007

Subject Matter Code 21.0
Implementation

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Implementation requirements should state clearly that reductions in entrainment and impingement by species or life stage are not required. On other implementation issues, UWAG believes flexibility is called for.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see EPA's response to comment 316bEFR.017.003. For an explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble section IX for a discussion of the Technology Installation and Operation Plan. EPA believes that providing flexibility in the means by which compliance is determined will encourage facilities and Directors to cooperate to find the best means of protecting their source waterbodies from adverse environmental impact.

Comment ID 316bEFR.307.008

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

The requirements of the rule must be timed so that existing facilities are not forced into a period of noncompliance (or "violation" of permits) just because of the time needed to determine, design, and install new intake technology.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. See also the preamble for a discussion of compliance issues.

Comment ID 316bEFR.307.009

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Where reliable data on entrainment survival are available, they should be used to determine compliance with the entrainment performance standard.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards.

Comment ID 316bEFR.307.010

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 11.0

Role of Restoration

Voluntary enhancement and restoration projects should be accepted as means of complying with the rule.

EPA Response

Under the final rule, permit applicants may use restoration measures as one of several approaches to complying with the rule.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.307.011

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Section I: General Information

At the heart of the proposed rule are "performance standards" that call for reducing impingement mortality by 80-95% and, for many facilities, entrainment by 60-90%. EPA has looked at available intake structure technologies and concluded that some of them can achieve these standards. The candidate technologies are wedge wire screens, fine mesh screens with fish return systems, and aquatic filter barriers.

The proposed rule could conceivably be read, incorrectly, to suggest that, if wedge wire screens, fine mesh screens with fish return systems, or aquatic filter barriers could not achieve the performance standards at a particular site, cooling towers (closed-cycle cooling) might be required.

Clearly it is not EPA's intent to require cooling towers, as several passages in the NODA reveal. For example, EPA deliberately did not include costs for cooling towers in its economic analysis for the "preferred" option. As EPA said in the original proposal:

[A]lthough closed-cycle, recirculating cooling is not one of the technologies on which the presumptive standards are base[d], use of a closed-cycle, recirculating cooling system would achieve the presumptive standards.

67 Fed. Reg. 17,142 col. 2.

To make it clear that cooling towers are not a "default" option to be required whenever the other alternatives cannot achieve the numerical standards, EPA should revise the rule as follows.

§ 125.94 How will requirements reflecting best technology available for minimizing adverse environmental impact be established for my Phase II existing facility?

(See hardcopy page 4)

§ 125.95 As an owner or operator of a Phase II existing facility, what must I collect and submit when I apply for my reissued NPDES permit?

(See hardcopy Page 5)

EPA Response

The commenter has characterized the proposed rule and NODA; no response to this part of the comment is necessary. Please refer to the preamble for a discussion of the framework of the final rule.

Comment ID 316bEFR.307.012

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

As UWAG said in its comments of August 7, 2002<FN 2> , the rule should not apply to emergency intakes. The “existing facilities” to which the proposed rule would apply are facilities with a design intake flow of 50 million gallons per day (MGD) or more. Proposed § 125.91(c)(4), 67 Fed. Reg. 17,220 col. 2. In applying this 50 MGD threshold, EPA should distinguish between ordinary cooling water intakes and emergency service water intakes. An emergency service water intake may operate only a few hours each month, enough to ensure that it stays in working order. It may have a capacity greater than 50 MGD, but the design flow of an intake that is used only rarely should not be counted in determining whether a facility is subject to the § 316(b) rule.

Footnotes

2 Comments of the Utility Water Act Group on EPA's Proposed 316(b) Rule for Phase II Existing Facilities and ICR No. 2060.01 (August 7, 2002), Comment 1.41 (Hereinafter UWAG August 2002 Comments)

EPA Response

Please see response to comment 316bEFR.041.202.

Comment ID 316bEFR.307.013

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code SUP

General statement of support

UWAG supports EPA's effort to gather more information in mid-rulemaking with this NODA. Many difficult questions of interpretation were raised by the rule as originally proposed. The NODA will help ensure that the final rule addresses the details that will be important for effectively implementing the rule.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.307.014

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Capacity Utilization Factor

In number 7 of its "major changes," discussed in Section III of the NODA, EPA says that it may refine its definition of "capacity utilization rate" in proposed § 125.93. The definition is important because a facility must reduce entrainment of all life stages of fish and shellfish by 60 to 90% from the calculation baseline if the facility has a capacity utilization rate of 15% or greater and withdraws cooling water from a tidal river or estuary, an ocean, or one of the Great Lakes, or if the facility's design intake flow is greater than 5% of the mean annual flow of a freshwater river or stream. 67 Fed. Reg. 17,221 col. 2. Hence, it is important to be clear about when a facility has a capacity utilization rate of 15% or greater. The old proposed definition of capacity utilization rate is "the ratio between the average annual net generation of the facility (MWH) and the total net capability of the facility (MW) multiplied by the number of available hours during a year. The average annual generation must be measured over a five-year period (if available) of representative operating conditions." 67 Fed. Reg. 17,220 col. 3.

EPA now proposes to change the definition to reflect use of only the steam electric part of a facility. For the NODA, EPA uses the capacity utilization of only the steam electric generators at Phase II facilities so that its updated economic analyses include this potential refinement (68 Fed. Reg. 13,525 col. 2-3).

As explained in Section XI.H of these comments, UWAG supports adding "steam electric part" to the definition. But UWAG is troubled that the proposed definition of "capacity utilization rate" may unfairly penalize facilities that are out of service for a large part of a year. Also, UWAG proposes modifying the five-year period to avoid inflating capacity factors in uncharacteristically dry years when some generating units operate more than is normal.

EPA Response

EPA notes that the commenter agrees with the Agency's decision to base the definition of capacity utilization on steam electric capacity.

However, the Agency disagrees with the commenter's suggestion to modify the five-year period for calculating the capacity utilization rate. See response to comment 307.084.

Comment ID 316bEFR.307.015

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 9.06

Burden to facilities (general)

Costs of Demonstrations and Monitoring

EPA addresses in Section III its prior inclusion of costs associated with demonstrations and monitoring in cases where the permittee has recirculating cooling (68 Fed. Reg. 13,525). EPA says that it should not have included those costs, because the proposed rule does not require any studies or monitoring. UWAG agrees with EPA's conclusion and hopes EPA will make this clear in the rule.

EPA Response

The Agency notes that there is an omission in the following statement made in the comment: "EPA says that it should not have included those costs, because the proposed rule does not require any studies or monitoring." The Agency notes that the correct summary would include a clarification that the proposed rule does not require any studies or monitoring for facilities "with recirculating cooling."

Regarding the commenter's request that EPA clarify the point in the final rule, the Agency has done so for the final rule, and, therefore, the comment has been met.

Comment ID 316bEFR.307.016

Subject Matter Code 9.0
Costs

Author Name David E. Bailey
Organization Hunton & Williams obo Utility Water Act Group

Downtime

EPA has changed its assumption about net installation downtime for cooling towers and intake technologies. EPA should be commended for getting better data. UWAG agrees that downtimes in most cases will be longer than EPA initially assumed. However, actual downtimes will be highly site-specific and differ from one site to another.

EPA Response

The Agency notes that the general comment agrees with the analysis of downtimes for the final rule. Because the Agency has analyzed downtimes separately for each intake technology and factored in site-tailored characteristics into the duration of the downtime, it recognizes that downtimes can differ from one site to another.

Comment ID 316bEFR.307.017

Subject Matter Code 9.0

Costs

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Energy Penalties

EPA made changes to its analysis with respect to energy penalties in an attempt to capture seasonal penalties. Actual energy penalties will be highly site-specific. An analysis by John Maulbetsch for EPRI addresses this subject. See Maulbetsch Appendix to June 2003 Technical Comments by EPRI (EPRI June 2003 Comments).

(See Maulbetsch Appendix in EPRI June 2003 comments)

EPA Response

The Agency responds to the referenced comment in response to comment 316b.EFR.208.002.

Comment ID 316bEFR.307.018

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 9.0

Costs

Engineering Cost Analysis

UWAG welcomes the more detailed cost analysis in the NODA. We agree that no generic analysis of this kind can capture all site-specific factors that would determine the choice of "best technology available" or its cost. That is why it is important to have a cost-cost test that allows permittees and permit writers to compare the cost of the technology EPA assumed a facility would use with the cost of the technology a facility actually proposes to use. UWAG has not been able to critique EPA's analysis in detail, however, because EPA has not provided the data, citing constraints due to confidentiality.

The new data EPA has provided on cooling tower costs and other factors shed important light on the technical feasibility (or, for some sites, infeasibility), cost, and environmental side-effects of recirculating cooling. It is apparent, in light of the Department of Energy (DOE) documents referred to in the NODA and contained in the docket, that EPA's original cost estimates for closed-cycle conversions were far too low. DOE's initial review of site-specific factors resulted in cost estimates that were between 65% and 104% larger than EPA's. Further site-specific information received by DOE after this analysis was completed revealed that actual costs of construction at the four studied facilities could be 230% to 310% greater than EPA's cost methodology would suggest. We also believe that EPA's decision to revise its estimates for downtime for nuclear facilities to seven months, while leaving the outage time for non-nuclear facilities unchanged, is arbitrary and unrealistic. If more realistic outage times were considered, the impact of a closed-cycle option would increase even further.

UWAG thinks that all of this information, taken together, confirms that EPA should reject any option that requires cooling towers of any kind for existing facilities. <FN 03>

Footnotes

3 In fact, for the reasons explained in our preious comments, UWAG seriously questions EPA's authority to impose a closed-cycled cooling requirement on any facility. See UWAG August 2002 Comments, Section IV.B.

EPA Response

EPA notes that the cost-cost test is included in the final rule. As such, this portion of the comment is met. The Agency responds as follows to the assertion of the commenter that it was not been able to critique EPA's NODA cost analysis because EPA did not provide sufficient data due to confidentiality to be an insufficient reason for not reviewing and critiquing the detailed cost analysis provided by the Agency in the NODA: The Agency notes that it provided in the NODA pertaining to the revised cost analysis the detailed cost algorithms and equations for each of the technologies forming the basis of the NODA analysis, the methodology for applying these cost technologies to model facilities, and the results of the costing analysis in the most detailed format permissible by the restrictions of protecting confidentiality. The Agency notes that other comments to the NODA, for instance comments 316bEFR.306.002, 316bEFR.306.009, 316bEFR.306.023, and 316bEFR.306.030

through 316bEFR.306.053 were able to critique the Agency's revised cost methodology and estimates suitably with the data provided in the NODA.

The Agency has reviewed the study (An Investigation Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants, January 22, 2003)prepared on behalf of the Department of Energy and finds the principles and concepts behind the analysis to be sound. The Agency notes that it did not base the requirements of the final rule based on cooling tower retrofits. Also see response to comment ID 316bEFR.208.002.

Comment ID 316bEFR.307.019

Subject Matter Code 8.04

Proposed standards for tidal rivers and estuaries

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

As to the specific option EPA considered, i.e., the waterbody/capacity option, we do not believe the rulemaking record provides any valid biological basis for the assumption, on which that option depends, that facilities on estuaries and oceans merit such dramatically different treatment as a group. The distinction between facilities on estuaries and oceans and other facilities is fundamentally arbitrary.

EPA Response

With respect to the standards for tidal rivers and estuaries, please refer to the response to comment 316bEFR.025.014.

With respect to the standards for oceans, please refer to the response to comment 316bEFR.032.014.

Comment ID 316bEFR.307.020

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

IPM Analyses

In footnote 8 at 68 Fed. Reg. 13,530, EPA says its two base case scenarios were used to analyze the impacts associated with the preferred option and the waterbody/capacity-based option. It is difficult to compare the results of EPA's two analyses of the preferred versus the watershed/capacity (i.e., cooling tower) alternatives, because EPA used different assumptions to run the base cases for the two analyses. EPA says it is rerunning the analyses to make them more comparable, but we have not seen the re-analyses. UWAG believes it is important that we be allowed time to comment on the re-analyses.

EPA Response

EPA notes that the re-analyses were added to the docket on June 19, 2003.

Comment ID 316bEFR.307.021

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Other Economic Analyses

The Edison Electric Institute has prepared a more detailed review of EPA's revised IPM runs and other aspects of EPA's economic analyses. EPA says that those analyses are intended to estimate the economic impacts of the rule on electricity consumers (i.e, the average electricity price and average household cost impact analyses) and to electric power sector investors (i.e., the cost-to-revenue test and the electricity market impact analysis). As that review <FN 4> shows, EPA provides no explanation of how the results of these analyses will be used to inform the broader cost-benefit analysis it has undertaken. Moreover, EPA's economic analyses still suffer from a number of flaws that are likely to result in understatement of the economic implications of the rule at all levels.

Footnotes

4 Edison Electric Institute's review will be submitted with its comments on the NODA.

EPA Response

EPA notes that the "other economic analyses" are measures of the magnitude of compliance costs. They are not intended to "inform the broader cost-benefit analysis". For a response comments on the average electricity price and average household cost impact analyses, please refer to subject matter code 9.02. For a response to comments on the cost-to-revenue test, please refer to subject matter code 9.02.

Comment ID 316bEFR.307.022

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Even assuming that EPA's economic analyses were correct (which DOE's and EOP's reviews suggest they are not), EPA's revised economic analysis shows that the cost implications of the proposed rule for the power industry, and for reliability, are serious even for the preferred alternative. EPA tends to dismiss the effects as trivial, but even a 1% effect on profits is important in a newly competitive industry with as small a margin and as many financial challenges as the power industry. A greater than three percent effect, which EPA estimates for at least one region, is very large.

EPA Response

EPA disagrees with this comment. EPA notes that the percentage effects cited by the commenter are a reduction in absolute profit, not a reduction in the percentage profit margin. Even in a "newly competitive industry," profit changes of 1% and, in one region, 3% would be considered very small, particularly within the context of ordinary variations in profit performance.

Comment ID 316bEFR.307.023

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.02.03

Technology Efficacy Database

Database

UWAG has reviewed the comments on EPA's database prepared by EPRI and agrees with EPRI's conclusions. According to EPRI, the studies show that the technologies EPA has identified will be deployable at appropriate sites and are capable of achieving appreciable reductions in impingement and entrainment. The technologies probably can meet the proposed performance targets, provided those targets are properly and reasonably interpreted, at many but not all sites. As the studies in EPA's database show, technology performance has been evaluated in many different ways, using a wide variety of metrics and monitoring approaches adapted to the features of the technology and the site. Later in these comments we discuss in greater detail (1) important principles that EPA should follow in interpreting and applying the performance standards, and (2) the important connection between a performance standard or target and the means of assessing whether it has been achieved.

EPA Response

For a more detailed discussion of the efficacies of some of the technologies documented in the database, the commenter should refer to Chapter 3 of the Technology Development Document (TDD). The studies detailed in the TDD contain a more robust set of data that EPA was able to analyze when developing the performance standards. EPA agrees that the studies contained in the database are varied in many ways, including the study protocols and metrics, but maintains that the data discussed in the database and the docket support the performance standards in today's rule.

Comment ID 316bEFR.307.024

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

While we believe that there may be some sites for which the performance standards are not achievable, the cost-cost and cost-benefit tests offer an appropriate – in fact, an essential – means of setting alternative targets for those sites. Unlike a maximum intake flow requirement, which could be met by cooling towers or other equipment but which is not the same as a proportional reduction in entrainment or impingement, there is no technology, even wet recirculating cooling systems, that (1) can feasibly be deployed at each and every existing facility and (2) would always meet the proposed numerical reductions in impingement mortality and entrainment at all sites.

EPA Response

The Agency agrees with the comment and notes that the cost-cost and cost-benefit tests have been included in the final rule.

Comment ID 316bEFR.307.025

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.04

Streamlined Technology Option

The NODA, unfortunately, does not address a critical issue in the rulemaking: how the permittee and the permit writer are to select the most cost-effective technology or alternative for purposes of setting a site-specific performance target from the range specified by the rule (80-95% reduction in impingement mortality and 60-90% reduction in entrainment). For a facility where not just one but several alternatives will produce reductions that are within the specified ranges, what technology or option should be chosen? While UWAG believes that, under § 316(b), EPA should set BTA performance standards that maximize net benefits, the use of performance ranges inherently departs from strict application of that principle. In fact, in many cases, hitting the minimum levels of the ranges may provide for a level of control that is excessive if viewed solely from the position of maximizing net benefits. However, use of specified ranges can be justified as a streamlining measure, because it can reduce uncertainty and transaction costs for both regulators and the regulated community by providing a “safe harbor” for those able to obtain performance in the range at reasonable cost. The most appropriate way to apply the ranges, consistent with this purpose, is to allow the permittee to choose among technologies that it can demonstrate will achieve performance within the range. To do otherwise would defeat the purpose of the ranges by a cost-benefit calculation (and a review of the calculation by EPA) in every case.

Allowing the technology choice to fall anywhere within a range does not mean that permittees will choose technologies that provide the lowest acceptable level of protection. Selection of technologies will be driven largely by what will work under the conditions of a site, and permittees will err on the side of caution and choose a level of performance that will ensure compliance through the lifetime of the facility, in order to avoid the risk of noncompliance.

EPA Response

EPA agrees that Directors and permit applicants will require guidance when it comes to setting alternate performance standards and BTA in the event that a facility qualifies for a site-specific determination of BTA. EPA intends to develop a model permit and permitting guidance to assist Directors in implementing the requirements set forth by today’s rule. In addition, the Agency intends to develop implementation guidance for owners and operators to address how to comply with the application requirements, the sampling and monitoring requirements, and the record keeping and reporting requirements in these final regulations. In addition, see preamble section III.C. for a description of the guidance documents already available to Directors and permit applicants.

Comment ID 316bEFR.307.026

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.04

Streamlined Technology Option

Streamlined Technology Option

Part B of Section VII of the NODA addresses a "Streamlined Technology Option for Certain Locations" (68 Fed. Reg. 13,539 col. 2). EPA asks whether the following technology would qualify for streamlined application requirements:

Use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity is 0.5 feet per second (ft/s) or less.

68 Fed. Reg. 13,540 col. 1. The concept of a streamlined compliance option is sound and should be adopted. UWAG has long supported alternatives that simplify the approval of technologies that have proven themselves. <FN 6>

Footnotes

6 EPRI's June 2003 comments on the NODA will provide additional details on the criteria that should be specified as part of a streamlined option based on cylindrical wedgewire screens.

EPA Response

EPA appreciates Utility Water Act Group's support of EPA's Approved Design and Construction Technology option.

Comment ID 316bEFR.307.027

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.04

Streamlined Technology Option

EPA also proposes language that would implement two variations on the streamlined compliance option. Under the first variation EPA would evaluate the effectiveness of a technology under specific circumstances (68 Fed. Reg. 13,539 col. 3). Based on such an assessment, if EPA identified technologies that are sufficiently protective and for which applicability conditions could be defined, EPA would promulgate regulations that allows for their use as a means of complying with Phase II § 316(b) requirements. Such a technology would be used to treat the entire cooling water intake flow and would not be used in combination with restoration measures to meet the performance standards. Monitoring would be required as necessary to verify that the technology was in fact achieving an acceptable level of performance.

This concept is sound but can be implemented in a manner that has a better probability of success. First, it is doubtful that requiring agencies to go through a rulemaking process to approve each technology will prove practical or expedient in all cases. Just the process of promulgating a regulation under § 316(b) will be difficult, and burdensome for the regulatory agencies. A better approach would be to approve the technology by issuance of a Technical Support Document or similar technical document. Second, monitoring should be conducted for informational purposes, not compliance purposes (as UWAG argues should be the case whether or not a streamlined approach is used). If the technology has been established as BTA, then the permittee should not be liable if he has properly installed and maintained the technology, even if monitoring demonstrates that the performance standard percentages are not met (although further technology refinements could be required in appropriate cases).

The second variation would allow the approval process to be carried out by the permitting agency, perhaps with EPA oversight or approval. The rule would define the criteria that a control technology must meet to be approved and the process for approval, but the permitting agency would determine whether the preferred technology satisfied the performance criteria. If so, the technology would be approved for use by any eligible party (that is, any facility that met the applicability criteria) within the agency's jurisdiction.

We recommend that the approval process for the second variation be implemented through technical guidance and kept separate from the formal regulatory process. If that is not possible, the approval criteria should be set up on a statewide basis similar to the criteria for a general NPDES permit. These approval criteria would be subject to the public participation process. Once the approval criteria were approved, the regulatory agency then could issue an approval certificate (or denial) to each applicant who qualified. As with the first variation, monitoring should be conducted for informational purposes, not compliance purposes. Once a technology was established as BTA, the permittee should not be liable if monitoring demonstrated that the performance standard percentages had not been met.

Any regulatory language in proposed § 125.94(a)(4) and § 125.95(c) should reflect the above concepts, especially the idea that monitoring should be for informational purposes and not to assess compliance for enforcement purposes. If a permittee is required to monitor a preapproved technology for compliance with the performance standards, then the "streamlined" compliance option may be undermined, because most permittees will not install a preapproved technology if they could face civil or criminal liability should the technology fail to meet the performance standards.

Finally, the language of 125.94(a)(4)(ii) is awkward:

Any interested person may submit a request that a technology be approved for use under the compliance option in § 125.94(a)(4). If the Director approves, the technology may be used with compliance option § 125.94(a)(4) by all facilities under their jurisdiction. Requests for alternative technologies for compliance under § 125.94(a)(4) must be submitted to the Director and include the information in paragraphs (A), (B), and (C) below:

- A detailed description of the technology;

- A list of design criteria for the technology and site characteristics and conditions that each facility must possess in order to ensure that the technology can consistently meet the appropriate impingement mortality and entrainment performance standards in § 125.94(b); and

- Information and data sufficient to demonstrate that all facilities under the jurisdiction of the Director can meet the applicable impingement mortality and entrainment performance standards in § 125.94(b) if the applicable design criteria and site characteristics and conditions are present at the facility.

68 Fed. Reg. 13,540 col. 2-3. Paragraph 125.94(a)(4)(ii) should read as follows:

Any interested person may submit a request that a technology be approved for use throughout the Director's jurisdiction. If the Director approves, the technology may be used to establish best technology available for minimizing adverse environmental impact by all facilities under the Director's jurisdiction. Requests for approval of alternative technologies under this 125.94(a)(4)(ii) must be submitted to the Director and include the information in paragraphs (A), (B), and (C) below: . . . .

While EPA is considering "streamlined" approaches, it should consider also the expedited § 316(b) permitting process that UWAG has recommended before for facilities that have already performed a successful § 316(b) demonstration in the past and show that their present intake is already "best technology available." See UWAG August 2002 Comments, at 10-11. In such cases the permitting agency should be empowered to reapprove the existing intake unless there has been a material change in the facility or the waterbody.

EPA Response

EPA disagrees that approval for an alternate streamlined technology should be based upon Technical Support Documents as opposed to a regulatory process. The benefit of codifying an alternate approved technology is that once approved, the technology will be available to all applicants in the region to use as a means of compliance. EPA anticipates that this mechanism will expedite the application process in the future, and result in time and money saved for both applicants and State permitting agencies.

In response to the comment that monitoring should be used only as a means of gathering data and not to evaluate compliance, EPA disagrees. In today's final rule, meeting the performance standards is the benchmark for determining a facility's compliance, with the exception of facilities that choose to comply through a Technology Operation and Installation Plan (see EPA's response to comment 316bEFR.063.005).

EPA has set a monitoring minimum of two years in today's rule for those facilities that must demonstrate the efficacy of their design and control technologies, operational measures and/ or restoration measures through a Verification Monitoring Plan. EPA believes that this is a reasonable amount of time by which to determine if a facility's technology or operational or restoration measures are indeed achieving the performance requirements. A facility may demonstrate compliance within a shorter timeframe, while others may need additional time. Because of the site-specific factors affecting the speed with which a facility is able to come into compliance, EPA has determined that the Director will be the appropriate authority over determining how much monitoring, if any, should be conducted by a facility beyond the mandatory two-year minimum. Facilities that have reduced intake flow commensurate with closed-cycle recirculating systems are exempt from monitoring requirements. In addition, facilities that reduce intake their velocity to 0.5 fps or less under § 125.94(b)(1)(ii), will not be required to demonstrate compliance (through monitoring) with the performance standards for impingement mortality. Facilities not demonstrating compliance through the Verification Monitoring Plan must conduct monitoring in accordance with their Technology Installation
and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

An additional means by which a facility can reduce its biological study requirements is to prove that conditions at the facility and in the waterbody have not changed. EPA has provided this option to give facilities the ability to have reduced Comprehensive Demonstration Study (CDS) requirements when they apply for a permit renewal. For details on how facilities may reduce their CDS burden, refer to EPA's response to comment 316bEFR.034.005. Generally, facilities will be required to review whether conditions, such as biological, chemical or physical conditions, have changed. If conditions have changed, facilities will be required to submit all of the relevant CDS components when they submit the application for permit renewal. □
□□□
For an explanation of why EPA did not choose UWAG's recommended approach, please refer to the final rule preamble section VII. E., Major Options Considered for the Final Rule and Why EPA Rejected Them.

Comment ID 316bEFR.307.028

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

Cost Tests (68 Fed. Reg. 13,541)

In Section VIII of the NODA (68 Fed. Reg. 13,541 col. 1) EPA asks for comment on its “significantly greater” cost tests. Under the proposed rule, a facility may choose the site-specific alternative if the costs of complying with the performance standards would be “significantly greater” than either (1) the costs considered by EPA when establishing the performance standards or (2) the benefits of complying with the performance standards (68 Fed. Reg. 13,541 col. 1).

As a threshold matter, UWAG reiterates that these two tests are absolutely essential components of EPA’s proposal, without which EPA’s approach (using numerical performance standards) would be insupportable. We believe strongly that the two cost tests must be retained in any final rule, with certain refinements necessary to make them fairer and more workable.

EPA Response

The Agency notes that the cost-cost and cost-benefit tests have been retained in the final rule. As such, the commenter's recommendation has been met.

Comment ID 316bEFR.307.029

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.07.02

RFC: Appropriateness of “significantly greater”

How much greater is “significantly” greater? As explained below, UWAG believes that when applying the cost-benefit test, the cost should be viewed as significantly greater than the benefit whenever the cost is greater than the benefit by any amount at all. The purpose of this formulation is to prevent the requirement of a technology that will do more harm than good to society’s overall interest. The “significantly” could be interpreted to require enough evidence to provide confidence that the cost really is higher than the benefit.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.307.030

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

One thing that would not be appropriate for either test would be to impose a simple percentage test, by declaring, for example, that 1.10% of EPA's costs would be "significantly greater" than those costs (or 1.10% of actual costs would be greater than actual benefits). A percentage test would be inequitable because it would penalize precisely the facilities for which costs are estimated to be highest (either by EPA or the discharger, depending on the test used). The greater the costs assumed by EPA or estimated by the facility, the harder it would be for the facility to meet either test. This would be irrational.

EPA Response

The Agency agrees that implementation of the cost tests is not suited to application of a percentage test. As such, the cost tests in the final rule do not have percentage tests in the Agency's requirements or guidance for their implementation.

Comment ID 316bEFR.307.031

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

UWAG's position on the cost-benefit test is clear on the record and has not changed from our comments on the original proposed rule: The alternative that should be chosen from among several available intake technologies is the one that maximizes the net benefit to society. This is the only test that makes sense based on the principles of economics.

If EPA retains the "significantly greater" test, however, the test should be simply that the costs of compliance are "significantly greater" if they are greater than the benefits by any amount whatsoever. Otherwise, EPA will be requiring technology that does more harm than good, and this would be irrational. To date, EPA has offered no real justification for using the "significantly greater" test or indeed any test other than a break-even net present value of zero (meaning that benefits are equal to costs).

Possibly the "significantly" in the proposed "significantly greater" formula is designed to err in the direction of complying with the standards, instead of using an alternative, in the face of uncertainty. The "significantly" may be designed to provide a margin of safety for the performance standards to account for uncertainty.<FN 7>

If this is EPA's rationale, this safety margin could be accomplished by using, as UWAG suggests, the test that the costs of complying with the performance standards be greater than the benefits by any amount at all, but adding that there must be enough evidence, or a sound enough analysis of costs and benefits, to give the permitting agency confidence that the cost of compliance really would be greater than the benefits. The margin implied by "significantly," in other words, could be addressed considering both the magnitude of the difference between estimated benefits and estimated costs and considering the precision of the estimates. The precision of the estimates would be affected by amount of evidence or analysis underlying the estimates.

Footnotes

7 "Safety" is here a relative term, because erring in one direction is just as bad as erring in the other. Erring in the direction of preferring the performance standards over the site-specific alternative means erring away from doing the most good for the public in a larger sense. It is not really "safe" to err in favor of overprotecting fish, since this may underprotect society's larger interests

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater then" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.006.003.

Comment ID 316bEFR.307.032

Subject Matter Code 10.1

General: cost tests

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Cost-Cost Test

Meaning of Significantly Greater

The rationale of the cost-cost test is somewhat different from the cost-benefit test. Rather than seeking to avoid decisions that do more harm than good, the cost-cost test tries to identify facilities where, because of site-specific conditions, the assumptions underlying EPA's rule do not fit. The question of what constitutes "significantly greater" for purposes of the cost-cost test deserves further development on the rulemaking record. The question is how much site-specific cost is "different enough" from EPA's assumptions to warrant an alternative standard. UWAG proposes that "significantly greater" should be defined, consistent with the cost-benefit test, as an amount that is any amount at all greater than the cost, once uncertainty and the precision of the estimates are taken into account. A variety of approaches to deciding how to account for uncertainty and precision might be used. We suggest that EPA should consider the following factors in deciding how far above EPA's estimated costs is "significantly greater": the range of and uncertainty in EPA's cost estimates, standard statistical tests for "outliers" in a data set, financial and accounting standards for what are significant expenditures in a business environment, and how cost overruns are treated in utility ratemaking.

Although EPA should provide guidance on how much excess cost is significant, ultimately the question of when a facility's individualized costs are so high that relief should be granted is one that ought to be addressed by the states, because it is tied up with how states value their resources and how they regulate their electric utilities. EPA should avoid setting a rigid numerical test for "significantly greater" in the cost-cost test.

EPA Response

EPA agrees with the commenter's request to EPA allow local authorities to determine what is the proper definition of significantly greater for the reason stated by the commenter (i.e., that local authorities should be responsible for valuing their local resources and regulate electric utilities).

See response to comment 316b.EFR.006.003.

The Agency has provided discussions of the "uncertainty" and precision of its cost estimates in the Technical Development Document for the final rule which addresses the principles outlined in the comment.

Comment ID 316bEFR.307.033

Subject Matter Code 10.1

General: cost tests

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Applying the Cost-Cost Test

Since the cost-cost test depends on the costs EPA considered when it promulgated the regulation, EPA must be very clear about stating these costs in a way that makes comparison possible. First, EPA must make it clear that the cost to be compared is the cost that EPA actually assigned to a particular facility. <FN 8>

Second, EPA needs to make available information about what intake technology it chose for each facility, so that the facility can calculate EPA's estimated cost for that facility by starting with EPA's choice of technology and applying EPA's own costing method. To know what the cost assigned by EPA is, permittees and permit writers need to know (1) what technology (wedge wire screen, fine mesh screen, or aquatic filter barrier) EPA chose for each facility and (2) what EPA's costing method would estimate it to cost. EPA could provide this data quite simply by publishing a table listing the facilities for which costs were identified (using questionnaire numbers to assure confidentiality) and the costs it assigned to each facility. Most permittees will have a copy of their questionnaires; if not, EPA should be able to disclose the questionnaire number, at least to the permittee and permit writer, since the number itself is not the permittee's information, and it need not be linked to any other confidential business information provided by the permittee on its questionnaire.

Although less straightforward and simple, there is another approach. A permittee could obtain information about EPA's choice of technology for its facility by using the spreadsheets and other information referenced in EPA's Technology Costing Module Applications for Model Facilities (DCN 5-2504). The spreadsheets provide, for each facility that completed a detailed or short-form questionnaire, a code identifying the CWIS technology or technologies that EPA selected for the facility.<FN 9> Thus, the permittee and permit writer would need only the questionnaire number to learn what technology EPA chose for the facility. As discussed above, most permittees should have that number, or be able to get it from EPA. Knowing what technology EPA chose for the facility, the permittee then can use the algorithms EPA developed for that technology (described in DCN 5-2505), to calculate the cost EPA would have calculated for the facility.

This method requires some calculation, and possibly extrapolation, but it at least accounts for both key factors – the choice of technology and the cost of that technology scaled to a given site. It also allows use of the cost-cost test even when the technology proposed by a permittee (such as an aquatic filter barrier) is not an option applied by EPA in its national cost analysis

Footnotes

8 The other part of the comparison is the costs the permittee calculates based on its engineering analysis of what technology will work and what it will cost at the site. In the proposed rule, these costs are characterized as "your costs" based on "data specific to your facility" (proposed 40 C.F.R 125.94(c)(2)). In the preamble to the proposed rule, EPA goes to some length to describe the level of "empirical" information it proposes to require of permittees who wish to apply for site-specific requirements under either the cost-cost or cost-benefit test. 67 Fed. Reg. 17, 152. UWAG reiterates its view (UWAG August 2002 Comments, Section XII.E.1) that, while it is fair to require permittees to identify a reasoned basis for the

assumptions and calculations they make, if EPA intends by the term "empirical" to require a showing that the same costs have been incurred elsewhere, that is unreasonable. It is the very circumstances that make costs site-specific that also make direct empirical cost transfer impractical. Permittees must be allowed to make adjustments, which may involve assumptions or calculations or textbook values, to account for site-specific circumstances.

9 These spreadsheets were not placed in the docet until April 23, 2003, and may facilities may not be aware that they exist.

EPA Response

The Agency notes that the commenting organization (UWAG) provided additional (and somewhat different) recommendations on implementing the cost to cost test in comment 316b.EFR.410.001. The Agency has reviewed and considered, in depth, both sets of suggestions from the commenter and has determined a methodology that meets both sets of recommendations, to the extent possible, and balances the need for a flexible cost to cost test that is also easily implementable. See section IX.H of the preamble to the final rule.

Comment ID 316bEFR.307.034

Subject Matter Code 10.1

General: cost tests

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

EPA also should explain what site-specific requirements are justified once the permittee has met the cost-benefit or cost-cost test. In the original notice of proposed rulemaking, EPA said that the applicant must propose less costly technologies "to the extent justified by the significantly greater costs." See 67 Fed. Reg. 17,146 col. 2. In some cases, EPA said, this might justify no additional technologies at all. This would be most likely where either (1) the monetized benefits at the site were very small (for example, a facility with little impingement mortality and entrainment, even in the calculated baseline) or (2) the costs of implementing any additional technologies or measures at the site were unusually high (67 Fed. Reg. 17,146 col. 2). EPA's suggestion that the benefits of the alternative should "justify" the costs raises many questions.

Based on the economic principle that benefits should exceed costs (the best choice being the alternative that "maximizes net benefits"), it seems clear to UWAG that no alternative site-specific technology should be chosen unless its benefits exceed its costs. If the benefits do not exceed the costs, then society will be no better off for having required the technology, and the decision to impose a different technology will be at best a waste of effort and at worst a bad decision, contrary to the public's interest. If no technology for reducing entrainment or impingement mortality that has benefits greater than its costs can be found, then none should be required.

But what if there is more than one technology that will reduce impingement mortality or entrainment and that has benefits greater than its costs? The ideal decision in this case, based only on economic principles, would be, again, to choose the alternative that has the maximum net benefit. To ensure that this approach works as intended, however, it is important that total costs be accounted for as accurately as possible.

An example will illustrate this point. Suppose an alternative with capital and O&M costs totaling $1 million dollars is deemed likely to produce benefits worth $1.1 million dollars (for a net benefit of $100,000), while a cheaper alternative has capital and O&M costs of $100,000 and is likely to produce a benefit of $190,000 (net benefit of $90,000). Maximizing net benefits would require that the more expensive of these be selected as BTA. If, however, the more expensive option would likely impose other types of costs (e.g., greater hazards to navigation or other uses of the waterbody, aesthetic effects, effects on air emissions) that had not been counted, or if the benefits of the more expensive option were less certain to occur than the other option, choosing the less expensive option could maximize net benefits.

EPA Response

Regarding the site-specific, alternative requirements, see section IX.H of the preamble to the final rule, which describes the implementation of the cost-cost and cost-benefit tests.

EPA disagrees with the commenter's assertion that benefits must exceed costs in order to be justified by them. Rather, EPA believes that the purpose of the cost benefit test is to lay out all of the options and evaluate them in relationship to each other. One difficulty evaluating the benefits is that they are not always monetize-able, another complication is that a cost benefit test does not specify any decision criteria on how benefits and costs should be weighted. Also, see response to comment 316bEFR.005.020 for a discussion of the Agency's approach to net benefits and the cost-benefit test.

Comment ID 316bEFR.307.035

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Reliable Data on Entrainment Survival Should be Used for Compliance Determination

Some species of fish survive entrainment quite well. Although EPA is correct to assume no survival of entrained organisms for the “baseline” condition, in determining compliance it should not forbid the use of sound data that show some survival, where such data exist.

Reliable data on entrainment survival should be accepted to show compliance with the entrainment performance standard of 60-90% reduction. If a facility can show, based on reliable data for a given site, that the facility has less than complete entrainment mortality, or can demonstrate modifications that will lessen entrainment mortality, then EPA should allow that information to be taken into account. As Peru's June 2003 comments point out, scientific data demonstrate with 100% certainty that entrainment survival can be significant for many fish and shellfish species.

Although EPA is skeptical of past entrainment survival studies, EPA’s assessment of the shortcomings of existing studies as a basis for national standards does not lessen the value of site-specific studies that can quantify accurately with reasonable certainty the entrainment survival that might be expected for particular species at a particular facility.

In any event, EPA’s skepticism about entrainment survival studies is not entirely deserved. The comments submitted by EPRI address entrainment survival at some length. As EPRI points out, <FN 10> EPA sets a much more rigorous standard for entrainment survival studies than for contingent valuation studies and often criticizes entrainment survival studies that are outdated.

In fact, survival studies can be useful. Apart from their value in site-specific analyses, entrainment survival studies provide useful background information, such as the following:

- Biocides, if they are used at all, are used typically only a few hours a week. One of EPA’s primary sources (Marcy 1973) reported no increase in mortality due to biocide use. The chemical component of entrainment stress, where it occurs, typically is of limited duration.

- At many stations, the combinations of cooling water flow rate and heat rejection rate actually observed does not result in significant thermal mortality for many of the commonly entrained taxa.

- Survival rate depends on species sensitivity. Some taxonomic groups (e.g., Serranidae and Ictaluridae) are relatively hardy, and significant proportions of them might be expected to survive passage through some cooling systems. Only a small portion of more sensitive taxonomic groups (e.g., Engraulidae and Clupeidae) would be expected to survive passage through a cooling system.

Footnotes

10 Epri 2000a.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see the updated chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.307.036

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

As EPRI points out, where significant site-specific data exist or could be developed, it may be possible, now or in the future, to specify operating conditions that will minimize the numbers of organisms killed by entrainment instead of minimizing the number entrained.

Developing a site-specific operation plan will depend on the species involved, the flow control capabilities of the station, the generation levels, the ambient temperatures, and the design of the cooling water system. Stations that have good entrainment survival data or that can implement changes that will increase survival should be permitted to incorporate survival information into their plans for complying with the entrainment performance criterion.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.307.037

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.02

Entrainment survival chapter

The Shortcomings in Survival Studies Have Been Overstated

As EPRI points out, although entrainment survival studies are difficult and expensive to conduct, EPA's review of existing studies in Chapter A7 of the Case Studies (DCN 5-4059) is overly pessimistic in several respects.

Taxa covered. Typically only a few taxa are entrained at high densities at any one station. Studies of entrainment abundance have shown that the five most abundant taxa compose about 90% or more of entrained ichthyoplankton. For instance, at the Yorktown Station (York River, Virginia) a study in 1977 reported that entrained fish larvae were 68% Anchoa mitchilli, 15% Gobiosoma sp., 7% Menidia menidia, 4.5% Microgobius thallisinus, 1.5% Syngnathus fuscus, and approximately 4% others.<FN 11> In a four-year study of entrainment at the Fort Calhoun Station on the Missouri River, freshwater drum (Aplodinotus grunniens) and suckers (Catastomidae) were 95.4% of all larvae collected.<FN 12> Because most species are entrained at low levels, it is neither possible nor necessary to derive empirical estimates of entrainment survival for every species that may be encountered.

Footnotes

11 Virginia Electric Power Corporation, Yorktown Power Station, Yorktown, VA. Environmental Studies- 1977

12 King 1977

EPA Response

This comment is identical in nature to comment 316bEFR.306.076. Please see response to that comment.

Comment ID 316bEFR.307.038

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Temporal extent of sampling. Seasonal patterns of entrainment, particularly in northern states with large seasonal temperature variations, are typically very peaked, with a high proportion of total entrainment occurring over a short period of time. The timing of the peak varies depending on the environmental conditions and taxa in the source waterbody. At the Fort Calhoun Station, peaks occurred from June through early July, reflecting the spawning period of freshwater drum and suckers.<FN 13> Peaked temporal distributions have also been found in other freshwater and estuarine systems.<FN 14> Thus, it may not be necessary to conduct year-round studies of entrainment survival. A more cost-effective and relevant study could be done over the periods of peak abundance.

Footnotes

13 Id

14 Gammon 1976; Lawler, Matusky & Skelly Engineers 1993

EPA Response

This comment is identical in nature to 316bEFR.306.077. Please see response to that comment.

Comment ID 316bEFR.307.039

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Inconsistent methodology. The methods used in the studies reviewed by EPA in Chapter A7 of the Case Studies (DCN 5-4059) and in the NODA varied because of site-specific deployment issues or because the sampling technology was in a period of rapid evolution when most of the studies were conducted.<FN 15> Preferred sampling gear changed from plankton nets to pumped flumes to rear-draw and pumpless flume systems, with more reliable results as each advance in gear design reduced the effects attributable to the sampling itself. The most advanced rear-draw and pumpless systems appeared only in the late 1970s and early 1980s, about when most entrainment survival studies were discontinued. Only two of the studies reviewed by EPRI were more recent than 1985.<FN 16> Future studies using modern sampling gear would be expected to be substantially better than past studies.

Footnotes

15 EPRI 200a.

16 Id.

EPA Response

This comment is identical in nature to comment 316bEFR.306.078. Please see response to that comment.

Comment ID 316bEFR.307.040

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Sample size. EPA criticizes the small sample sizes that were reported in many entrainment survival studies. It is true that many single-year studies had small sample sizes for many species. But this generally reflected the fact that only a relatively small percentage of the total number of resident species are significantly susceptible to entrainment. EPRI says that it may be quite reasonable to combine information across years at a facility to obtain the most precise estimate of entrainment survival rates.

EPA Response

This comment is a summary of comment 316bEFR.306.079. Please see response to that comment.

Comment ID 316bEFR.307.041

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.02

Entrainment survival chapter

Latent effects. EPA criticizes entrainment survival studies for not providing a realistic or comprehensive assessment of sublethal effects. Although observation of latent effects does take place in artificial surroundings, the critical issue is whether the entrained organisms collected from the discharge experience the same conditions as the unentrained "control" organisms collected from the intake. On this issue the NODA does not comment. In other regulatory efforts, EPA uses similarly artificial test settings to determine the effects of exposing aquatic organisms to chemical contaminants.

EPA Response

This comment is identical in nature to comment 316bEFR.306.080. Please see response to that comment.

Comment ID 316bEFR.307.042

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

EPA Should Allow the Use of Survival Studies

As Peru's comments recommend, in its final rule, EPA should explicitly allow using entrainment survival to determine compliance with the entrainment performance standard. Allowing permittees to factor in valid estimates of survival may stimulate the collection of better information on survival than presently exists, particularly where some of the hardier taxa are the most common ones. This additional information, even if it does not ultimately demonstrate high survival rates, will still be useful in understanding the factors that contribute to entrainment stresses and could lead to improved design of once-through cooling systems. Such improvement clearly would be consistent with EPA's goal of advancing technology.

Equally important, assessing survival of entrainable-sized organisms will be essential for purposes of evaluating the performance of one of EPA's BTA technologies, i.e., fine mesh traveling screens. Those screens and associated fish handling systems are designed to increase survival of entrainable-sized organisms that, with the decrease in mesh size, become impinged. It would be irrational for EPA to require facilities that use this type of technology to evaluate performance by assessing organism survival rates, while denying other facilities the opportunity to do the same.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.307.043

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Experience Teaches Lessons About How to Design Survival Studies

EPA has requested comment on how to design entrainment survival studies to account for organisms that may be destroyed during passage through the condenser system. As the EPRI comments point out, destruction of organisms is difficult but not impossible to address. Although comparing sample densities at the plant intake and at the discharge would be the simplest approach, this usually will not be sufficient, because ichthyoplankton may exhibit distribution patterns at the intake that are not found in the discharge sample because of mixing. Thus, the intake sample may have a systematic bias that is usually not found in the discharge sample. Even so, if properly designed, a comparison of net or pump samples from the intake and discharge in terms of species and length-frequencies can provide valuable information about what organisms are susceptible to entrainment and what ones are likely to be destroyed.

Additional information on destruction can be obtained from state-of-the-art survival sampling at intake and discharge stations. By comparing the frequency and types of damage at both locations, information can be obtained on the severity of organism destruction. If organisms are being completely destroyed during passage through the plant, then it is likely that the occurrence of damaged but still recognizable organisms will be significantly higher also. Thus, a finding of low and roughly similar frequencies of damaged organisms in both intake and discharge samples would suggest a low degree of destruction. However, a significantly higher frequency of damaged organisms in the discharge samples would suggest that organism destruction should be considered.

Direct release studies, in which large quantities of hatchery-reared organisms are released into the cooling system, are perhaps the most effective way to assess organism destruction. Release of a few hundred hatchery-reared organisms directly into the intake sampling device and of larger numbers (on the order of 10^5) into the intake structure for subsequent sampling in the discharge using state-of-the-art survival gear can provide a direct estimate of damage that is not confounded by the unknown state of wild organisms. Direct release studies are probably most informative if the hatchery-reared organisms can be released somewhat out of the natural period of abundance, so that there is no possibility that wild organisms of the same species and lifestage will appear in the sample.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.307.044

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

In Summary, EPA Should Allow Entrainment Survival to Be Considered for Compliance Determinations Where There Are Reliable Data

EPA notes in the NODA that the language of the proposed rule does not preclude the use of estimates of entrainment survival when estimating monetary benefits. Likewise, the rule should not preclude the use of entrainment survival estimates for compliance determination, where reliable data on survival are available. There is no question that survival occurs and can be substantial for some species and circumstances. It would be irrational not to consider it where reliable information is available.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.307.045

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 11.0

Role of Restoration

EPA's Proposal to Permit Voluntary Restoration is Justified by Congressional Intent

EPA has recognized the benefits of voluntary restoration and has proposed that a facility may implement restoration measures in lieu of or in combination with reductions in impingement mortality and entrainment. Proposed § 125.94(d). Restoration measures, alone or in combination with reductions from other sources, would be designed to maintain fish and shellfish at a level comparable or substantially similar to that which would be achieved by compliance with the rule's performance standards or with BTA on a site-specific basis.

One commenter, Riverkeeper, Inc., has complained that restoration measures are "wholly unrelated" to intake structure technologies and therefore cannot be BTA. Riverkeeper August 2002 Comments 1.76, p. 48. But EPA, in its discretion as the expert agency, has the right to accept mitigation or restoration measures instead of intake structure modifications, particularly given the site-specific nature of intake designs and their effect on the surrounding environment.

Moreover, Congress is firmly in favor of habitat restoration, including wetlands restoration. Many statutes passed by Congress over the past 30 years show that Congress' intent is to encourage the preservation, creation, restoration, and enhancement of wetlands. In particular, the U.S. Army Corps of Engineers issues nationwide permits under § 404 of the Clean Water Act for activities that cause only "minimal" adverse effects on the environment. "General Condition 19" says that "½-acre of created wetlands can be used to reduce the impacts of a ½-acre loss of wetlands to the minimum impact level in order to meet the minimal impact requirement associated with NWPs." 67 Fed. Reg. 2,092-93 (Jan. 15, 2002). This mitigation is authorized by § 404(e) of the Clean Water Act, 33 U.S.C. 1344(e), which was enacted at the same time as § 316(b). EPA would be inconsistent with § 404(e) if it were to prohibit wetlands restoration under § 316(b) to "minimize" adverse environmental impact, even while the Corps is using it under § 404(e) to ensure "minimal" adverse environmental effects.

Congress has consistently promoted creation and restoration of wetlands in a wide variety of statutes. The Water Resources Development Act of 1976 funds Corps of Engineers projects, including the creation of wetlands where the benefits justify the costs. 33 U.S.C. 59m, 426, 547a, 577, 579, 701e, 702a-12. The Estuary Restoration Act establishes an Estuary Habitat Restoration Council, which is charged with developing a national restoration strategy with a goal of restoring 1,000,000 acres of habitat by 2010.

The Magnuson Stevens Fishery Conservation and Management Act and the National Marine Fishery Service (NMFS) regulations require Regional Fishery Management Councils to "prevent, mitigate, or minimize any adverse effects from fishing." 50 C.F.R. 600.815(a)(2)(ii). If appropriate, "habitat creation may be a means of compensating for lost or degraded habitat." 67 Fed. Reg. 2,356 (Jan. 17, 2002).

The North American Wetlands Conservation Act provides that "wetland ecosystems provide essential and significant habitat for fish, shellfish, and other wildlife of commercial, recreational, scientific, and aesthetic values." 16 U.S.C. § 4401(a)(1) & (2) (1989). The Migratory Bird Conservation Act provided $200,000,000 to prevent loss of wetlands and other waterfowl habitat essential to the preservation of waterfowl. See 16 U.S.C. § 715-3k (1929). The Coastal Wetlands Planning, Protection and Restoration Act aims to protect, create, or enhance wetlands. 16 U.S.C. §§ 3951, 3956 (1990). So does the Coastal Zone Management Act, 16 U.S.C. § 1452.

Congress' enthusiasm for wetlands extends to the transportation laws as well. The Intermodal Surface Transportation Efficiency Act of 1991 authorized National Highway System funds to be used for wetlands mitigation efforts. 23 U.S.C. § 1006(b). The Transportation Equity Act for the 21st Century, 23 U.S.C. §§ 103(b)(6)(M), 133(b)(11) (Supp. V. 1999), clarified Congress' desire to favor wetland mitigation banking to offset adverse environmental impacts. And the Endangered Species Act allows restoration projects. In Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F. 3d 515 (9th Cir. 1998), procuring, restoring, and protecting an alternative nesting habitat was allowed to meet the threshold of "no adverse effect" on a species' habitat. Id. at 524. Even the National Environmental Policy Act (NEPA), though essentially a procedural statute, obligates EPA to improve its programs so as to enhance the quality of renewable resources. 42 U.S.C. § 4331(b). Incorporating restoration and enhancement of wetlands into its § 316(b) program would help fulfill this obligation.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

The final rule permits both "in-kind" restoration measures (those that address organisms impinged and entrained by the cooling water intake structure) and "out-of-kind" restoration measures (those that address organisms other than those impinged and entrained by the cooling water intake structure). The final rule also permits restoration measures to be used either in lieu of or as a supplement to design and construction technologies and/or operational measures. All restoration measures must adhere to the requirements for restoration described in the final rule, including those in sections 125.94 and 125.95.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.307.046

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 11.0

Role of Restoration

EPA's Approach to Restoration Is Justified by Successful Precedents

It is not surprising that many NPDES permitting authorities have accepted restoration measures such as hatcheries, fish ladders, wetlands creation or restoration, and other types of habitat enhancements in fulfillment of § 316(b) requirements. Many restoration projects implemented under state § 316(b) rules have been very successful. Exelon's Quad Cities Station has stocked walleye and hybrid striped bass in the Upper Mississippi River since 1984. This program has produced over 4 million game fish fingerlings. Presently the program's production goals are 175,000 walleye fingerlings (2-5 inches in length) and 5,000 yearling hybrid striped bass (8-9 inches in length) per year (LaJeone 2003). The program uses native Mississippi River walleye as breeding stock. LaJeone and Pitlo 1989. Biological monitoring and trending of standing crop estimates in the Mississippi River pools stocked by Exelon have demonstrated a 30% recruitment in certain game species as a result of these stocking efforts. This project has strong support from the Illinois and Iowa Departments of Natural Resources.

Other successful § 316(b) restoration projects include the following:

- Chalk Point Station: Over 3.4 million striped bass were produced and released in the Chesapeake Bay watershed. Once the striped bass stocks rebounded, at the request of regulators the hatchery raised other species, including American shad, yellow perch, and sturgeon.

- Salem Station: The restoration projects undertaken at Salem are innovative and extensive. Through the Salem Estuary Enhancement Program, PSEG has: (1) restored and/or preserved more than 20,000 acres (32 square miles) of wetlands; (2) constructed eight fish ladders to help river herring and other species migrate over barriers and made plans to build four more; (3) supported artificial reef programs in both New Jersey and Delaware; and (4) conducted extensive biological monitoring that has greatly increased scientific knowledge about the estuary's ecosystem. <FN 17>

- Crystal River Energy Complex: A successful multispecies marine hatchery is being operated at the Crystal River site to culture and release twelve selected important organisms. The facility has released over 1.7 million fingerlings and 4 million larvae of red drum, spotted seatrout, pink shrimp, striped mullet, silver perch, and stone crab. The remaining targeted species will be phased in on a rotating basis as culture techniques are developed.

- John Sevier Station: Between 1982 and 1995, over 5 million hatchery-reared walleye, saugeye, and paddlefish fingerlings and over 1.5 million saugeye fry were stocked in the Cherokee Reservoir (below the plant) as mitigation for organisms lost to the cooling water intake structure. Throughout this period, paddlefish numbers in Cherokee continued to increase, and survival of the stocked fish was good. Saugeye (a walleye-sauger hybrid, selected by the Tennessee Wildlife Resources Agency) demonstrated good-to-excellent growth and survival, and a sport fishery was established. Stocked walleye also survived and grew to catchable size in Cherokee, and thereby a fishery also was established for that species. In 1995, the Station provided the Tennessee Wildlife Resources Agency

(TWRA) with five new rearing ponds to integrate into its fish propagation, stocking, and management programs and in which to propagate appropriate fish species for introduction into the Cherokee Reservoir and the Holston River (on which the plant is located). TWRA has managed and will continue to manage the rearing facility and stocking programs as it sees fit.

- Contra Costa and Pittsburg Stations: Mitigation activities at these stations included restoration of tidal flow by creating dike openings along the Sacramento River and the creation of additional tidal marsh zones.

In addition to these successful § 316(b)-specific projects, power companies have conducted many water-related restoration measures unrelated to § 316(b) compliance. For example, at Reliant Energy's Cedar Bayou Station, aquaculture ponds are used for growing redfish and to propagate wetland plants used for marsh restoration projects. Also, State resource agencies such as the Texas Parks and Wildlife Department and conservation groups such as the Coastal Conservation Association routinely catch fish from the plant's cooling pond to use as brood stock in their hatcheries.

Southern California Edison (SCE) operates an extensive mitigation project in connection with the San Onofre Station. SCE has provided $4.7 million for a white sea bass hatchery, which began operation in October 1996. See SCE, "SONGS Mitigation," available at http://www.sce.com/sc3/006_about_sce/006b_generation/006b1_songs/006b1c_env_prot/006b1c3_songs_miti/default.htm. When operating at design capacity, the hatchery is expected to produce 300,000 juvenile white sea bass per year. SCE also plans to construct a 150-acre artificial reef for the mitigation of kelp impacts. Id.

EPRI's new report on enhancement strategies describes many other successful restoration projects (EPRI 2003).

Footnotes

17 PSEG "Estuary Enhancement Program, " Available at http://www.pseg.com/companies/nuclear/estuary/overview/html

EPA Response

EPA acknowledges that restoration measures have been used in past NPDES permits as one of many tools to implement section 316(b) on a case-by-case, best professional judgment basis. Restoration measures, both existing and proposed, may be used to comply with the final rule provided they fulfill the requirements for restoration projects described in the final rule, including those in sections 125.94 and 125.95.

Comment ID 316bEFR.307.047

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 11.0

Role of Restoration

Design and Management of Restoration Measures

EPA is considering whether to add requirements for the use of restoration measures. The three principal requirements EPA seeks comment on are the following:

- Documentation of sources and magnitude of uncertainty in expected restoration project performance,

- Creation and implementation of an adaptive management plan, and

- Use of an independent peer review to evaluate restoration proposals.

68 Fed. Reg. 13,542 col. 1.

Uncertainty. Uncertainty in project performance is related to natural variations both in the restoration project and in the ecosystem that is affected by the restoration project. It is recognized that this uncertainty exists and is inevitable. This uncertainty should be taken into account in determining the feasibility of a project, but the methods used to account for uncertainty should not impose an unreasonable burden.

Prescribing in detail how this uncertainty must be addressed would be needlessly inflexible and add an unnecessary burden to the process. We note, however, that the degree of uncertainty can be lessened by looking at biomass or at trophic levels rather than at specific species (especially when looking at lower trophic levels, e.g., forage fish). This is done when performing natural resource damage assessments and can result in significantly greater certainty that a given level of benefits will occur than can be obtained if individual species are examined.<FN 18>

Peer Review. EPA's discussion of the Independent Peer Review process is ambiguous. From the discussion, it appears that EPA is proposing to require permittees to consult with federal and state resource agencies and select a panel of multidisciplinary private individuals who would review the restoration project plan before submittal. Selection of reviewers and alternates, coordination of review timeframes, and consultation with federal and state resources agencies all would add expense and delay to the Comprehensive Demonstration Study, and the benefits are questionable.

The addition of all the proposed practices for restoration projects will require additional time and effort in the early stages of the process when the Comprehensive Demonstration Study is prepared. EPA should consider this burden when determining the amount of time needed to prepare the Study.

On the other hand, the three suggested approaches to assessing and managing restoration measures may be useful, depending on the nature and complexity of the proposed measure. In general, the formality and level of detail for each of the proposed requirements should be tailored to the specific project. For example, the application of these factors to a standard hatchery operation should be different from their application to a wetlands restoration project. For the hatchery, the magnitude of uncertainty will be much less than for wetlands restoration, and therefore the documentation and scrutiny of the uncertainty factors need not be extensive. Also, the hatchery project may not need a formal adaptive management plan. Instead, the hatchery could simply report its annual production numbers to the permitting authority.

For a wetlands restoration project, on the other hand, uncertainty analysis, adaptive management, and peer review may well require a higher level of effort. To manage and address the uncertainty of a restoration project, an adaptive management plan that calls for regular assessment of the restoration's progress may be appropriate. Peer review for a hatchery project could be handled informally by a local fish and wildlife manager or other official as part of the project's approval process. In contrast, for a large wetlands restoration project, it may be critical to the overall success of the project to have several peer reviewers from different disciplines provide written comments on the restoration plan, and then continue to review the data during the plan's implementation.

On the other hand, some types of restoration may be well established on the waterbody in question and not require intensive scrutiny. For example, if the restoration involves building a fish ladder on a river where several other fish ladders already have been installed and have proven useful in expanding habitat uses, then a lesser degree of scrutiny may be appropriate for the new ladder project.

In short, while UWAG agrees that all three factors (uncertainty analysis, adaptive management, and peer review) may be useful for designing, assessing, and managing restoration projects, each factor should be tailored to the individual project. Therefore, the rule should not require these factors or prescribe the details, but it should empower and encourage permitting authorities to apply them as necessary to ensure a successful project.

Footnotes

18 This point was made by Dr. Deborah French-McCay in her comments on behalf of PG&E NEG submitted in August 2002. See PG&E National Energy Group August 2002 Comments 1.60 Appendix XVII.

EPA Response

EPA acknowledges the commenter's assessment that uncertainty analysis, adaptive management, and peer review may be useful for designing, assessing and managing restoration measures. In section 125.95 of the final rule, EPA has included provisions relating to uncertainty analysis, adaptive management, and peer review. EPA believes the implementation of these requirements, along with the other requirements described in the final rule, including those in sections 125.94 and 125.95, will reduce the uncertainty associated with restoration measures and enhance their overall performance (see the discussion of uncertainties associated with restoration measures at 67 FR 17146-17148 and the discussion of the roles of uncertainty analysis, peer review and adaptive management at 68 FR 13541-13543). EPA believes the requirements in the final rule allow permittees and permitting authorities the flexibility to conduct analyses appropriate to the nature of the restoration measure under consideration. The final rule also contains provisions that EPA believes will provide facilities with sufficient time to develop the studies associated with restoration measures.

For additional discussion of the use of restoration measures to address aquatic organism species other than those impinged and entrained by a cooling water intake structure, see EPA's response to comment 316bEFR.099.034.

Comment ID 316bEFR.307.048

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.07

Regional Benefits Approach

An important part of the NODA, Section X, is devoted to EPA's reassessment of the estimated benefits of the rule. This section makes clear that commenters raised many questions and concerns about EPA's original estimates of both use and non-use values. In many respects, EPA has made commendable efforts to address those questions and concerns. On some points, the refinements EPA has made are clear improvements. But EPA leaves some key questions unresolved, and its revised analyses – particularly its estimate of non-use values – remain seriously flawed.

What EPA Did to Estimate Benefits

The NODA describes EPA's new regional methodology for estimating use and non-use benefits and presents use values it calculated for two regions (the North Atlantic Region and the Northern California Region) and non-use values it calculated for one region (the North Atlantic Regions). See 68 Fed. Reg. 13,543-80. EPA very generally describes the data sources it is considering using and the types of methods it may apply for another six regions, but it provides insufficient details to allow UWAG a meaningful opportunity to comment on the appropriateness of any such future analyses. See, e.g., 68 Fed. Reg. 13, 546-47, 13,575-76.

EPA's regional methodology uses species groupings to aggregate impingement and entrainment data from a subset of plants within the region for which EPA had such data. EPA then used the flow-weighted data to extrapolate losses for other facilities within the region, grouped by waterbody type. As with its previous methods, EPA assumes, but does not test, the representativeness of its data for other plants within the region.

EPA then converted annual impingement and entrainment losses for each species group into (1) Age-1 equivalents, (2) fishery yield, and (3) biomass production foregone. Each of these conversions requires EPA to use biological data or make assumptions that heavily influence the results. For example, in estimating production foregone, EPA used a revised trophic transfer efficiency that is eight times higher than the value it previously used. For purposes of this analysis, EPA assumed that no entrainment survival occurs and that compensatory mechanisms do not operate to offset losses in any way. See 68 Fed. Reg. 13,543-46, 13,552-54, 13,559-63.

EPA then estimated commercial and recreational use values for losses within the two regions. For both categories of use values, EPA made some changes in the methods it used. See 68 Fed. Reg. 13,546-48, 13554-58, 13,563-67.

EPA also estimated non-use values for the North Atlantic region, using a new benefits transfer approach that uses the results of a stated preference survey assessing the preferences for different kinds of aquatic habitat (wetlands and submerged aquatic vegetation (SAV) (i.e., eelgrass)) held by a study population of households near the Peconic Estuary in western Long Island. EPA used that study to derive a per-household value-per-acre of wetland or eelgrass. The Agency then estimated the amount of wetland and eelgrass habitat needed to produce the same number of organisms as it estimates were lost to impingement and entrainment within the region. Lacking any data on the productivity of wetlands for the species in question, EPA used abundance data collected for certain species near two power plants in the region.

Notably, the NODA does not mention the Habitat Replacement Cost (HRC) or Societal Revealed Preference (SRP) approaches for estimating non-use benefits. It also omits any response to objections raised by UWAG and many others opposed to EPA's wholly inappropriate use of those methods for benefits estimation. As UWAG's comments explained, those methods, even if applied perfectly, are capable only of estimating costs, not benefits. See UWAG August 2002 Comments, at 65-66 and Appendix 9; Stavins April 21, 2003 Comments (DCN 5-1.1).

If EPA's decision not to discuss these methods in the NODA means that it has decided to drop all use of those methods, then UWAG agrees wholeheartedly. We believe, however, that in the final rule, EPA should go further by recommending against any use of those methods for benefits estimation.

EPA Response

This comment is simply a general opinion about EPA's analysis without any specifics. Therefore, no specific responses from EPA is required. EPA notes that the HRC and SRP approaches were not used to estimate benefits for the final analysis for the 316b Phase 2 rule. However, EPA believes that studies such as these provide a potentially useful approach. For information on the HRC, please see the document entitled "Habitat-based Replacement Cost Method" (DCN # 6-1003) and responses to Comments 316bEFR.005.035. For additional information on the SRP, please see Part B of the Regional Analysis Document (DCN # 6-0003) and response to Comment 316bEFR.005.006. For a discussion of nonuse analyses, see response to Comment 316bEFR.307.061 on the Peconic habitat-based study, and responses to Comment 316bEFR.338.046 and Comment 316bEFR.338.047 on nonuse.

Comment ID 316bEFR.307.049

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.07

Regional Benefits Approach

A number of experts have reviewed some or all of the biological data and assumptions EPA used to estimate the extent of impingement and entrainment losses caused by power plants and the value of those losses. They include Drs. Larry Barnthouse and Webster Van Winkle, on behalf of EPRI; Gregory Seegert, M.S., on behalf of UWAG; and Dr. Douglas Heimbuch, on behalf of PSEG. Among the conclusions evident from their reviews are these:

- The regional approach, while an improvement over EPA's previous approach, is unlikely to compensate for site-specific differences that determine the nature and extent of impingement and entrainment losses;

- EPA's failure to account in any way for entrainment survival and compensation, both of which are known to occur, means that its estimates will overstate losses of Age-1 fish, yield, and production foregone;

- EPA made erroneous assumptions about the age of impinged organisms, many of which are young of year (YOY or Age-0 fish), rather than Age-1 or older, as EPA has assumed. This error also is likely to have resulted in a substantial overestimate of losses;

- EPA overestimated the weights of fish and larvae, again inflating loss estimates;

- EPA's new net trophic transfer rate is too high, which will result in overstatement of production foregone or any other summary metric for which it is used; and

- EPA incorrectly assumed that it could use species abundance as a proxy for wetlands productivity, resulting in vast overestimates of the amount of habitat needed to replace organisms lost to impingement and entrainment.

EPA Response

It was not the aim of EPA's analysis to develop facility-specific estimates of I&E for the over 550 facilities inscope of the Phase II rule. Rather, EPA used available I&E data to develop regional-scale estimates of I&E, which were then summed to obtain an estimate of the magnitude of I&E nationwide. Facilities will have an ample opportunity to collect facility-specific I&E data for their permit applications.

See Chapter A7 of the Phase II Regional Study Document (DCN #6-0003)for a discussion of EPA's conclusions about entrainment survival.

See response to Comment 316bEFR.025.015 for a discussion of EPA's assumptions about compensation.

Few facility studies provide information on the age distribution of impinged fish. See response to Comment 316bEFR.029.105 for a discussion of EPA's assumptions about the age of impinged fish for the purposes of the national benefits analysis.

The commenter provides no evidence to support his conclusion that EPA overestimated weights of fish and larvae. In fact, EPA consulted with local fisheries experts and conducted as thorough a review of the biological literature as possible to obtain the best available life history data. In addition, whenever possible, EPA used life history data recommended by local technical advisory committees and provided in current facility studies (e.g., EPA used the same life history data used by Salem and by Brayton Point in their recent permit renewal applications).

EPA's final analysis used a trophic transfer efficiency of 10% based on Pauly and Christensen (1995) (see Docket #6-1004).

EPA disagrees with the commenter that it is necessarily incorrect to assume that species abundance is a proxy for productivity. Please see response to Comment 316bEFR.029.113.

Comment ID 316bEFR.307.050

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

EPA has made some clear improvements in its analytical approach (for example, by eliminating multi-market producer surplus) and some changes that appear likely to have improved its analysis but as to which further details on implementation would be helpful (e.g., using the regional aggregation approach, assuming proportionality between stock and harvest (rather than assuming that 100% of all fish spared by CWIS improvements would be harvested), <FN 19> and accounting for benefit timing with discounting);

Footnotes

19 This is not to suggest, however, that EPA has even considered, much less shown, that from a biological point of view reduction in impingement and entrainment losses will result in a proportional increase in harvest. Rather, it is simply to suggest that EPA's assumption in the NODA, while biologicaly unsupported, is less wrong than its original assumption

EPA Response

The commenter is incorrect that EPA assumes that 100% of all fish spared by CWIS improvements would be harvested.

The fate of fish spared by CWIS improvements is determined in the I&E model, as described in Chapter A5 of the Regional Study Document (DCN #6-0003).

For a discussion of the 98% of the saved fish that are not valued in the analysis because they are not harvested, please see EPA's response to comment #316bEFR.336.009.

As suggested by this commenter, improved documentation on these matters has been provided in the Regional Study Document and in the EBA for the final Section 316(b) Phase II rule.

Comment ID 316bEFR.307.051

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.07

Regional Benefits Approach

EPA intends to take a regional approach to benefits estimation, aggregating data within regions by species and again by waterbody type. In concept, this approach has the potential to offer better resolution both biologically and economically. On the biological side, however, there is no evidence that EPA has made any attempt to test its apparent assumption that the approach will produce more realistic impingement and entrainment values not only for facilities for which it has data, but for facilities for which it does not. Given the site-specific factors that drive entrainment and impingement, we believe EPA has an obligation to test its assumption.

EPA Response

While the commenter argues that EPA should test its assumption that I&E data can be extrapolated among like facilities in the same region, he provides no suggestions about how this could be done. Nevertheless, EPA believes that its approach was reasonable given the goals of its analysis. Please see response to Comment 316bEFR.041.041.

Comment ID 316bEFR.307.052

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Failure to Account for Entrainment Survival and Compensation in Estimating Losses

Above we addressed why entrainment survival studies should be used at individual facilities to determine compliance with the entrainment performance standard. A related issue is whether entrainment survival estimates should be used in EPA's assessment of regional benefits of the new rule.

As Dr. Van Winkle points out,<FN 20> EPA's assumption of zero entrainment survival (along with its assumption of zero compensatory effect) is unsupportable. Even if it might be defensible to assume zero percent survivability at an individual facility where there are no reliable data, it is not defensible for regional or nationwide costs and benefits, for which zero survivability is clearly not true. What is needed, says Dr. Van Winkle, is a sensitivity analysis that illustrates the effect on estimated regional and national economic benefits of representing both the reality and the uncertainty of what is known about entrainment survival.

Footnotes

20 See Van Winkle Appendix to EPRI June 2003 Comments.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

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Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.01.02.02

Fish Population Modeling

Also, EPA continues to make no adjustment for the effects of compensation on Age-1 equivalents, production foregone, or yield. As Drs. Barnthouse and Van Winkle point out, and as UWAG has shown in its previous comments,<FN 21> there is no credible scientific doubt that compensation operates in aquatic populations. EPA's failure to make any adjustment for compensation is unreasonable, especially in light of EPA's willingness to make extravagant and wholly unfounded assumptions with respect to parameters it used for non-use benefit valuation, which we discuss below.

Footnotes

21 See UWAG August 2002 Comments, at 23-26.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.307.054

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA relaxes its previous assumption that all impinged fish are Age-1 and assumes instead that “the ages of impinged fish are one and older and that they follow an age distribution that is implied by the associated survival rates.” 68 Fed. Reg. 13,546 col. 2. <FN 22> EPA says that data collected at the Salem and Millstone facilities indicate that individuals older than Age-1 were collected and that EPA’s assumption that all impinged fish were Age-1 resulted in an underestimate. Id. As EPA notes, the adjustments it made increased the estimates of forgone yield by factors ranging from three to ten, depending on species-specific age survival rates. Id. This is so because older fish weigh more and thus contribute more biomass and because Age-1 and older fish have a higher probability of surviving to reproductive age.

EPA’s assumptions about the age distribution of impinged fish are in error and as a result greatly overstate the expected forgone yield due to impingement. As the Barnthouse report points out, studies of the ages of impinged fish have consistently shown the following:

- Most impinged fish are younger than one year of age, not one year old or older as assumed by EPA.

- The vulnerability of most species to impingement decreases with age, so that EPA’s use of survival rates to estimate the age composition of impinged fish usually overstates the relative contributions of older fish to impingement losses.

Using data from Salem for weakfish, striped bass, and white perch, Dr. Barnthouse shows that estimates using the NODA assumptions are inflated compared to estimates calculated using actual age distributions. For weakfish, the NODA value is inflated by a factor of 70 times over the value calculated using actual age distributions. For striped bass and weakfish, assuming that all impinged fish are Age-1 likewise greatly overestimates foregone yield. Only for white perch does the Age-1 assumption underestimate foregone yield, and the difference is only about 20%. Dr. Barnthouse says that the age distribution of fish impinged at Salem is probably typical of estuarine facilities.

The reasons for EPA’s overestimates are not hard to discern. A large fraction of the species impinged in high numbers at Salem and other estuarine facilities are anadromous and spend most of their life cycles outside the estuary. Many of the species included in EPA’s North Atlantic Region case study are anadromous, such as American shad, Atlantic menhaden, blueback herring, striped bass, weakfish, and winter flounder. For all these species, EPA’s original approach to calculating foregone yield due to impingement probably would have overstated the potential reduction in harvest. EPA’s revised approach in the NODA would overstate the reduction even more.

Relatively few of the species addressed in EPA’s case studies <FN 23> (for example, white perch and bay anchovy) reside in the estuary throughout their life cycles and are vulnerable to impingement at all stages. These are the only species for which EPA’s original approach might have caused an underestimation of foregone fishery yield due to impingement. The revised approach would still overestimate foregone yield, because it assumes that all impinged fish are at least one year old.

It is impossible to tell how much EPA's estimates of production foregone are affected by this error, because EPA has provided no documentation of the method used to calculate production foregone for harvested species. Dr. Barnthouse points out that, although Chapter 5 of EPA's original case study report says that the production foregone model was applied only to forage species, both the original case study and the new regional case studies documented in the NODA include estimates of production foregone for impinged fish belonging to harvested species. If the same assumptions used to calculate yield foregone for these species were also used to calculate production foregone, the production foregone estimates would be similarly biased.

As Mr. Seegert documents in Appendix A to these comments, it is clear that in freshwater rivers, as well as in lakes and reservoirs, impingement is typically dominated by YOY (young-of-year) fish. Mr. Seegert examined fewer estuarine studies, but dominance of YOYs at such sites also appears to be typical. At Great Lakes plants, the age distribution of impinged fish appears to vary considerably depending on the plant in question. However, even at sites where YOYs do not predominate, EPA's assumption that all fish impinged will be Age-1 and older is still erroneous. At such sites, EPA production foregone estimates will be "less wrong" than at sites where YOYs predominate, but still wrong.

In the NODA, EPA says it will assume that the ages of impinged fish will be Age-1 and older. Clearly, this approach is not supported by the data. Based on the studies reviewed in the Seegert report, it would be appropriate for EPA to assume that 80-90% of the fish impinged at sites situated on rivers, lakes, and reservoirs are YOYs, 10-20% are Age-1, and a very small percentage, no more than 1-2%, would be Age-2 and older.

For the Great Lakes, especially Lakes Michigan and Erie, the changes in species composition that have occurred over the past 20-30 years are great enough to make any assumption tenuous. Nonetheless, it is clear that impingement in the Great Lakes includes significant percentages of YOYs. EPA cannot ignore this documented evidence and should adjust its estimates accordingly.

Footnotes

22 We cannot tell what EPA means when it says that it will assume that the ages of impinged organisms "follow an age distribution that is implied by the associated survival rates." If it means that EPA will assume that impinged fish at facilities for which it has no data will survive or die at the same rate as impinged fish at facilities for which it has data, then EPA would seem to be omitting any consideration of the extent to which fish protection technologies or other site-specific factors may affect survival.

23 EPA is proposing to combine similar species into family groups or groups used by NMFS for landings data (68 Fed. Reg. 13,545). Species should be combined according to their taxonomic classification and not by their common names. For example, two widespread species whos distributions overlap are the trout-perch and the logperch. The trout-perch (Percopis omiscomaycus) is in the Order Percopsiformes, which is unrelated to the logperch's (Percina caprodes) Order Perciformes. These two species were erroneously combined in at least one of the case studies.

See Appendix A

See Barnthouse report (UWAG. Aug 2002).

EPA Response

The commenter expresses concern EPA's assumptions about the age distributions of impinged fish. For its analysis for the final rule, EPA revised the methods used to assume age distributions of impinged fish in a manner that acknowledges that YOY may be predominant among impinged fishes, as described in EPA’s response to Comment 316bEFR.029.105.

Comment ID 316bEFR.307.055

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Erroneously High Weights of Fish and Larvae

Although the NODA does not provide enough data to allow duplication of EPA's equivalent loss calculations, an initial analysis conducted by Lawler, Matusky and Skelly Engineers (LMS) for PGE/NEG was able to identify unrealistically high weights that EPA appears to have used for eggs and larvae.

The production foregone values for tautog in the North Atlantic region (NODA Table X-7) appear totally inconsistent with the number of Equivalent Age-1 fish and estimated yield foregone. By assuming that most (~80%) of the entrainment was eggs, LMS was able to get Age-1 numbers comparable to EPA's for Brayton Point from the case study. When LMS ran the production foregone model for this species, it produced a result of over 12 million pounds, which appears unreasonably high. LMS then looked at the life history values used for tautog (Case Study Table F1-13) and found it assumed that each egg weighed ~1 gram (0.00022 lbs) and each larva weighed ~10 grams (0.022 lbs). By comparison, a 3-inch (75-mm) striped bass weighs just over 5 grams.

To see if these high weights might be the reason for the high EPA production foregone values, LMS re-ran the production foregone model using more reasonable weights for eggs and larvae. This single change lowered the production foregone for tautog from more than 12 million pounds to less than 2,500 pounds. Clearly the production foregone model is very sensitive to values used for weight in the early life stages when mortality is high.

Based on these results, LMS looked at other weights used in the Brayton Point case study. It found that EPA had used unreasonably high weights for eggs or larvae, or both, for many other species. For example, weakfish larvae were assumed to weigh 30 grams each, and winter flounder larvae were assumed to weigh 2 - 10 grams each. For many other species, larvae were assumed to weigh only 0.5 to 1 gram each, but even these values are far too high. Larval fish are most typically in the range of hundredths of grams each.

EPA did not use reasonable weight values in these calculations. As a result, the production foregone values are likely to be substantial overestimates for many species. Unfortunately, without more information from EPA, it is difficult to evaluate further the estimates presented in the NODA.

EPA Response

Please see EPA's response to Comment 316bEFR.305.003 regarding its production foregone calculations for the final rule.

Comment ID 316bEFR.307.056

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Use of Inappropriate Net Trophic Transfer Rate

For the proposed rule, EPA used a trophic transfer model to estimate the yield of harvested species foregone due to entrainment and impingement of forage species.<FN 24> EPA's model assumed that 20% of forage species biomass is directly consumed by harvested species and that the transfer efficiency for this direct pathway is 9%. EPA assumed that the remaining 80% of forage fish are consumed by intermediate predators, which are then consumed by harvested species, with a transfer efficiency for this indirect pathway of 0.9%. These values imply a net transfer efficiency, considering both direct and indirect pathways, of 2.5%.

EPA now says that it is using a different net trophic transfer efficiency of 20%, "based on an additional review of the scientific literature." 68 Fed. Reg. 13,546 col. 1 (citing Reed et al. (1994)). Dr. Barnthouse has concluded that EPA's new, far higher net trophic transfer rate is unsupported for two reasons: (1) it is derived from an un-refereed source and is at the high end of the range of accepted values and (2) it assumes that 100% of forage fish biomass is consumed by economically valuable species.<FN 25> See Barnthouse Appendix to EPRI June 2003 comments. Dr. Barnthouse concludes, based on review of more recent, authoritative literature, that a net trophic transfer rate of 10% would be more reasonable, yet still quite conservative.

Although EPA says that the effect of the change in trophic transfer assumptions is insignificant because foregone yield attributable to losses of forage fish is only a small component of the total foregone yield due to entrainment and impingement, it provides no support to verify this claim. Given that the change in assumptions results in an eight-fold increase in all estimates of yield foregone due to losses of forage species, the difference might well be significant for facilities at which entrainment and impingement losses consist primarily of forage species.

Footnotes

24 While EPA says that it performed these trophic transfer calculations for purposes of the new estimated losses presented in the NODA it is less than clear about the results. We have been unable to find clear evidence of how those calculations were applied and what they yielded. Equally important, assuming the calculations were done and done correctly, it is not clear that they were used for the benefits estimate. If the calculations were done and are reflected in results for commercial and recreationally important fish, then assigning a non-use value to forage species would result in at least some double-counting.

25 Although EPA does say what percentage of biomass it assumes is consumed directly by top harvested species, it identifies only one trophic transfer rate (20%), which is the same single rate discussed in Reed et al. Had EPA assumed that different percentages were consumed via direct and indirect pathways, the collective net rate would have been different from 20%. Thus, Dr. Barnthouse concludes that EPA must have assumed that 100% of the forage biomass is consumed directly by the harvested species.

EPA Response

Please see EPA's response to Comment 316bEFR.305.004 regarding its trophic transfer analysis for the final rule.

Comment ID 316bEFR.307.057

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

EPA's Erroneous Use of Abundance as a Proxy for Habitat Productivity

In addition to the erroneous biological assumptions detailed above, which undercut EPA's quantification of impingement and entrainment losses, EPA's method for estimating non-use benefits rests on other major biological errors that result in vast overestimates of the amount of habitat needed to replace those losses. An analysis prepared by ASA for PGE/NEG <FN 26> details these errors. By pointing out these errors, UWAG does not mean to suggest that it endorses the overall method EPA applied for non-use valuation, or that that method is salvageable if EPA corrects these errors. Rather, we raise them because they provide further evidence, if any is needed, that EPA's non-use value estimates are unreliable.

One of EPA's gravest errors is its assumption that limited surveys of species abundance in comparable habitat around two power plants in the region can be used as a legitimate proxy for the productivity of an acre of wetlands. As the ASA report shows, they cannot. EPA has made no effort to establish that habitat in that area can serve as a reference point for gauging the maximum, or even the minimum, productivity of an acre of wetland or eelgrass for any given species. In fact, it is highly likely that they cannot, given other conditions that are likely to affect the presence and abundance of organisms (most critically winter flounder, which the NODA (13,569 col. 1) says dominated the acreage determination) in that habitat.

Footnotes

26 The ASA report is appended to PGE/NGE's June 2003 comments

EPA Response

In regards to the commenter's assertion that it is incorrect to assume that species abundance is a proxy for productivity, please see EPA's response to Comment 316bEFR.029.113.

With respect to habitat restoration alternatives, EPA met with and received information from local experts with knowledge about which restoration alternatives would most efficiently address the majority of species being lost to I&E in the vicinity of the facilities. EPA believes that the information was sufficiently site-specific, and sufficiently reviewed by local experts to include the most relevant restoration alternatives that could address the majority of species in a practical, cost-effective approach. EPA deliberately avoided including highly experimental or uncertain restorations for species that had no obvious and practical restoration opportunities.

For additional information on the HRC method, please refer to the response to comment 316bEFR.005.053 and the document entitled "Habitat-based Replacement Cost Method" (DCN 6-1003).

Comment ID 316bEFR.307.058

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02

Benefit Estimation Methodology

The attached report by Triangle Economic Research (TER), entitled "Comments on Benefit Estimation in EPA's Proposed Phase II 316(b) Rule as Summarized in the Notice of Data Availability" (2003) (Appendix B to these comments), addresses the revised estimate of benefits that EPA announces in the NODA. EPA has made major changes to the benefits analysis, including the following:

- Eliminating multi-market producer surplus;

- Replacing the case study-based benefit extrapolation with a regional approach;

- Accounting for the impact of benefit timing through discounting;

- Correcting the assumption that all fish spared due to CWIS modifications are harvested by recreational or commercial anglers;

- Exploring new options for calculating commercial benefits;

- Using regional random utility models (RUMs) to estimate recreational fishing benefits; and

- Developing a revised analysis of non-use benefits.

TER's review indicates that EPA has made improvements and potential improvements in estimating the amount and timing of benefits. However, while EPA has potentially corrected some problems, it has introduced new ones. Consequently, TER concludes that the resulting benefit estimates, especially the non-use benefits, are vastly overstated.

A comparison of benefit sources across the two analyses demonstrates the magnitude of the problem. In EPA's original benefit-cost analysis, benefit estimates for the Salem facility along the Delaware Estuary (comparable to the North Atlantic region) of approximately $23.2 million were distributed approximately 64% to commercial, 24% to recreation, and 12% to non-use. In the NODA, EPA estimates that the total benefits from reduction in entrainment and impingement for the North Atlantic region is $79 million per year. Of this, $0.3 million (0.4%) is due to commercial benefits, $3.1 million (3.9%) is due to recreational benefits, and the remaining $75.6 million (95.7%) is from non-use value.

This dramatic shift in the apportionment of benefits across categories is remarkable, and in particular the movement of benefits from use categories to the non-use category is troubling. Moreover, TER reports that its ability to evaluate some of the significant issues is limited because, in many cases, EPA's intentions are only partially developed and not completely implemented.

(See Appendix B)

EPA Response

EPA agrees with the commenter that the revised benefits analysis presented in the NODA is an improvement over the benefits analysis presented at proposal. The commenter, however, states that non-use benefit estimates presented at the NODA are "vastly overstated." The comment concludes with the implication that, because the magnitude of total non-use values has increased from EPA's original analysis to the NODA analysis, that it cannot be correct. The Agency disagrees.

First, EPA's original analysis only considered a very small fraction of non-use values – those non-use values that accrue to users of the resource for species that have use values. In the revised analysis, EPA has included additional species that do not have use values, or that have only indirect use values, and has included a more reasonable population who are likely to hold these values.

EPA has responded to concerns regarding the Agency's non-use valuation methods presented in the NODA in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services.

For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis.
For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Second, the Agency points out that comparing the apportionment of benefits across use and non-use categories between the Delaware Estuary case study presented and proposal and the North Atlantic Region case study presented in the NODA is not appropriate because commercial and recreational fish losses are much greater in the Mid Atlantic region compared to the North Atlantic region (for detail see Section XII, Benefits Analysis, of the preamble for the final rule).

For the final Section 316(b) Phase II regulation, the Agency presented only a qualitative assessment of the benefits of the environmental protections at issue in the final 316(b) benefit cost analysis given the unavoidable uncertainties in estimating non-use benefits at the national level.

Comment ID 316bEFR.307.059

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

EPA still bases benefit estimates for commercial fishing on the gross revenue of lost commercial catch. EPA is now considering a range of 0% to 40% of dockside value. This adjustment is significant, but EPA's methodology inappropriately characterizes the source and nature of societal benefits.

EPA's approach reflects the misconception that the effect of entrainment and impingement reductions can be approximated as some portion of increased dockside value. This notion is rooted in short-run production theory, which has no place in the analysis of benefits rising from entrainment and impingement reductions.

TER's investigation indicates that societal benefits from § 316(b) regulations under open markets exceed gains observed with market restrictions. Using the assumptions of unit price elasticity and open markets, TER estimates that societal gains from the elimination of entrainment and impingement in the North Atlantic region are $0.72 million, as opposed to the EPA estimate of $0.28 million.

EPA Response

The estimates presented by the commenter assume some level of decrease in price as a result of the increased supply of fish. EPA assumes that the magnitude of changes in the commercial fishing harvest will not be large enough to affect prices. Thus, no change in consumer surplus is expected.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, including short run vs. long run issues, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.307.060

Subject Matter Code 10.02.01

Recreational Fishing Benefits

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

EPA plans to use region-specific random utility models (RUMs) with participation components to estimate losses to recreational fishing. Random utility models provide the best opportunity for correctly valuing increased catch hypothesized to result from impingement and entrainment reductions. However, unadjusted data from the surveys cited by EPA may reflect an upward bias in benefits estimates caused by the sampling procedure, because anglers lead to an upward bias in benefit estimates. Another concern is that EPA incorrectly measures the opportunity cost of time; this also will result in an overestimate of benefits.

EPA Response

The commenter argues that using unadjusted data from the surveys cited in the NODA (the National Marine Fisheries Service (NMFS) Marine Recreational Fishing Statistics Survey (DCN #6-3189) and from the Michigan Recreational Anglers survey conducted by Michigan Department of Natural Resources (MDNR) (DCN #6-3176)) may lead to an upward bias in recreational benefits estimates (see DCN #5-1008 and #5-1009 for details regarding EPA's recreational fishing analysis presented in the NODA). EPA believes that NMFS and MDNR have adequately corrected for sampling bias through long-established and tested survey and statistical methods. In addition, EPA does not believe that the Agency's analysis incorrectly calculates opportunity cost of time in the RUM models. If anything, EPA's measure of opportunity cost of time would result in downward bias in estimates for regions where income was reported for extremely small numbers of respondents. For regions where income was estimated using median household income from the U.S. census, it is impossible to determine the direction of bias, if any, because, without collecting primary data, there is no way to compare the median income of anglers to the median income of all households in the region. EPA has followed standard, generally-accepted methods of RUM modeling.

See response to comment 316bEFR.041.452 for additional details.

Comment ID 316bEFR.307.061

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Whether non-use benefits should be included in a benefit-cost analysis is somewhat controversial. Currently contingent valuation (CV) is the most widely used technique for attempting to measure non-use values.

Citing difficulties with regulatory scheduling and resource requirements, EPA employs a benefits transfer approach for non-use valuation. This approach assesses respondents' values for habitats that play a significant role in the production of fish and shellfish and then estimates the quantity of this habitat that would be required to replace fish and shellfish lost to entrainment and impingement. EPA then combines this information with population data to produce what it hopes will be an indirect estimate of aggregate human values for fish and shellfish lost to entrainment and impingement.

EPA concludes that $76 million or 95.78% of the benefits from entrainment and impingement reduction in New England fisheries is attributable to non-use values. However, EPA's approach to assessing non-use values is entirely inadequate. In particular, the assumption that values for eelgrass and wetlands can be transformed into non-use values for fish is unfounded and rests on a string of unsupported, and unsupportable, assumptions. Not only did EPA assume that the value respondents placed on habitat could be translated into a value those same respondents would place on the well-being of a fish stock, it went further. In essence, EPA assumed that it could convert that derivative value into a value respondents would place on the well-being of individual fish, which is what the Agency seeks to value here. <FN 27>

Throughout this proceeding, EPA has refused categorically to make any attempt to consider the implications of individual losses at a higher, more meaningful level (which UWAG has suggested is the population level).<FN 28> Yet the survey EPA relied on, and all of the other surveys it suggests it may consider using, elicits responses about the values non-users place on broader, resource-wide endpoints.

But EPA has done no analysis from which it could link any reduction in impingement or entrainment to any increase in well-being or decrease in risk to a resource, instead of an individual fish. UWAG submits that, even if further efforts to estimate non-use benefits more reliably were worthwhile, such efforts could succeed only if EPA framed the questions so that responses were directed to the values relating to the resource, not to individual fish.

In short, the vast difference between the transfer study's hypothetical valuation scenario and the § 316(b) policy context cannot be overcome. EPA's attempt to overcome this disparity leads to the remarkable conclusion that over 90% of benefits due to § 316(b) regulations can be attributed to growth in the stock of forage fish. TER concludes, in contrast, that non-use values for the proposed regulation are likely negligible.

A report prepared for EPRI by Ivar Strand <FN 29> agrees in large part with the TER analysis. Dr. Strand concludes that EPA's use values for the North Atlantic Region are probably within an order of magnitude of the truth. For non-use (passive use) values, on the other hand, some major progress in the case studies has been made, but substantial questions remain. Dr. Strand identifies these questions:

- To obtain non-use values of North Atlantic fish and shellfish changes, EPA bases its dollar value of willingness to pay per wetland (or eelgrass) acre on Opaluch et al. (1998). In this study, the authors specifically state "we believe that the resource priorities or relative values of resources are more reliable than are the dollar estimates of values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions" (Opaluch and Grigalunas (DCN-5-1292), at 5).

- In transforming the questionable value per acre of wetlands in the North Atlantic into a value per change in fish population, EPA goes through a process that relies on numerous unsupported judgments, resulting in fundamentally arbitrary and excessively large non-use values.

- In developing information for the Northern California region, EPA develops a "break-even" analysis that calculates the dollar amount of non-use values that will equate the costs of Northern California investment in closed-cycle cooling systems with total economic value. While this may provide useful information, it is not a substitute for a credible study of the non-use value of the uncaught recreational and commercial fish plus the forage fish losses from impingement and entrainment.

Footnotes

27 This criticism is equally true for the other studies EPA has found through its literature review. EPA says it is considering using these studies individually or collectively in some fashion as its non-use benefits assessment proceeds. See 68 Fed. Reg. 13,575-76; DCN 5-1011. Those papers are not in the record, and, even if they were, a thorough review would have been possible in the time available. Nevertheless, based on what TER knows of the papers with which it is familiar and what EPA says of those papers in DCN 5-1011, it is clear that non of them probes respondents on individual-level values, which is what EPA is seeking to value here.

28 UWAG August 2002 Comments, Section III.B.1.

29 See Strand Appendix to EPRI June 2003 Comments.

EPA Response

The comment states that "EPA's approach to assessing non-use values is entirely inadequate." EPA does not agree.
For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values. However, the Agency has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

The benefit transfer method used by EPA was never intended to value specific quantitative changes in fish and shellfish based on WTP per acre of habitat. Rather, it was intended to value the habitat required to compensate for, or offset, losses of fish and shellfish. The relevance of this approach was approved, in principle, by Stavins in his comments on the National Pollutant Discharge Elimination System (NPDES) permit for Brayton Point. Stavins wrote "while mitigation, restocking, and/or habitat restoration may be acceptable approaches as alternatives to the installation of specific technologies in order to offset I&E losses, the cost of such alternatives is in no sense whatsoever a reasonable proxy for the value (that is the benefits) of reducing I&E". (R.Stavins. October 4, 2002. Review of Economic Analysis Supporting NPDES Permitting Determination for Brayton Point Station, pp. 6-7).

The above statement shows that commenters seem to agree with the assumption that the public would be willing to accept a one-to-one tradeoff between a unit of lost habitat services at one site (i.e., the CWIS) and a unit of habitat services at another site (e.g. a salt marsh). Thus, the main objection to the use of HRC in the proposed rule analysis and the economic analysis for the NPDES permitting determination for Brayton Point was based on distinction between costs and values.
A study by Milon and Dodge (2001; Bulletin of Marine Science 69) presents an application of a habitat valuation method to the assessment of economic losses resulting from damage to coral reefs. In addition, NOAA has allowed the use of this method as one means of compensating for lost interim values pending restoration, under the NRDA regulations of the Oil Pollution Act (Damage Assessment and Restoration Program (DARP), National Oceanic and Atmospheric Administration, 1997. Natural Resource Damage Assessment Guidance Document: Scaling Compensatory Restoration Actions (Oil Pollution Act of 1990) Available at: http://www.darp.noaa.gov/pdf/scaling.pdf). A paper by Mazzotta, Opaluch and Grigalunas ("Natural Resource Damage Assessment: The Role of Resource Restoration," Natural Resources Journal V. 34, pp. 153-178) describes a method for providing habitat restoration to compensate for the lost services of that habitat, rather than attempting to estimate dollar values for those services.
The commenter asserts that "non-use values for the proposed regulation are likely negligible." The commenter provides no empirical evidence for this assertion, which is simply an opinion. EPA has provided evidence to the contrary, indicating that non-use values are not negligible.

The comment includes a quote regarding the reliability of measured priorities versus that of measured dollar values in the Peconic Estuary study. At issue here is what level of precision of value estimates is required for this particular policy analysis. The results of the Peconic survey have been used by the Peconic Estuary Program to evaluate options and plan for preservation and restoration actions in the Estuary, under the National Estuary Program, programs that require expenditure of scarce public funds and thus have significant opportunity costs for the public.

The Peconic model was designed to both measure dollar values and develop priorities; the dollar values estimated through the PES study have been published in the peer-reviewed literature. As clearly stated by Johnston et al. (Johnston, R.J., J.J. Opaluch, T.A. Grigalunas, and M.J. Mazzotta. 2001. Estimating Amenity Benefits of Coastal Farmland. Growth and Change 32(summer): 305-325.) on page 313: "Contingent choice questions were designed to measure respondents' values for changes in the natural resources of the Peconic Estuary system…." Nearly identical text is found in Johnston et al. (Johnston, R.J., T.A. Grigalunas, J.J. Opaluch, J. Diamantedes, and M. Mazzotta. 2002. Valuing Estuarine Resource Services Using Economic and Ecological Models: The Peconic Estuary System Study. Coastal Management 30(1): 47-66).

The original Peconic study concludes that

the minimum conditions for economic rationality are met, with mixed results for the more rigorous tests. The estimated coefficients for all models have the correct sign and are statistically significant. Relative values and priorities are consistent across model specifications, and estimates of dollar values are not highly sensitive to specification. ….

Overall, there is no strong evidence that people are unable to make tradeoffs that express their priorities for resources. Open-ended comments and other qualitative evidence suggest that respondents were concerned about the issues, accepted the scenarios, and made an effort to provide thoughtful answers …

…[R]esponses provide robust estimates of people's priorities and relative values for the natural resources…. Although the dollar values may not be precise, they may be appropriately used to indicate the general magnitude of benefits of different programs as part of a decision-making process that considers a variety of factors, including economic benefits. (Mazzotta, 1996)

EPA recognizes that the Peconic study does not provide perfect estimates of dollar values. There is no study in existence that provides perfectly reliable dollar values for non-marketed goods. Every non-market valuation study contains some level of bias or uncertainty. However, the Agency believes that the values provided are useful for indicating the magnitude of benefits that would be provided by restoring fish habitat. EPA believes that the values provided, while not perfectly ideal, are adequately reliable for the context.

The comment further states that the benefit transfer "relies on numerous unsupported judgments." For EPA's response to comments regarding the connection between values for habitat and values for fish and shellfish, please see the response to comment #316bEFR303.020.

For EPA's response to comments regarding losses to individual fish vs. population losses, please see the response to comment #316bEFR.306.302.

For EPA's response to comments regarding the similarity of wetlands between the study area and the policy area, please see the response to comment #316bEFR303.020.

For EPA's responses regarding the relative magnitudes of use and non-use values, please see response to comment #316b.EFR.306.315.

For EPA's response regarding the soundness of value estimates from the Peconic study, please see the response to comment #316bEFR.304.002.

For EPA's response to comments regarding the allocation of values for various wetland services using the Johnston, et al. study, please see the response to comment #316bEFR.303.021.

For EPA's response to comments on the break-even method, please see comment #316bEFR.306.106.

Comment ID 316bEFR.307.062

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 6.01

Overview of I & E effects on organisms

According to Dr. Van Winkle,<FN 30> empirical evidence is not available from any field study during the past three decades showing that entrainment and impingement losses are the sole cause, or even the primary cause, of changes at the population, community, or ecosystem levels. This lack of evidence does not necessarily mean that entrainment and impingement losses are having no negative effects at the population and higher levels, but it does mean that for all existing facilities, environmental changes other than entrainment and impingement are implicated. An example is Brayton Point.

In addition to surface water withdrawal by cooling water intakes and discharges of heated water, fish populations may be stressed by habitat alteration (water pollution, dredging, coastal development, and other environmental stressors that have nearly eliminated eel grass in Mt. Hope Bay), overfishing, pollution (for example, Narragansett Bay and Mt. Hope Bay must assimilate high levels of industrially derived toxic pollutants, nutrients, and wastewater from the area's 33 wastewater treatment facilities), and weather patterns (for example, warmer winter water temperatures resulting in the loss of the usual winter-spring diatom bloom and perhaps contributing to increased predation rates by shrimp on larval winter flounder). In some situations, reductions in other stresses will complicate the interpretation of monitoring data. For example, substantial improvements in water quality and the ban on commercial and recreational fishing for striped bass have affected the fish population in the Hudson River.

EPA's one and only example of entrainment and impingement effects at the population level, the operation of the San Onofre Nuclear Generating Station, is misleading. While the observed decreased densities of two fish species within three kilometers of San Onofre, relative to densities in control areas, were likely due to operation of the facility, the fundamental problem was the effect of the thermal discharge on the kelp beds near the facility. The resulting reduction in suitable habitat for the two fish species was the primary cause of the observed spatial differences in densities.

In contrast, there are many studies showing that entrainment and impingement have not caused adverse impact. For example, a recent report of a 30-year study conducted by the Texas Commission on Environmental Quality examined two cooling water intake systems in the Houston Ship Channel.<FN 31> At one of the intakes, statistical analysis revealed an upward trend in total abundance, species richness, and diversity over 30 years, and no species demonstrated a statistically significant decline over the period of the study. The second intake also experienced an upward trend in diversity and no statistically significant change in species richness and abundance.

Similarly, studies conducted for the Connecticut Yankee power plant, situated on the Connecticut River, suggest little or no long-term impact from the plant's thirty years of operation. The Connecticut Yankee example provides a unique opportunity to assess the potential effects of long-term impingement and entrainment because its preoperational studies were thorough and well-documented. EPRI will finalize papers on the Connecticut Yankee case study in 2004.

Additionally, data on Lake Wheeler indicates no harm to the lake's biological communities from the long-term operation of Browns Ferry Nuclear (BFN) Station. BFN operates two units supported by six intake pumps with a rated total capacity of 2,312 MGD.<FN32> Although standing stock estimates for the reservoir exhibit extreme fluctuations, regression analysis revealed no significant increasing or decreasing trend for either total numbers (fish/hectare) or biomass (kg/ha) during the 30 years of monitoring. <FN 33>

In short, there is little or no evidence that impingement/entrainment losses occurring at power plants have had or are having any meaningful effect at the population level or any other level meaningful from a resource management perspective. While this does not mean that no effects would ever occur under any circumstances, or that controls on impingement or entrainment are wholly unnecessary, UWAG submits that it does suggest two things: (1) EPA's evaluation of non-use benefits is wildly inflated and wholly unrealistic and (2) no matter how much effort EPA applies, no credible, realistic estimate is likely to show that non-use benefits are significant enough to make a difference in the benefit-cost analysis. Thus, EPA would be fully justified in making no further effort to quantify them or include them in its analysis.

Such an approach is entirely consistent with the approach EPA has taken to estimating the more indirect economic and social costs of this rule, which EPA has only partially quantified and has largely excluded from its benefit-cost analysis. Costs such as aesthetic effects, increased land use, effects on navigation and instream habitat, water consumption, and a host of others are much more certain to occur than are the non-use values EPA has struggled so long to quantify. Yet EPA has concluded that, while they indisputably will occur, they are unlikely to be so widespread or significant that they will significantly influence the outcome. We suggest that non-use values (EPA's incredible and inflated estimates not to the contrary) fall into the same category. In fact, given the results of EPA's "break-even" analysis, which shows that non-use values would have to be 30 times use values in order to equal the costs of the rule (at least for the two regions EPA considered), we think EPA can safely assume that that margin would more than capture any plausible non-use value (and almost certainly significantly exceeds non-use values).

Footnotes

30 See Van Winkle Appendix to EPRI June 2003 Comments.

31 Texas Commission on environmental Quality 2003.

32 Bailey and Bulleit 2001

33 Id.

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion on environmental impacts associated with cooling water intake structures. This comment highlights a fact that EPA contends, that is, many environmental and anthropogenic factors work concurrently on the environment. It is extremely difficult to separate out any one factor to determine the extent of its effect on fish populations. The intention of section 316(b) of the Clean Water Act is to minimize the adverse environmental impact of cooling water intake structures specifically and does not seek to eliminate stress on fisheries due to habitat alteration, overfishing, or pollution. There are other sections of the Clean Water Act which seek to reduce other environmental stressors to improve fishing and swimming in the waters of the United States.

With regard to EPA's example of the environmental effects at the San Onofre Nuclear Generating Station. EPA thanks the commenter for the submission of their theory why the kelp beds have been destroyed in the vicinity of the facility. EPA has also received information that the destruction of the kelp beds has attributed to discharge turbidity and scouring. Mention of the kelp beds at San Onofre was removed from the text in the preamble to the final rule.

With regard to the issue of whether non-use values may exist at levels that merit any further consideration or empirical investigation, the Agency must respectfully disagree with the commenter's assertion that such values could not possibly be significant enough to potentially sway the outcome of a benefit-cost comparison or that, as a consequence, such values are not worth further consideration or investigative effort. First, there is a very large number of living organisms that are prematurely killed due to I&E, and the percentage that are directly embodied in the limited analysis the Agency has conducted of direct use benefits is very small (e.g., 2%). Thus, there is potential for a high ratio of non-use values to direct use values, based solely on the respective magnitudes of physical injury between total impacts and the portion embodied in direct use values (see, for example, the response to comment 316bEFR.336.009).

Second, the potential relevance and magnitude of non-use values remains an empirical matter. Experts and lay persons alike can and have hypothesized at great length on whether non-use values might or might not be applicable and significant for the 316b-related I&E injuries. In fact, the comments received by EPA reveal both sides of the argument very clearly -- some argue the values are likely to be appreciable, others (such as this commenter) argue that they think the values would not be high enough to matter in the policy-making context. Ultimately, these comments reflect speculation only, and the core issue remains an untested matter for empirical research. For further discussion of the approaches and constraints associated with conducting the type of empirical research that could shed light on this matter, please see response to comment 316bEFR.306.105.

Comment ID 316bEFR.307.063

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

As UWAG has said in its previous comments, the assessment of adverse environmental impact for § 316(b) purposes should be done by a structured ecological risk assessment process. See UWAG August 2002 Comments, at 26-27. This approach is also recommended in UWAG's "Decision Principles," which were first submitted to EPA as Appendix 1 to the August 2002 comments, and were submitted again in a revised, peer-reviewed version by letter of March 20, 2003.

EPA nevertheless focuses in the NODA on its performance standards, which are ranges of percentage reductions in impingement mortality and entrainment. The comments below focus on how those numerical ranges should be applied.

In the proposal and the NODA, EPA asks whether the performance data show that the performance standards can be met by existing facilities.<FN 34> UWAG has said that those standards probably can be met in many, but not all, cases if the performance standards are properly interpreted and applied. See UWAG August 2002 Comments, at 83. In fact, implementation issues are so important that, until they are addressed, most existing facilities cannot determine whether or how they would meet the standard.

As UWAG has stressed in its previous comments, selecting and operating entrainment and impingement controls and gauging their performance is not the same as meeting discharge limits for pollutants, and EPA has never attempted to treat them as the same. UWAG August 2002 Comments, Section III. Fish are not under the control of the NPDES permittee, and a permittee cannot choose which fish are around its plant and in what numbers. The variability of fish in waterbodies is likely to far exceed the variability of even the most complex effluent in most cases. To ensure the rule is fair and reasonable despite these complexities, EPA needs to address several distinct, but closely related questions:

- What purpose should the numeric performance standard serve?

- Must each performance standard range be reduced to a single performance value, or may the range itself be used?

- What is the performance standard meant to protect?

- What metrics should be used to evaluate technology performance? <FN 35>

- What are the design elements of the calculation baseline design, and how should the calculation baseline be used?

UWAG's August 2002 comments on the proposed rule addressed these issues in some detail in Section XIX. We continue to believe that the ideas we offered in those comments are sound.

Footnotes

34 Actually, EPA asks whether the data "support the determination that the proposed performance standards are best technology available and that the existing facilities can meet these standards by implementing design and construction technologies either singly or in conjunction with other design ad construction technologies (including operational and restoration measures)." 68 Fed. Reg. 13,539 col. 2. UWAG assumes, however that EPA means to ask whether the performance standards it has proposed accurately reflect the level of entrainment and impingement achievable by technologies it has identified as BTA candidates. Both 316(b) and the other CWA technology-based provisions clearly require that performance standards reflect the technology identified as the "best available," not vice versa. In addition UWAG asks EPA to clarify that it does not mean by this tatement to suggest that facilities can be required to undertake restoration measures or operational controls, neither of which EPA has authority to require under 316(b), because they are not CWIS intake technologies.

35 For reasons discussed above, we do not believe the purpose of post-installation monitoring should be assess "compliance" per se. Instead, we think compliance should be based on evaluation of whether the permittee adheres to a process, set forth in the permit, that requires completion of specific actions. As discussed later in these comments in the section on compliance, that same concept could be used to establish objective, enforceable, pre-installation process requirements for submitting a study plan, completing that study within a reasonable period after approval, submitting a BTA technology proposal for approval, and installing the technology after it has been approved.

EPA Response

Please see response to comments 316bEFR.307.064, 316bEFR.311.002, 316bEFR.063.005 and 316bEFR.029.040.

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.307.064

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

What purpose should the numeric performance standards serve? Should they be binding, enforceable "limits"? Or should the performance ranges instead serve as a consistent basis for setting permit conditions that require their use for purposes of (1) identifying a technology or technologies (or other measures) that will achieve the performance range (or an alternate range justified by the cost-cost or cost-benefit test) with appropriate operating and maintenance specifications adapted to the technology and the site; (2) installing, operating, and maintaining the chosen technology in accordance with the operating and maintenance specifications approved by the permit writer; (3) performing appropriate monitoring to gauge performance; and (4) refining or adjusting operation, maintenance, or other factors in light of initial monitoring.

UWAG's previous comments have said that the latter approach – using the standard to set enforceable permit conditions requiring the permittee to take stated actions, without making the numeric standards themselves enforceable – is the reasonable and efficient course. See UWAG August 2002 Comments, Section XVIII. The more rigid course, making the numeric standards enforceable per se, would be unwarranted for a number of reasons.

First, it would be inconsistent with EPA's own technology performance data, which show that the performance of any intake technology will vary at different sites and that it will vary over time even at a single site in response to widely varying biological, physical, and even chemical conditions in the waterbody. Unlike discharges of pollutants produced and controlled by a discharger, varying instream conditions, particularly the high natural variability of biological populations and communities, are not under the permittee's control, and the permittee cannot reasonably be expected to anticipate and adjust for such fluctuations. Technology performance varies over time in response to factors beyond the facility's control.

Second, the more rigid approach would have a number of undesirable consequences, which the less rigid, but no less enforceable, approach would avoid. The rigid approach would tend to stifle innovation, making facilities wary of pursuing promising new technologies for fear they will face enforcement action should the technology fail to work exactly as expected. A "performance-standard-as-enforceable-limit" approach also would require far more extensive and expensive data collection and analyses than EPA has projected, as facilities are likely to need to collect more data to hedge against variability that might suggest noncompliance in spite of overall good technology performance. And the rigid approach would lead to far greater administrative burdens and delays, as permittees and permit writers debate exactly what is the "right" number to pick and belabor exactly how to measure it. These resources would be much better spent evaluating, refining, and optimizing technologies for fish protection.

The more rigid approach also would be inconsistent with EPA's approach for facilities having recirculating cooling systems. EPA's proposal properly does not require facilities having or proposing to install cooling towers to show that they meet any given level of entrainment or impingement reduction vis-à-vis a baseline. EPA should not require appreciably more of other facilities than it requires of those with recirculating cooling systems.

In the NODA section addressing compliance schedules, deadlines, and determinations (68 Fed. Reg. 13,586 col. 2), EPA notes that commenters have described the difficulty of ensuring uniform “performance” and have suggested the need for a “shakedown” period before the performance standard becomes enforceable. Certainly if the performance standard itself will serve as an enforceable limit or condition, such a period is essential, for the reasons UWAG has described. And if EPA decides that it has no choice but to go this route, then we believe that EPA should provide for a period at least as long as the initial permit term and should make that period renewable for cause. While some might argue for a shorter period, when one considers the time it will take to complete the initial demonstration process, install the technology, and get data over a representative time period, five years seems, if anything, too short a time.

In any case, for all the reasons described above, UWAG believes that a far more straightforward and reasonable course would be for EPA to specify that the performance standard is not enforceable. Rather it should be used in the process of technology selection, and once the technology is installed, it should serve as the basis for evaluation and, if necessary, further action. This approach is supported both by regulatory precedent and current technological and biological realities.

EPA Response

EPA has provided examples of facilities in different areas of the country sited on different waterbody types that are currently meeting or exceeding the performance standards promulgated today. The ability of these facilities to do so suggests that while site-specific factors can influence the performance of a given technology, it is the exceptional situation where no design or construction technology is capable of meeting the performance standards. EPA opted for performance ranges instead of specific compliance thresholds to allow both the permittee and the permitting authority a certain degree of flexibility in meeting the obligations under the final Phase II rule. Further, EPA recognizes that precise results may not be able to replicated in different waterbody types in different areas of the country. Methods of determining compliance with today's rule are left to the permitting authority who may, for example, authorize the use of a Technology Installation and Operation Plan. See also response to comment 316bEFR.063.005.

Comment ID 316bEFR.307.065

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

Must Each Performance Standard Range Be Reduced to a Single Performance Value, or May the Range Itself Be Used?

Even if EPA applies the performance standard within the process-based approach that UWAG endorses, it will need to explain whether the "BTA" technology must be designed to meet a selected value within the performance range or whether it is sufficient for the permit to present a reasonable amount of information showing that the current or proposed technology will reduce impingement or entrainment to within the performance range (or an alternative range established pursuant to the site-specific provisions of the rule). Again, UWAG believes that the available data, as well as administrative efficiency, support the latter course. As noted above, selecting just one perfect number is extremely difficult and is likely to engender endless debate for little or no environmental gain.

EPA Response

Please see response to comment 316bEFR.307.064.

Comment ID 316bEFR.307.066

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.02

Performance standards

What is the performance standard meant to protect?

What is the performance standard meant to protect? The proposed rule speaks of "all life stages of fish and shellfish," but the NODA properly suggests that EPA did not intend to require the standards to apply equally to all life stages, all species, or each life stage of each species. In other words, the performance standard is not meant to require a permittee to show that its chosen technology reduces entrainment or impingement to a percentage within the performance range for each species, for each life stage, or for each species/life stage combination. That EPA does not intend to require this is apparent from the NODA discussion of two possible metrics for evaluating technology performance. Both approaches contemplate that organisms would be measured, either individually or as biomass, without taxonomic measurement or differentiation.<FN 36> See 68 Fed. Reg. 13,582. This makes good sense, especially given that the technology database shows that there are no technologies that could meet the performance targets for all species, much less for all life stages of all species. Even cooling towers, as we have said, would not achieve that result, nor would they be either environmentally necessary or desirable.

Footnotes

36 Requiring the facility to demonstrate a percent reduction in impingement mortality and enrainment for every species would require the permittee to adjust the entrainment and impingement samples to account for interyear variability. Doing this for every species would be impractical. Ineryear variability sampling generally will not cover all species, because some gear types are designed for benthic species, others for pelagic species, and others for nearshore species, and in addition different gear varies in effectiveness for different size classes. Facilities would have to use every gear type for each species or size class, and the rule would be unworkable.

EPA Response

EPA believes that the performance standards in today's final rule will achieve an acceptable level of protection for the source waterbody. In recognition of the difficulty in establishing a uniform means of measuring compliance with these standards, today's final rule defers to the Director to determine the most appropriate means by which compliance with the rule is to be measured. The Director is therefore best suited to make such a determination. See also response to comment 316bEFR.063.005.

Comment ID 316bEFR.307.067

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.0

Impingement and Entrainment Assessments

UWAG also urges EPA to clarify that permittees are not required to achieve any reduction in entrainment or impingement of species that have been formally or informally classified by the state or federal agency as "nuisance" species or otherwise have been targeted for control or eradication. EPA and states have identified the proliferation of such species as a major threat to aquatic ecosystems, and in some places millions of dollars are being spent to control the spread of such species. See EPA, Nonindigenous Species – An Emerging Issue for the EPA, Vol. 2: A Landscape in Transition: Effects of Invasive Species on Ecosystems, Human Health, and EPA Goals (2001). Requiring facilities to protect such species from impingement and entrainment would be the opposite of minimizing adverse environmental impact. While care would need to be taken to avoid penalizing facilities that have such organisms in their baseline by simply eliminating them from the baseline, UWAG believes that appropriate analyses could be conducted to ensure that facilities are not required to protect nuisance species.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

for purposes of measuring technology performance, what metrics should we use? Should the permittee collect and evaluate "all species," or should it collect and evaluate only representative important species, which if properly selected can serve as an appropriate proxy for any other species that might be entrained or impinged? Under what circumstances might it be appropriate to identify the species and life stages of organisms collected for evaluation, even if all the impinged or entrained organisms are later aggregated, as EPA suggests it intends (see 68 Fed. Reg. 13,582 col. 1)? And is performance best evaluated by looking at individuals or at biomass?

UWAG believes there is no single metric or measurement system that can or should be used for all cases. Both the endpoint (i.e., numbers or biomass, or
representative species or all species) and the period over which those data should be reviewed depend on a number of factors. These include the following:

- whether one is assessing impingement, entrainment, or both;

- what types of data already exist;

- what species and life stages are most likely to be affected; and

- what techniques will be used to achieve the standard (i.e., restoration measures vs. hardware).

Because of the complexity of applying the performance standards at different sites, UWAG urges EPA to make the rule flexible enough to allow several different approaches to these questions.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.069

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.0

Impingement and Entrainment Assessments

In the NODA, EPA asks whether it should allow permittees to evaluate technology performance by measuring entrainment or impingement of "representative species." UWAG has said consistently that we believe a representative species evaluation will be the most practical approach in many cases. Many § 316(b) studies using representative species have been done. This approach has worked well by providing a focus for evaluating technologies that could be designed with particular species in mind.

Even with representative species, though, it is important to use a composite measure of compliance instead of requiring a numeric reduction in entrainment or impingement mortality for each and every representative species. Especially when a representative species is relatively uncommon, it may be hard to achieve the same percentage reduction that can be achieved for species that are more abundant or hardier. EPA should use a holistic measure of compliance that does not unduly focus on a single taxon.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.070

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.0

Impingement and Entrainment Assessments

EPA also has asked how "representative species" should be identified, and what term should be used. 68 Fed. Reg. 13,582-83. UWAG has outlined principles for identifying "Representative Indicator Species" or "RIS" in a paper entitled "UWAG's Proposed Decision Principles for Applying § 316(b) to Existing Facilities," which EPRI peer-reviewers have endorsed (Bailey 2003). UWAG has submitted that document and the peer review to EPA. We believe that the principles for identifying representative species that we have outlined there remain valid, and we encourage EPA to use them as the basis for any rule or guidance on representative species.

As to the appropriate term to be applied, if EPA is concerned that the term "representative indicator species" will be confused with the term "representative important species" (a term used in the § 316(a) context), then we suggest EPA simply use the term "representative species" with appropriate definition. This term has not been used previously and therefore will avoid confusion about the relationship between term and terms (like "critical aquatic organisms") used in the past. <FN 37>

EPA has suggested a large number of representative species (15). This number should be much smaller in most cases. At some plants, four or five species make up over 95% of impingement or entrainment numbers. A demonstration should focus on the four or five species and add to the list only if there is another species of special concern.

Footnotes

37 EPA used six criteria for critical aquatic organisms in its 1977 draft 316(b) guidance, but UWAG believes that all six are captured in the following four categories:

- Commercial and recreational importance

- Federal or state threatened or endangered or specially designated species;

- Importance in local ecological community structure and function; and

- Species and life stage vulnerability

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.071

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.0

Impingement and Entrainment Assessments

There are circumstances in which an "all species" approach can make compliance demonstrations simpler and somewhat less expensive so long as the taxonomic identity of collected organisms is not required. Thus, this approach would not be suitable for use in cases where taxonomic identification is needed (e.g., where eggs and larval stages are converted to Age-1 equivalents).

The all species approach might well be used for those technologies that EPA approves in advance under prescribed conditions, such as wedge wire screens, as EPA proposes in the NODA. If the technology can be demonstrated to be highly effective under conditions at the facility (e.g., the facility is situated on a river where the flow velocity is high enough to carry organisms past a wedge wire screen), a case can be made that intensive performance monitoring on a species-specific basis is not warranted. Similarly, if a facility uses a prototype aquatic filter barrier or wedge wire screen and demonstrates that it is highly effective at the site, then species-specific performance monitoring may not be necessary after the full-scale technology is installed.

Measuring either biomass or total undifferentiated numbers of organisms for all species, instead of identifying individual species, would also be appropriate if certain restoration options were used. If wetland restoration is used, for example, then monitoring entrainment of total biomass would allow comparison with the biomass contributed by the wetland.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.072

Subject Matter Code 12.0

Impingement and Entrainment Assessments

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Measuring Organisms by Counting Their Numbers

If the number of organisms is counted, the very early lifestages (eggs and prolarvae) will dominate the numbers and therefore dominate the compliance determination, even though most of them would have suffered enormous natural mortality losses even without entrainment. The appropriate way to address this is by identifying entrainable organisms to genus, family, or species and using appropriate life history data, where available, to convert those life stages to a common unit, such as equivalent juveniles, so that each lifestage is appropriately weighted. In such cases the results of those calculations will need to be aggregated and the total number used for any comparison.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.073

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 12.0

Impingement and Entrainment Assessments

Measuring Organisms by Biomass

For biomass, the numbers will be dominated by later larval stages even though the number of these organisms per unit weight will be small compared to eggs and larvae. Again, one way to deal with this would be to convert to a common unit, such as equivalent juveniles. This would make sense for forage fish, where biomass is an appropriate measure of the organisms as a food source for commercial and recreationally important species. If biomass was used to measure forage species, numbers still could be counted for commercial and recreational representative species.

For many species, identification is possible for eggs or very early lifestages only at the genus or family level. Comparisons might best be based on genus or family for these early lifestages. As a practical matter, it is probably better to count these lifestages and convert the numbers to biomass based on values from the literature, rather than to collect eggs and weigh them.

As noted above, if the restoration option is used, it makes sense to use total biomass as the measure. There will almost never be a one-for-one species-for-species compensation when habitat restoration is used. If a permittee chooses to restore a wetland or other habitat, the appropriate measure is to determine total biomass produced by the enhanced habitat.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.307.074

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.04

Determination of compliance

Averaging Period for Performance Evaluation

In its comments on the proposal, UWAG stressed that any performance evaluation should allow for appropriate averaging periods over which to review data and assess performance. EPA has requested additional comment on this topic, offering several possibilities: (1) a one-year average, (2) a three-year average, (3) a five-year running average, (4) use of basic arithmetic means, and (5) leaving the decision to the permit writer. 68 Fed. Reg. 13,584 col. 1.

Of these options, UWAG believes that only the last – allowing averaging periods to be set case-by-case – is really feasible. As with the other issues discussed above, the appropriate averaging period depends on site-specific characteristics, including the characteristics of the species in question and the nature and extent of existing data that can be used to adjust data collected in the future. UWAG believes that the rule should direct the permit writer to set an appropriate averaging period as necessary to account for variability, but EPA should not specify an averaging period for all cases.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027.

Comment ID 316bEFR.307.075

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.01

Submittal of required information

EPA also requests comment on whether to use data collected at other locations. 68 Fed. Reg. 13,581 col. 3. In its previous comments, UWAG said that EPA should let permittees use data from other sites, albeit with appropriate analysis of the data and the conditions at the collection site to ensure that conditions are comparable and that the information is relevant to the permittee's site.

UWAG recognizes that site-specific circumstances can complicate analysis of data from other sites, as other commenters apparently have pointed out. This does not mean, however, that data from other sites with similar characteristics necessarily are irrelevant. Such data can be used to make initial judgments about the likely presence or absence of species and life stages at different times of year, to make judgments about population variability and year class strength for various species, and to assess likely reactions of motile organisms to different intake configurations. Thus, UWAG believes EPA should allow use of such data.

EPA Response

EPA agrees with the commenter and notes that the definition of calculation baseline in 125.93 allows a facility to estimate the calculation baseline using historical impingement and entrainment data from its facility or another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of the cooling water intake structure; or current impingement mortality and entrainment data collected at it's facility.

Comment ID 316bEFR.307.076

Subject Matter Code 21.04
Determination of compliance

Author Name David E. Bailey
Organization Hunton & Williams obo Utility Water Act Group

What Are the Appropriate Elements of the Calculation Baseline Design, and How Should the Calculation Baseline Be Used?

The proposed performance standards are percentage reductions from a “baseline.” Determining an appropriate “baseline” is therefore important and deserves just as much attention as do the performance numbers themselves. One cannot evaluate the achievability or cost of meeting the performance standards without understanding how they will be interpreted and measured against the baseline.

Approaches for Defining the Calculation Baseline Design

The NODA requests comments on two approaches to defining the calculation baseline design: (1) a standardized baseline design and (2) the “As Built” approach. Following are UWAG’s comments on each.

EPA’s Baseline Design

In the NODA, EPA offers additional details to define the baseline configuration, which it says provides facilities “a consistent basis for determining compliance and allows them to take credit for fish protection technologies already in place.” 68 Fed. Reg. 13,580 col. 2. In effect, the baseline design serves as a typical design for facilities that have not used locational strategies, technologies, or operational measures to reduce impingement mortality or entrainment. See 68 Fed. Reg. 13,580-81.

As in the proposal, EPA defines the “baseline” intake structure as located at the shoreline with a screen face parallel to the shoreline. This is appropriate in most cases, though there may be facilities for which it is not representative. In the NODA, EPA appropriately notes that, in cases where this configuration does not represent the worst case, it is appropriate to allow a different baseline configuration to avoid making the control requirements, in effect, more stringent. UWAG agrees that this flexibility is necessary.

The NODA clarifies that EPA conceives the baseline structure to have a traveling screen with a standard 3/8-inch mesh. This is an appropriate description of the typical intake structure.

EPA defines “baseline practices and procedures” as those that the facility would maintain in the absence of operational controls that are, in whole or in part, for the purpose of reducing impingement mortality and entrainment. It would be better to define the baseline as full-flow operation. EPA’s definition, which requires determining the “purpose” of operating practices, will cause disputes. For example, some plants in the northern United States operate at reduced flows during the winter months. The reduced flows are operationally efficient because they eliminate subcooling of the condensate and reduce auxiliary power requirements or prevent ice damage. But they also may reduce impingement. If impingement reduction was part of the “purpose” of reducing the flow, then the baseline condition would be full flow. If impingement reduction was only incidental, then the reduced flow would be the baseline. Much confusion will be avoided if EPA defines the baseline as full-flow operation, and UWAG recommends this.

UWAG also recommends that EPA clarify that "operational" changes may include flow reductions that occur as a result of a permittee's decision to repower or replace units or any other change that can be shown to have reduced impingement or entrainment mortality, regardless of the reasons for that decision. A clarification would encourage such changes.

Another source of confusion with the proposed "baseline" comes from the scheduling of maintenance outages. When a plant is shut down for maintenance, entrainment and impingement may be reduced while the cooling water pumps are out of service. If a plant typically scheduled its outages at a time of high entrainment by chance, and not with the purpose of reducing entrainment, then its "baseline" would include an outage at that time. This would lock the plant into the same maintenance schedule in the future, reducing flexibility for future operations. In contrast, if the station had scheduled its outages purposefully to coincide with high entrainment periods, the reduction would not be part of the baseline. Again, this confusion can be eliminated by defining the baseline as full flow and full operation, the operational practices that would be used if § 316(b) were not considered at all. This also avoids a continually changing baseline as maintenance and operational schedules change over time.

In short, a baseline that reflects unrestricted operation at full design capacity will provide a relatively easy-to-calculate, fair baseline that will allow the performance standards to be applied uniformly at all plants. The baseline should be defined as year-round operation at maximum design capacity.

In the same vein, EPA should clarify that the baseline configuration (which is intended to reflect the "worst case") has no entrainment or impingement survival and assumes that all fish were alive, not already dead or moribund, before they were impinged. EPA's assessment of the impacts from once-through systems and its estimates of the benefits of different technologies are based on the assumptions (1) that there is no entrainment or impingement survival and (2) that all fish are alive and healthy at the time they are impinged. To be consistent, EPA's baseline should make the same assumptions. This will both simplify the baseline and performance evaluations and allow permittees to take credit for the efforts they already have made to improve survival of healthy organisms that are entrained and impinged. These same assumptions would apply both to any baseline calculation used to select a technology in the first place and then to any "as built" assessment of performance as the facility operates.

For purposes of performance evaluation, however, UWAG agrees with EPA's proposal to allow facilities to show that impinged organisms may have been dead or moribund before they reached the intake structure and to omit them from impingement calculations. Fish kills caused by natural waterbody conditions are a common occurrence. In March 2003, the Michigan Department of Natural Resources issued a press release reminding residents to expect fish kills in many lakes throughout the state, and noting that spring fish kills are most often naturally caused by the weather shift from a long, cold winter to above normal spring-like temperatures. Michigan DNR Web Page, "Fish kills expected statewide," March 20, 2003 (Michigan DNR at http:www.michigan.gov/dnr/0,1607,7-153-10371_10402-63902--M_2003_3,00.html). Another DNR web page explains how natural fish kills can occur in winter, spring, and summer. Michigan DNR Web Page, "Fish Kills," (Michigan DNR at http://www.michigan.gov/dnr/ 0,1607,7-153-10364_10951_18964-45765--,00.html). Similarly, in February 2001 the Illinois Department of Natural Resources reported that "minor to extensive fish kills" had occurred on lakes and ponds throughout northern and central Illinois, and that fisheries biologists blamed "[t]hick ice and heavy snow cover on many ponds and lakes . . . result[ing] in dissolved oxygen levels in the water being too low for many fish to survive." Illinois DNR Web Page (http://dnr.state.il.us/pubaffairs/2001/Feb/2001Feb22wpd.htm).

UWAG concurs with EPA's definition of "moribund" (68 Fed. Reg. 13,583) and believes that this definition, combined with established methods for assessing the condition of organisms, <FN 38> will improve the rule.

Footnotes

38 UWAG suggests that dead or moribund organisms can be distinguished from organisms harmed by the intake structure by using fisheries management data evaluating well established seasonal die-off rates, looking for symptoms of advanced disease likely to lead to death, and other methods discussed in the literature.

EPA Response

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013 and EPA's definition of calculation baseline at § 125.93, along with the accompanying preamble text. For EPA's position on the factoring of naturally dead or moribund organisms, please see EPA's response to comment 316bEFR.306.116.

EPA agrees that operational changes may include flow reductions that occur as a result of a permittee's decision to repower or replace units or any other change that can be shown to have reduced impingement or entrainment mortality, regardless of the reasons for that decision.

Comment ID 316bEFR.307.077

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.04

Determination of compliance

EPA requests comment on the “As Built” approach. For entrainment, the As Built approach would determine the baseline either by using historical measurements of entrained organisms before a new intake technology was installed or by sampling immediately in front of the new technology and counting the organisms small enough to pass through a standard 3/8-inch screen. To determine entrainment reduction, the facility would sample and count (or weigh) entrained organisms behind the new technology or at the outfall.

UWAG believes the “As Built” approach is reasonable at those facilities where the efficacy of a technology can be assessed by directly measuring entrainment or impingement or both. Such an approach would help to simplify assessment and increase accuracy in instances where no credit is being sought, where the facility does not have the baseline condition, or where the facility can reduce the potential for error associated with inter-annual variability or other factors (such as gear changes or changes in sampling location) by evaluating technology performance within a given year.

EPA Response

EPA agrees that the “As-Built” approach is an acceptable method for establishing the calculation baseline. Therefore, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline (see EPA’s definition of calculation baseline at § 125.93).

Comment ID 316bEFR.307.078

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.04

Determination of compliance

EPA itself defines the baseline calculation as an estimate of impingement mortality and entrainment. As UWAG has said in past comments, the biological variability over hours, days, months, seasons, years, and generations makes the baseline only an estimate, and indeed one bounded by large confidence intervals. It would be irrational to make this rough estimate into a precise numerical legal requirement that permittees must meet in all circumstances.

Although providing further details on the baseline configuration will help to make the rule clearer and more workable, a number of important implementation issues remain. Under the current proposal, the calculation baseline plays an essential role both in selecting the intake technology initially and in determining whether it is performing. As EPA explained in its proposal, the calculation baseline is the means by which facilities that already have installed technologies or made other adjustments to reduce impingement and entrainment will be given credit for those controls. In fact, for some BTA control options, the calculation baseline may offer the most accurate means of capturing the benefits of the existing or future controls.

While having a standardized "baseline" intake configuration is important, the natural tendency of fish populations and communities to vary over time, and indeed to vary widely, makes it difficult to assess technology performance by comparing contemporary entrainment and impingement data with a calculation baseline established using data from the past. This will be true no matter what "metric" (individual or biomass, RIS or all species) is used to gauge performance. And it is by no means clear that the difficulty could be resolved even if there were a large initial baseline database (which there will not be in many cases) and even if entrainment and impingement data were collected over a long-enough period going forward.<FN 39> Even if Phase II facilities that use cooling towers were to measure entrainment and impingement over time, those results would vary widely year to year, even though the make-up flows remained stable. The same would be true for other technologies. Therefore, while UWAG believes that there will be circumstances in which the permittee should use historical baseline data to set the baseline, EPA should make it clear that this is not required. Instead, the baseline design assumptions (as opposed to historical baseline data) should be allowed as the basis for comparison.

To illustrate this point, suppose that a facility on a freshwater river determines that it can install a fish handling system that increases the survival of impinged organisms by 80% on average, based on the performance of such systems at other sites. To show compliance, it should be sufficient simply to monitor impingement survival going forward and compare it to a baseline configuration in which no fish handling is used and impingement mortality is 100%. This approach would be both straightforward and consistent with EPA's assumptions.

By contrast, there will be situations in which it makes sense to use available baseline data both to determine BTA initially and to evaluate its performance after it is installed. For example, where the BTA technology (particularly for impingement control) involves fish diversion (a barrier net or aquatic filter barrier) or a behavioral deterrent (as opposed to a handling and collection device to improve survival), it may be better to compare impingement rates with the technology in place to impingement rates before the technology was installed. As UWAG explained in its comments on the proposed rule, the difficulty of accurately sampling the subset of impingeable-sized organisms that would have been impinged but for the diversion or deterrent would make this type of comparison more efficient and accurate in some cases. This is especially true where (1) the facility has collected impingement (and, ideally, population) data long enough to allow it to conduct statistical analyses to account for natural variability and (2) evaluation of performance data going forward allows for analysis of data over an appropriate averaging period, using appropriate statistical techniques.

It is apparent that one of the key issues facilities will face is the issue of evaluating performance in the context of large inter-annual population fluctuations. For some situations (for instance, where a barrier net has been deployed to reduce impingement), this will require comparisons before and after net deployment and use of some measure to adjust for the relative abundance of the population year-to-year. In other situations, by contrast, it may be possible to avoid the need for such adjustments by evaluating technology performance within a given year. For instance, where an aquatic filter barrier is used to reduce entrainment, the facility could measure the density of eggs and larvae inside and outside the barrier.

In fact, in every case the right structure for the performance evaluation will depend on a number of factors, including the following:

- what is the nature and extent of existing impingement or entrainment or both;

- whether the assessment is for impingeable or entrainable organisms;

- whether the technology consists of collection systems, diversions, behavioral barriers, location changes, or flow changes;

- whether the facility has data to establish the baseline configuration; and

- whether the facility proposes to use restoration or request alternative limits based on the benefit-cost test.

UWAG does not believe there is any single, simple approach suitable for all performance evaluations. Instead, for the reasons illustrated above and discussed in our comments on the proposed rule, UWAG believes it is essential that EPA expressly give permittees and permit writers flexibility to develop appropriate site-specific performance evaluation requirements that consider these and other relevant factors. As one element of this approach, we believe it is important that EPA distinguish between the use of the calculation baseline for predictive purposes (i.e., for evaluating technologies and demonstrating that selected technologies will achieve reductions within the performance standard range and thus are BTA) versus the use of historical baseline data to evaluate technology performance going forward.

Footnotes

39 In any case, given the cost of entrainment and impingement sampling and analysis, we do not believe that extended monitoring requirements would be economically practicable or environmentally warranted. Such monitoring would be of little assistance in improving technology performance and ensuring better fish protection, which should be its main purpose. As UWAG said in Section XIX.E. of its August 2002 Comments, the most appropriate way to ensure compliance would be

to require the permittee to install one of the selected technologies and then monitor simply to be sure that it is being maintained and operated correctly.

EPA Response

EPA agrees that historical data may not be appropriate in all cases for determining a facility's calculation baseline. As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional detail please see EPA's response to comment 316bEFR.034.013. EPA also acknowledges that populations will experience natural variations in abundance over the course of a year. Please see EPA's response to comment 316bEFR.034.017 for EPA's position on episodic impingement mortality and entrainment episodes due to natural conditions and other factors and EPA's decision to authorize the use of TIOPs. Finally, EPA agrees that a single approach for evaluating performance is not appropriate. In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

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Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Timelines, Schedules, and Determination

The NODA raises several questions about the time for complying with the new rule, once it becomes final (Section C, "Compliance Timelines, Schedules, and Determination," 68 Fed. Reg. 13,584-86).

First, EPA says it is considering options that would require full compliance with the rule after the effective date, to the extent the best technologies will not be available immediately after promulgation of the final rule. Id. at 13,584 col. 2. EPA observes, correctly, that the nature of this regulation is such that facilities may need to test and verify the efficacy of the technology option that they choose. EPA requests comment on this approach.

We are advised that NPDES permits issued by some states say something like "the permittee will comply with the schedules and requirements of EPA's 316(b) regulations." States using such language seem to anticipate that EPA will resolve the issue of when the requirements become enforceable by including "schedules" in the regulation. Otherwise, permit language of this sort will leave everyone in doubt. Thus, the timing of compliance needs to be clarified in the rule itself, or else permit writers need to be directed to include in individual permits reasonable schedules that make the § 316(b) permit requirements enforceable in the future after sufficient time for coming into compliance.

In order to fulfill their duty to provide electric power, power companies must be able to (1) forecast necessary expenses for budgeting purposes, (2) forecast needs for personnel resource allocation planning and scheduling, and (3) coordinate intake modification construction with scheduled outages. These issues are critical not only for business practices but for successful compliance with the § 316(b) regulation. Consequently, EPA must structure the § 316(b) compliance requirements so that the industry has the time to complete these activities.

A worst-case timeline for complying with the regulation may take up to five years, once regulatory agency approval time is factored into the process. The compliance timeline must take this into consideration.

EPA has requested comment on the CAFO (concentrated animal feeding operation) approach. The CAFO approach (apart from the NPDES administrative requirements) requires that all CAFOs develop and implement a nutrient management plan by December 31, 2006, and that large CAFOs comply with the effluent guideline requirement (land application area) by the same date (68 Fed. Reg. 7,184). Since the rule was published February 12, 2003, this provides a compliance time of almost four years. A four-year period is inadequate for successful compliance with the § 316(b) rule, because as much as 4-5 years might be needed for studies and construction and because there will be a shortage of consulting and field resources if the entire industry crowds in compliance activities at the same time. Consequently, the CAFO time is too short for § 316(b) efforts unless the final compliance date is set as late as 2012.

For more recent effluent guidelines, <FN 40> EPA has simply stated that existing dischargers must comply with limitations as soon as such requirements are imposed in their NPDES permits, without addressing the schedule in detail. Apparently, this has allowed permittees and the permitting agencies to work out a permitting schedule that makes allowance for the time needed to achieve compliance. EPA should consider these precedents in addressing compliance with the § 316(b) rule.

Footnotes

40 Coal Mining Category, Final Rule, Jan. 23, 2002 (67 Fed. Reg. 3,370); Iron and Steel Manufacturing Category, Final Rule, Oct. 17, 2002 (67 Fed. Reg. 64,216); Centralized Waste Treatment Category, Final Rule, Dec. 22, 2000 (65 Fed. Reg. 81,242); and Pulp, Paper, and Paperboard Category, Final Rule, April 15, 1998 (63 Fed. Reg. 18,505).

EPA Response

See response to comment 316bEFR.025.019.

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Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Time for Facilities to Comply with the Rule Once the State Program Is Updated

Whether it is done by specifying a schedule as part of the rule itself or by directing permit writers to write reasonable future compliance dates into permits, it is essential that the requirements of the rule be phased in over time. Making new requirements immediately enforceable would violate due process of law and probably cause endless disputes.

The key is not to write a rule that puts permittees in “violation” as soon as the rule becomes final or shortly thereafter. It will not be sufficient to make the rule immediately effective and then offer a “compliance schedule” as a matter of agency discretion. The rule would invite legal challenge if it was structured so that companies were technically in violation of the law for a period of time before they were able to install new intake technologies. Much of this problem could be avoided by careful drafting. EPA must take care not to allow anyone, including citizen plaintiffs, to claim that there is a period of “noncompliance” or “violation” simply because there is an unavoidable need for time to do biological sampling and to choose the best technology, design it, implement it, and test it.

UWAG addressed this issue in Section XIX of its August 2002 Comments. We will not repeat those comments here, but they are as pertinent now as they were in 2002. UWAG’s proposal was summarized in a timeline as follows:

(See Graph on pg 78)

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.307.081

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Time for the State to Adopt the New Federal Rule or Demonstrate Existing Program is Comparable

The above schedule does not account for time for the state to promulgate a state regulation consistent with the new EPA rule, or to demonstrate, as provided in proposed § 125.90(d), that the existing state program will produce environmental benefits that are comparable to the rule's performance standards. Every state will have to create a regulation to implement the new federal rule or demonstrate the comparability of its program. In some cases a state may even need to have its legislature enact a statute.

The state then will have to submit its § 316(b) regulation or program demonstration to EPA for approval. For new regulations, EPA approval would presumably be handled under 40 C.F.R. 123.62. If EPA determines that the proposed program revision is "substantial," it will have to give at least 30 days' notice to the public, followed by EPA approval.

EPA must decide whether the schedule for phasing in compliance with the new rule should begin immediately when the federal rule is promulgated or whether it should wait until the state has revised its own permit program or secured EPA approval of its existing § 316(b) program. If the latter, then the schedule must begin with at least a six-month period to allow the state to enact the necessary regulation and to get EPA approval. Indeed, almost certainly more than six months will be needed.

If, on the other hand, EPA wishes to begin phasing in the new § 316(b) requirements immediately, then the federal rule must be written so as to address permit renewal applications that are submitted before the state has enacted its § 316(b) regulation.

In light of the 30 years that have already passed while § 316(b) was applied case-by-case without significant damage to the environment, it would seem that EPA can afford to proceed in an orderly fashion and begin the phase-in process several months after the federal rule becomes final. Unless this initial period for the states to change their law is more than a year, however, there will be some states (especially if there are any that must enact statutes) that will require more time. Some provision must be made for these states as well.

There is no great danger in allowing a long period before the regulation goes into effect, because all that would happen during that period would be the same process, the case-by-case application of § 316(b), that has, in our view, worked well enough for the past 30 years.

EPA Response

Irrespective of today's rule, NPDES permits must contain requirements consistent with § 316(b). See 40 C.F.R. § 401.14. Today's amendment to Part 125 establishes specific § 316(b) requirements for certain existing facilities within its scope. Permits issued by States for cooling water intake structures must comply with the requirements of today's rule in conformity with the timeframes specified in the rule. Today's rule authorizes the Director to establish a schedule for the submission of certain studies required by today's rule. EPA created this authority to account for the fact that some NPDES permits would expire – and applications would need to be filed under Part 122 – prior to the time when the studies required under today's rule would be complete. EPA intends that this provision addresses the concerns raised by the commenter.

EPA is aware that States may need to make statutory or regulatory revisions to reflect the requirements of today's regulations in their own State law. However, the requirements of the Clean Water Act and EPA's regulations implementing it must be incorporated into NPDES permits under federal law, so such revisions are not a necessary pre-condition to State implementation of today's regulations.

Comment ID 316bEFR.307.082

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Time for All Parties to Properly Implement the Rule

Regulators and permittees alike will benefit from an explicit, phased-in compliance period. States will benefit because they will have time to promulgate regulations or demonstrate the efficacy of existing programs. States also will benefit because the burden of implementing § 316(b) will be distributed across several years. EPA will benefit because it will have time to better assess technologies (e.g., through its ongoing wedge wire screen studies) and to develop much-needed § 316(b) implementation guidance.

Facilities will benefit because they will have adequate access to experts and vendors familiar with § 316(b) issues and technologies. At present, only a handful of consultants have the range of disciplines required (biology, statistics, engineering, and economics) and the experience to manage a comprehensive § 316(b) demonstration. Without phased-in compliance, the demand for such consulting services will quickly outstrip the supply. Furthermore, vendors and consultants are not likely to invest in equipment and employee development and training if all the available work will be completed in a single five-year span. A phased-in approach to compliance, however, would provide an incentive for better long-term staffing plans and development of new and improved technologies.

Finally, phased-in compliance will allow companies with multiple facilities to plan and budget for capital expenditures needed to comply with the rule. UWAG surveyed its members to determine how each facility will deal with the burdens of complying with the rule. Out of 178 responding facilities, 45 (about 25%) reported that they expect to perform both biological and engineering studies to support a § 316(b) determination. Another 42 reported that they had not yet developed a plan for compliance with the rule. And 20 expect that, in addition to any biological or engineering studies, they will need to resort to either the cost-cost test or cost-benefit test and therefore will have to develop economic information. It is clear, even from this informal survey, that the analytical work required for § 316(b) decisions will take considerable time and effort on the part of the permittee. Thus, it makes sense to phase in compliance over a number of years.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.307.083

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subsequent Permit Renewals

As UWAG said in Section XX of its August 2002 Comments, the analysis of BTA for a facility should not have to be redone every time the permit is renewed. Once a successful § 316(b) demonstration is made, maintaining and operating the technology for the life of the plant should be enough. At a minimum, there should be no reconsideration for at least ten years, unless there is evidence that conditions have so changed that the aquatic community is threatened.

Another way to put it is that, after a successful demonstration of compliance with EPA's performance standards, at each later permit renewal the permit writer should accept the initial demonstration, unless there have been significant changes in plant operations or material adverse changes to the aquatic populations. This has been EPA's position, as reflected in guidance issued by EPA's Office of General Counsel to the regions over 20 years ago (Cooper 1982). Conservation of scarce administrative resources (which EPA claims is essential) and practicality weigh in favor of retaining that policy.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. See response to comment 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.307.084

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 16.0

Capacity Utilization

Determining Capacity Utilization Rates (68 Fed. Reg. 13,586)

In the proposed rule, a facility with a "capacity utilization rate" of less than 15% does not have to meet the performance standard for reducing entrainment. The proposed rule defined capacity utilization based on the generating capacity of the entire facility, including both steam electric and non-steam generators. EPA now is considering defining capacity utilization based on only the steam electric part of a facility, because only the steam electric generators use cooling water.

The Definition Should be Limited to the Steam Electric Part of the Facility

UWAG supports this change. Because the definition of capacity utilization rate is intended to identify facilities with large inflows of cooling water, the definition should focus on the part of the facility that uses cooling water. UWAG therefore agrees with the "steam electric part" of EPA's new proposed definition of capacity utilization rate, which reads in full as follows:

Capacity utilization rate means the ratio between the average annual net generation of the steam electric part of a facility (in MWh) and the total net capability of the steam electric part of a facility (in MW) multiplied by the number of available hours during a year. The average annual generation must be measured over a five year period (if available) of representative operating conditions.

The Definition Should Not Penalize Facilities for Downtime

However, EPA's proposed definition of "capacity utilization rate" unfairly penalizes facilities that might suffer an extended outage. Under EPA's definition, the "capacity utilization rate" is calculated by multiplying by the number of "available" hours during a year. Much depends on what "available" means. UWAG is concerned that EPA might regard a power plant as "available" if it is physically available, even though it might not be available as a practical matter because of a planned outage for maintenance, an unexpected outage, or a permit limit restricting operation. Suppose, for example, that a plant has operational limitations allowing it to run only a fraction of the time during certain parts of the year. Although the facility could physically operate during these times, it cannot operate in fact because of either a permit restriction or its internal procedures. Such a period of time when the plant cannot operate should not be counted as "available" time.

Indeed, there is no good reason for EPA to make up its own definition of "capacity utilization factor" at all. EPA should adopt the definition of the Energy Information Administration, which reads as follows:

Capacity Factor - The ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full-power operation during the same period.

See www.eia.doe.gov/cneaf/solar.renewables/rea_issues/glossary.html.

The Five-Year Period Penalizes Small Older Facilities

Finally, EPA should change the five-year period over which the capacity utilization rate is calculated. For the past five years, parts of the United States have been suffering the worst drought in decades. This has required some plants, particularly small older facilities, to operate more than is customary. Using the highly unusual last five years for the capacity utilization rate would artificially inflate the capacity utilization rate of many facilities. Accordingly, EPA should change the five years to ten years. Alternatively, EPA should allow uncharacteristic (unrepresentative) years to be excluded.

EPA Response

The comment supports EPA's position on defining capacity utilization rate based on steam generating capacity.

The Agency agrees that the term "available" is not necessary in the definition of capacity utilization and has removed it for the final rule.

Regarding the Energy Information Administration (EIA) definition of capacity utilization factor, the Agency has reconciled this definition with the Agency's. Although the Agency could not accept the EIA definition verbatim, the principles are carried into EPA's definition.

The Agency does not agree that calculating the capacity utilization factor based on five-years is necessarily penalizing of small plants. The Agency allows for facilities in the final rule to calculate their capacity utilization based on their previous permit-cycle (or five years) or to incorporate a "forward looking" capacity utilization rate into their permit that forms an agreement to operate their plant at a certain average capacity factor in future years. For the case of small older plants, this will allow for flexibility to consider drought periods and account for the continued aging of the plant (i.e., decreased operation in the future) in their capacity utilization calculation.

Comment ID 316bEFR.307.085

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 4.01

Source data used by EPA

The NODA Gives Inadequate Notice of the Analyses EPA Has Done

UWAG said in Section XXII of its August 2002 Comments that at that time it was virtually impossible to assess EPA's analysis of costs and benefits, because EPA had not clearly explained its reasoning. Although EPA had summarized the benefit-cost analysis in the preamble to the proposed rule and included underlying technical documents and a large number of worksheets in the record, the method EPA used to determine costs and benefits was so poorly articulated that a reader could not follow it. UWAG argued that generating many pages of calculations and tables of numbers was not enough to satisfy the Administrative Procedure Act or due process of law. UWAG argued that EPA is required to provide enough explanation of its reasoning to enable reviewers to identify the strengths and weaknesses of the analysis.

UWAG renews those arguments now with respect to the NODA. The analyses summarized in the NODA are impossible to follow in detail. Several consultants have reported that they cannot follow EPA's analyses step-by-step because details are missing and the reasoning is not clearly explained. This is especially true of the analysis of nationwide costs and benefits.

Some parts of the analysis are missing altogether. For example, EPA's analysis of benefits considers only two of eight regions. UWAG sees mistakes in the analysis of those two regions and must presume that there would be mistakes for other parts of the country as well, if such analyses were presented. When will EPA present its methodology and use benefits for the other regions? Will interested parties be given an opportunity to comment on these benefit analyses? EPA states that "for the final rule analysis, the Agency intends to expand the Tampa Bay case study used in the proposed rule analysis to include the whole Gulf of Mexico region and to develop an original travel [cost] model for the Great Lakes Region" (68 Fed. Reg. 13,546). When will these evaluations be completed? Will they be made available for review?

UWAG believes that EPA's explanation of the reasoning underlying the proposed rule does not now meet the standards of the Administrative Procedure Act or of Due Process of Law.

EPA Response

EPA has made substantial efforts to help explain the complex issues involved with 316(b), and done a great amount of public outreach, including responding to comments, creating a publicly available record and hosting conference calls.

In regard to the comments on EPA's analysis of benefits, EPA has continued its regional approach to the estimation of benefits for the 316b rule. The methodologies followed in each region are detailed in the Regional Analysis Document (DCN 6-0003). The Tampa Bay case study was not used in the summation of monetized benefits for the final rule. EPA did estimate a RUM for recreation benefits in the Great Lakes region, it is presented in detail in Chapter G4 of the Regional Analysis Document.

EPA believes that today's rule is reasonable and supported by the; therefore, the standards of the Administrative Procedure Act are met.

Comment ID 316bEFR.307.086

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Approval of Functionally Equivalent State Programs is Essential to Implementation Success

EPA's proposal would allow states to demonstrate that they have adopted "alternative regulatory requirements that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved" through the rule's performance standards. Proposed § 125.90(d).

As UWAG previously commented, <FN 41> EPA should allow states to continue successful § 316(b) regulatory programs without having to force-fit them into EPA's new performance standards. For a state to demonstrate that its program would always provide environmental benefits comparable to what could be achieved by applying the rule's performance standards would be a daunting undertaking. Therefore, proposed § 125.90(d), if promulgated as proposed, will be a "dead letter" provision, because states will find it safer to adopt the performance standard approach than to risk disapproval of their existing program.

Yet many existing state programs, such as Maryland's, are effective and well-established means of implementing § 316(b). Those programs deserve a better opportunity to prove their effectiveness. UWAG recommends that EPA amend § 125.90(d) to specify the following factors to be considered in approving alternative state programs:

- whether the state program has effective procedures for review of § 316(b) demonstrations;

- whether the state program adequately assesses costs of technologies in light of their associated environmental benefits;

- whether state-issued permits have addressed § 316(b) for subject facilities in a consistent manner, considering site-specific factors; and

- whether the state program, to the extent it permits mitigation/restoration measures, has been implemented so as to ensure proper completion and evaluation of such measures.

Footnotes

41 UWAG August 2002 Comments, at 11.

EPA Response

See response to 316bEFR.025.017 for a discussion on State program approval.

Comment ID 316bEFR.307.087

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA has made progress on its thinking about the Phase II § 316(b) rule as shown by some of the changes in its benefit-cost analysis and the questions it asks in the NODA. These questions tend to reflect the fact that the impacts of entrainment and impingement are site-specific. UWAG's answers to the questions in these comments show that flexibility is needed in the rule in order to cope with the many different situations that will arise at different sites. It is in that spirit that the above recommendations by the Utility Water Act Group are offered.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes, however, that it rejected an entirely site-specific alternative for the final rule. Please refer to the preamble for more information.

Comment ID 316bEFR.307.088

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 6.01

Overview of I & E effects on organisms

we note that EPA has no data on the extent to which flow reduction technologies will reduce impingement and entrainment losses, but instead appears to assume that such reductions will be roughly equivalent to the percent reduction in flow. Although UWAG agrees that flow reduction will produce appreciable reductions in entrainment, and may also reduce impingement (although the extent of any reduction is difficult to predict, since velocity rather than flow is the significant variable), we do not agree that EPA may assume that such options will produce a concomitant reduction in entrainment and impingement.<FN 5> A report prepared by Drs. Charles Bevelhimer and Charles Coutant for EPRI shows that the extent to which volume of water withdrawn or intake rate is related to impingement or entrainment is highly site-specific and not necessarily linear. See EPRI Technical Report, Impacts of Volumetric Flow Rate of Water Intakes on Fish Populations and Communities (March 2003). And, as the report indicates, the relationship between intake flow volume and effects at the population level and higher are even less well correlated.

Footnotes

5 Comments submitted by the Riverkeeper on the Phase II proposel include a paper prepared for Riverkeeper by Pisces, Ltd. (Pisces conservation Ltd., August 2002 Comment 1.77, which presents regression equations purporting to show that entrainment and impingement increase not linearly but exponentially with flow. However, a review of the Pisces analysis and some of the underlying data on which Pisces relied shows that it is without foundation. As Dr. Laryy Barnthouse concluded in a review prepared for EPRI (see Barnthouse Appendix to EPRI June 2003 Comments), the actual degree of non-linearity is trivial.

Equally important, a review of the 1979 paper on which Pisces' analysis is based (Kelso, and Milburn 1979(DCN4-1665)) shows that (1) although this article indicates a general relationship between flow and impingement of clupeids based on flow increases varying over many orders of magnitude, the data do nothing to support any relationship between flow and impingement over the less-than-single order of magnitude associated with retrofitting a Phase II facility with wet closed-cycle cooling; (2) even so, the actual correlation between impingement and entrainment and Mwe (which Kelso and Milburn used as the proxy for flow) looks relatively weak for all specias other than clupeids (I.d. gizzard shad and alewife), which dominated the impingement totals; (3) even for clupeids, a review of individual data points suggests that plants with higher flows in some cases had impingement or entrainment levels below plants with lower flow; and (4) the authors did not provide any deterministic statistics that would have allowed exploration of cause-and-effect relationships, nor did they examin any other factors, such as velocity, that might have had a greater correlation with some of the data.

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used by EPA for its benefits analysis that I&E are proportional to flow.

Comment ID 316bEFR.307.089

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.1

General: cost tests

For the cost-cost test, “significantly greater” also should be defined as any amount that is at all greater than the cost, once uncertainty and the precision of the estimates are taken into account.

EPA Response

See response to comment 316b.EFR.006.003.

Comment ID 316bEFR.307.090

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

EPA's revised commercial benefits estimation approach remains rooted in short-run production theory rather than analyzing long-run price responsiveness to long-run quantity changes, as is appropriate for impingement and entrainment reductions.

EPA Response

Comment is not clear regarding agreement or disagreement with EPA methodology. For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, including short run vs. long run issues, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.307.091

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.01

Recreational Fishing Benefits

EPA's revised recreational benefits estimate uses a promising method, regional random utility modeling, but neglects to ensure that data sources and survey methods used in the underlying studies are adjusted for bias and make appropriate assumptions about factors such as lost wages.

EPA Response

The comment states that EPA neglected to ensure that data sources for the RUM models are adjusted for bias, and that EPA made inappropriate assumptions about lost wages in the RUM models. EPA disagrees. EPA believes that both the National Marine Fisheries Service (NMFS) and Michigan Department of Natural Resources (MDNR) have adequately corrected for sampling bias through long-established and tested survey and statistical methods (see DCN #6-3189 for NMFS and DCN #6-3176 for MDNR). In addition, EPA does not believe that the Agency's analysis incorrectly calculates opportunity cost of time in the RUM models. If anything, EPA's measure of opportunity cost of time would result in downward bias in estimates for regions where income was reported for extremely small numbers of respondents. For regions where income was estimated using median household income from the U.S. census, it is impossible to determine the direction of bias, if any, because, without collecting primary data, there is no way to compare the median income of anglers to the median income of all households in the region. EPA has followed standard, generally-accepted methods of RUM modeling. See response to comment #316bEFR.041.452 for additional details.

Comment ID 316bEFR.307.092

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

EPA's new estimate of non-use benefits, based on a benefits transfer approach, suffers from a number of flaws that make both the method and the conclusions unusable. As a result, EPA vastly overestimates the non-use values of impingement and entrainment reductions in the North Atlantic Region.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.307.201

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

In the NODA (68 Fed. Reg. 13,546 (§ X.B.3.b(4)), EPA says that several commenters pointed out that all fish impinged will not be Age I, as EPA had originally assumed. Therefore, EPA says, "the current studies relax the assumption that all impinged fish are Age I, and assume instead that the ages of impinged fish are Age 1 and older, and follow an age distribution that is implied by the associated survival rates." As a result, "the effect of this adjustment is that a higher proportion of impinged fish are assumed to survive until harvest. As a result of this adjustment, the estimate of foregone yield associated with impingement increases by a factor ranging from about three to ten, depending on a species' age-specific survival rates." Unfortunately, EPA's attempt to correct the original error will lead to a much more significant error, because EPA's revised approach ignores the largest Age Class, Age 0 (young-of-the-year, or "YOY"). As documented below, impingement in many waterbody types is usually dominated not by Age I and older fish, but by YOYs. Because the survival rate of YOYs is much lower than the survival rate for all older age classes, EPA should be lowering, rather than raising, its production foregone estimates.

Compounding this fundamental error, EPA says that it assumed that the fish age 1 and older "follow an age distribution that is implied by the associated survival rates." Id. Even if EPA's assumption that all impinged fish are Age I and older was correct, which it is not, EPA has provided no basis for determining the distribution of older fish. EPA says it has used a distribution "implied by survival rates," but I was unable to find in the record the data underlying that assessment. In any case, as documented below, impingement does not reflect a random or representative sample of the size distribution for the species occupying the waterbody (much less the survival rate of those organisms post impingement). Therefore, even if the size distribution of each at-risk species within the waterbody is known, that is not the distribution that will be seen in impingement samples.

Documentation that Impingement is Dominated by YOY (Age 0) Fish

Numerous impingement studies from a wide variety of waterbody types and geographic areas were reviewed. As documented below, it is clear that in freshwater rivers, as well as in lakes and reservoirs, impingement typically is dominated by YOY fish. We examined fewer estuarine studies, but dominance of YOYs at such sites also appears to be typical. At Great Lakes plants, the age distribution of impinged fish appears to vary considerably depending on the plant in question. However, even at sites where YOYs do not predominate, EPA's assumption that all fish impinged will be Age I and older still is erroneous. At such sites, EPA production foregone estimates may be "less wrong" than at sites where YOYs predominate, but they are still wrong.

1. Freshwater Rivers

According to DOE figures (Puder and Veil 1999), roughly half the nation's steam-electric generating capacity is located on freshwater rivers. Thus, this is a particularly important category. And, as documented below for numerous freshwater rivers, impingement at such facilities almost always is dominated by YOYs.

Muskingum River (EA Engineering, Science, and Technology Inc. 1978a)

The Muskingum River is a large river in SE Ohio. Based on a one-year impingement study at the Muskingum River Plant (MRP), the authors estimated that 1,733,544 fish were impinged, of which 99.3% were gizzard shad. They further noted that 99.2% of the 1.72 million impinged shad were YOYs. They also reported that 70% of the 3,153 channel catfish impinged (the second most frequently impinged species) were YOYs.

Muskingum River (Dames and Moore 1979)

This study was conducted at the Conesville Generating Station, which is located upstream of the MRP. Gizzard shad (73.4%) and channel catfish (5.6%) again were the two most commonly impinged fish. Based on length frequency data provided in the report (Table 5.1), 98.9% of the gizzard shad and 91.4% of the channel catfish were YOYs.

Ohio River (Geo-Marine 1978)

Gizzard shad dominated (78.9%) the impingement catch at the Sammis Power Plant, which is located on the upper Ohio River. According to data provided in the report, 86.6% of the shad impinged were £100 mm and thus were definitively YOYs. The actual percentage is certainly higher because some, and perhaps most, of the shad between 100 and 120 mm likely also were YOYs.

Ohio River (EIA 1978a)

Gizzard shad also dominated (56.7%) the impingement catch at the Tanners Creek Plant located on the middle Ohio River. According to data provided in the report, 44.7% of these shad were <100mm long and thus definitively YOYs. Another 35.4% were between 100 and 140 mm and were probably YOYs. Skipjack herring was the second most commonly impinged fish (22.1%) at the Tanners Plant. More than 99% of the skipjack herring impinged were YOYs. For freshwater drum, the third most commonly impinged fish (11.0%), 72% were YOYs.

Ohio River (EIA 1978b and EA 1987)

Impingement studies were conducted at the Clifty Creek Power Plant in both the 1970's (EIA 1978b) and 1980's (EA 1987). The authors of the earlier study reported that gizzard shad dominated (86.3%) the catch and reported that YOYs dominated the shad catch during the summer and fall. Inspection of the length frequency data provided by the authors (Table C-1) indicates that 80-90% of the catch was comprised of YOYs.

During the latter study (EA 1987), gizzard shad again dominated (84.9%) the impingement catch. The authors noted that at least 80% and probably more than 90% of the shad impinged were YOYs. The authors also noted that catches of freshwater drum and bluegill, the next two most commonly impinged species, were also dominated by YOYs, 90% and 89%, respectively.

Wabash River (EA 1988)

A 6-month impingement study was conducted at the Cayuga Power Plant on the middle Wabash River in Indiana. The authors reported that the most commonly impinged species were gizzard shad (59%) and channel catfish (32%). They reported that 78% of the impinged shad were YOYs and 87% of the channel catfish catch were YOYs.

Wabash River (EA 1989)

A similar 6-month impingement study was conducted at the Wabash River Station located near Terre Haute, Indiana. At this plant, channel catfish was the most commonly impinged species (36%). Over 99% of the channel catfish impinged were YOYs. The authors also reported that YOYs dominated catches of all larger species (e.g., bass and redhorse).

Kankakee River (EA 1990)

This year-long study was conducted at the Braidwood Nuclear Station, which is a closed-cycle plant located on the lower Kankakee River in Illinois. Gizzard shad dominated (69.1%) the impingement catch, and the authors reported that 86% of the shad were YOYs. They also reported that centrarchids (smallmouth bass, rock bass, and longear sunfish), which were also common, were dominated by YOYs. For example, 90% of the smallmouth bass impinged were YOYs.

Illinois River (ESE 1987)

This impingement study was conducted at the Dresden Nuclear Station during 15 June-30 September 1986. The two most abundant species impinged were gizzard shad and freshwater drum, which together accounted for 70% of the fish impinged. The authors did not provide specific percentages according to age class, but inspection of the tabular summaries they provided indicates that 80-90% of the shad impinged were YOYs and >95% of the drum were YOYs. The authors noted that “the great majority of the fish collected during the impingement studies were small YOY fish (p. 152)” and that “YOY fish have historically been impinged in higher numbers than adults at most power plants throughout the midwest” (p. 152).

Mississippi River (LMS 1999)

Impingement sampling has been conducted at the Quad Cities Nuclear Plant annually for 25 years. The authors reported gizzard shad and freshwater drum always dominate the impingement catch and that for both species YOYs dominate the catch.

Various Sites in SE US (Loar et al. 1977)

These authors reviewed impingement data for 24 southeastern power plants. Their data set included a combination of river and reservoir sites. They reported that 98% of the fish impinged at the 24 sites were clupeids (threadfin shad and gizzard shad). Although exact percentages were not reported, the authors noted that “most” of the fish impinged were small (<90mm), probably YOYs and Age 1's. Based on length data provided by the authors (their Table 2), it appears that YOY dominated the catch.

Columbia River (Page et al. 1977)

This study was based on impingement sampling at the Hanford Reservation in Washington. The authors reported that during the period of study (May-June 1977) yellow perch and Chinook salmon accounted for 99.2% of the fish impinged and that all the perch and salmon that were impinged were fry (=YOY). They further reported that previous studies had shown that >90% of the fish impinged at this site were Age 0 (YOY).

Monongahela River (EA 1978b)

Based on studies conducted at the Elrama Power Plant, the authors found that three species -- gizzard shad, pumpkinseed, and bluegill -- accounted for 93% of the impingement catch. They further noted that the mean lengths of each of the species fell into the range for YOY fish reported in the literature.

In summary, it is clear that, regardless of the portion of the country considered, impingement catches are strongly (often >90%) dominated by YOY fish, not Age I and older fish as now assumed by EPA.

2. Lakes and Reservoirs

Lake Sangchris (Porak and Tranquilli 1981)

This study was done at the Kincaid Power Plant in central Illinois. The study authors reported that the majority of the gizzard shad and yellow bass (the two dominant species) and 12 other species impinged were YOYs.

Newton Lake (EA 1984a)

Newton Lake is a cooling lake located in east central Illinois. Based on a one-year impingement study, the authors reported that gizzard shad accounted for 92% of the fish impinged with bluegill accounting for 6%. The authors reported that 84% of the shad, the species that strongly dominated the impingement catch, were YOYs.

Various Sites in SE US (Loar et al 1977)

As described previously, these authors evaluated impingement data at 24 lakes, reservoirs, and rivers in the SE. They found that clupeids were by far the most frequently impinged fish and that most of these clupeids were YOYs.

Given that clupeids dominate impingement catches at lakes and reservoir sites and that YOYs invariably dominate the age distribution of those shad that are impinged, it is clear that EPA's decision to represent impingement by assuming that all impinged fish will be Age I and older cannot be supported for either freshwater rivers or lakes and reservoirs.

3. Estuarine Sites

Although the composition of fishes impinged at estuarine is obviously much different than at freshwater sites, it is clear, as documented below, that impingement at estuarine sites often is dominated by YOYs.

Indian River Estuary (EA 1978)

Atlantic menhaden, spot, Atlantic croaker, and weakfish are four of the dominant species impinged at the Indian River Power Plant. With regard to size, the report provides the following quotes regarding these species:

-“The Atlantic menhaden appear on the screens and are affected primarily as young-of-the-year during warmer water seasons.”

-“The summer catches [of spot] that climbed rapidly in 1976 are a reflection of the incoming, developing juveniles [i.e., young of year] using areas of the estuary as nursery ground…”

-“The catches [of Atlantic croaker] consisted primarily of young-of-the-year individuals.”

-“… the weakfish is a migratory visitor to the estuary and…the catches, consisting primarily of young-of-the-year, are a reflection of the use of the estuary as a nursery ground by this species.”

Thus, it is clear that YOYs dominated the catch at this plant.

Sacramento/San Joaquin Delta, California (EA 1981)

This study was conducted in the late 1970’s at the Pittsburg Power Plant. The authors estimated that 133,809 striped bass, one of the main species of concern, were impinged. They reported that the mean fork length for each month ranged from 57 to 122 mm over the course of the study. Based on this size distribution, the authors concluded “that primarily young-of-the-year were impinged.”

Upper Chesapeake Bay (EA 1979)

These results are based on the studies at the C.P. Crane Power Station. The authors reported that, for Atlantic menhaden and spot, YOYs accounted for 96% and 97%, respectively, of the numbers impinged of these two species. For white perch, another commonly impinged species, 25% were found to be YOYs.

Hudson River (Barnthouse and Van Winkle 1980)

Based on data collected at six Hudson River power plants, these authors estimated that YOY white perch accounted for 80-92% of all the white perch impinged.

4. Great Lakes

Species composition varies considerably among the Great Lakes. Also, composition has changed considerably since many of the studies were done in the 1970’s due to declines in some species (e.g., rainbow smelt and alewife in Lake Michigan) and increases in other species (e.g., white perch, gobies, and bloaters). Nonetheless, the data that are available indicate that YOYs can make up a significant part of impingement.

Lake Erie (EA 1984)

This study at the Monroe Station was done in the fall and early winter, a period when gizzard shad impingement has been high historically. The study found that in October, November, and December, the catch was predominantly YOYs, whereas in January somewhat larger fish (probably Age I) dominated impingement. In conjunction with the draft Phase II rule, Detroit Edison filed comments to the effect that impingement at the Monroe Station is usually dominated by YOYs.

Lake Michigan (Wisconsin Electric 1976a)

This study was conducted at the Oak Creek Power Plant near Milwaukee, Wisconsin, from March 1975 through February 1976. The authors reported that 79% of the fish impinged were alewives. The authors did not provide specific length data but, based on summary tables and graphs they provided, it is apparent that YOY, Age I, and adult alewives were represented. Age I fish appeared to be the most common age class. Similar results were obtained at the nearby Port Washington Power Plant (Wisconsin Electric 1976b).

Lake Michigan (LMS 1993)

During 1991 and 1992, impingement studies were conducted at the Zion Nuclear Plant. Alewives dominated the impingement collections with rainbow smelt also being common. The authors reported that fish ranging from Age 0 (i.e., YOYs) to Age VI were present in the impingement collection, with adult fish, Ages 3 through 6, accounting for about 50% of those collected. The authors reported that YOYs co-dominated the smelt catch in 1991 but that in 1992 the impingement catch was dominated by Age II and III smelt.

The data summarized above show that, in contrast to the other waterbody types, impingement at Great Lakes power plants does not appear to be dominated by YOY fish. On the other hand, these same data show that YOYs were impinged at all the sites considered and that, depending on the species and site, YOYs can provide a sizeable contribution to the impingement catch. Clearly, YOYs cannot be ignored for the Great Lakes as EPA proposes.

Recommendations

In the NODA, EPA says it will assume that impinged fish all are Age I and older. Clearly, this approach is not supported by the data. Based on the studies reviewed herein, it would be appropriate for EPA to assume that 80-90% of the fish impinged at sites located on rivers, lakes, and reservoirs are YOYs, 10-20% would be Age I, and a very small percentage (no more than 1-2%) would be Ages II and older.

For estuarine sites, we have not reviewed enough studies to provide definitive guidance, but based on those studies we have reviewed, it appears that an assumption of about 50% YOYs would be reasonable.

For the Great Lakes, especially Lakes Michigan and Erie, the changes in species composition that have occurred over the past 20-30 years are substantial enough to make any assumptions rather tenuous. Nonetheless, it is clear that impingement on the Great Lakes includes significant percentages of YOYs, and this contribution cannot be ignored

EPA Response

The commenter expresses concern EPA's assumptions about the age distributions of impinged fish. EPA has revised its assumptions about age distributions of impinged fish in a manner that acknowledges that YOY may be predominant among impinged fishes, as described in the EPA response to EFR.029.105.

Comment ID 316bEFR.307.301

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02

Benefit Estimation Methodology

Comments on Benefit Estimation in EPA's Proposed Phase II 316(b) Rule as Summarized in the Notice of Data Availability

Final Report

Prepared for: The Utility Water Act Group

Prepared by: Matthew F. Bingham, William H. Desvousges, Ateesha F. Mohamed
Triangle Economic Research, 2775 Meridian Parkway, Durham, NC 27713

June 2, 2003

EXECUTIVE SUMMARY

1.1 Introduction

On April 9, 2002, the U.S. Environmental Protection Agency (EPA) published a benefit cost analysis (BCA) supporting proposed standards for Cooling Water Intake Structures (CWIS) at "Phase II" facilities (existing power plants with flows over 50 million gallons per day). EPA received numerous comments and data submissions during the subsequent 120-day public comment period. On March 19, 2003, EPA released a related Notice of Data Availability (NODA). The NODA presents a summary of new data, discusses how those data might be employed in a revised analysis supporting proposed standards, details possible refinements to the proposed regulations, and provides additional information about data quality. Triangle Economic Research (TER) has prepared this report for Utility Water Act Group (UWAG) members involved in commenting on EPA's proposed §316(b) Rule for Phase II Existing Facilities.

This report addresses EPA's revisions to its original benefits analysis, as described in the NODA. However, the NODA provides only a very general description of the methods and data EPA intends to use for estimating regional benefits. <FN 1> In particular, this review is limited by the following:

-EPA presents benefit estimates for only two of eight regions: the North Atlantic and the Northern California regions.
-EPA only calculates nonuse benefit estimates for the North Atlantic region.
-The NODA docket only includes partial information on the methods EPA may use.
-EPA does not include a description of all the databases on which it may rely (68 Fed. Reg. 13543–45).

For these reasons, we cannot fully comment on EPA's methods or the implementation of these methods. Furthermore, as the text in 68 Fed. Reg. 13546, col. 2 suggests, EPA intends to rely somewhat on methods and data similar to those in its earlier proposal. To the extent that this is the case, EPA's current estimates are subject to problems discussed in our previous comments. Finally, the issues identified in this report are primarily relevant for the North Atlantic and Northern California regions.<FN 2> EPA's benefit estimates for the remaining six regions may raise additional issues.

1.2 Overview

EPA's proposed rules for CWIS at Phase II facilities contained a benefit cost analysis supporting the proposed regulations. In this analysis, EPA estimated that the total benefits of eliminating all impingement and entrainment (I&E) are $735 million per year for the entire U.S. TER's review indicated that due to a number of theoretical and empirical errors, this figure was overstated by as much as 16 times.

In response to public comments, the NODA has made or proposes to make several significant changes to the existing cost-benefit analysis. Major changes to the benefit analysis include the following:

-Eliminating multi-market producer surplus
-Replacing the case study-based benefit extrapolation with a regional approach
-Accounting for the impact of benefit timing through discounting
-Correcting the assumption that all fish spared due to CWIS modifications are harvested by recreational or commercial anglers
-Exploring new options for calculating commercial benefits
-Using regional random utility models (RUMs) to estimate recreational fishing benefits
-Developing a revised analysis of nonuse benefits.

The NODA makes no mention of a key issue raised in our previous comments, namely, EPA's erroneous reliance on the Habitat Replacement Cost (HRC) and Societal Revealed Preference (SRP) methodologies. Therefore we cannot determine whether EPA intends to employ cost-based measures any further in this rule-making. For all the reasons discussed in our comments <FN 3> on the proposed rule, and reiterated in this Executive Summary, we urge EPA to reject any further use of these methods for benefits estimation related to this rule.

The elimination of multi-market producer surplus is a clear methodological improvement that we consider briefly in this Executive Summary. Incorporating a regional approach for benefits, accounting for benefit timing through discounting, and relaxing the assumption that all spared fish are harvested address deficiencies in the previous analysis related primarily to the amount and timing of catch. This review does not analyze the many biological assumptions underlying the benefits analysis. <FN 4> We note, however, that other experts' comments indicate that EPA has made inappropriate assumptions on each of these points, resulting in vast overestimates on each score. <FN 5> Recent comments (Barnthouse 2003) demonstrate that EPA overestimates production forgone due to impingement, for the Salem plant, (one of four plants for which EPA had I&E data in the North Atlantic region) by factors ranging from 70 for weakfish to 2.3 for white perch. <FN 6>

The difficulty of accurately quantifying biological impacts highlights two additional caveats that apply to this critique. First, EPA omits any analysis of the uncertainty inherent in its biological estimates. This limits our ability to definitively assess the dollar values EPA presents as benefit estimates. As a result, this evaluation takes the biological values EPA used to calculate economic benefits as a given. This should not be interpreted as an endorsement of their validity. Rather, any economic assessment of §316(b) benefits relies directly upon biological estimates. In fact, the economic assessment is only as accurate as the underlying biological estimates. Second, the difficulty EPA has had quantifying biological impacts, underscores the substantial uncertainty surrounding the ultimate impact of §316(b) regulations on fish stocks and catch. In the §316(b) context, this uncertainty should have been assessed as part of EPA's benefit analysis. An appropriate benefit cost analysis should consider all biological sources of uncertainty and the influence of this uncertainty on economic values.

We these limitations, we comment briefly in this Executive Summary on EPA's three modifications related to the amount and timing of catch. We also refer the reader to our previous comments for appropriate methods of applying economic techniques such as discounting. The final set of proposed changes to benefit estimation—new calculations for commercial benefits, regional RUMs to estimate recreational benefits, and a revised method for analyzing nonuse benefits—are potentially major modifications. We discuss these modifications in both the Executive Summary and Detailed Discussion sections.

Improvements

As indicated in TER's prior comments for UWAG, both the HRC and SRP methods employ costs of one type or another as a substitute for benefit estimates. There is no justification for using costs as a proxy for benefits in the economics literature, nor is this approach consistent with EPA's Guidelines for Preparing Economic Analysis (hereafter Guidelines). Eliminating these techniques from the benefits analysis is essential. In the NODA, EPA does not say what its plans are for further application of these methods. However, for the reasons given in our previous report and in other comments on the proposed rule and the NODA, including Stavins (2003a, 2003b), EPA should make no further attempts to rely on such methods for national benefits estimation and must state clearly that they are not justified for site-specific benefits estimation.

In its original BCA, EPA contended that total benefits accrue not only to the commercial fishing sector, but also to processors and retailers. This factor justified the inclusion of multi-market producer surplus in commercial fishing benefit estimates. Our previous investigation of relevant market conditions indicated that fish processing and retailing in the U.S. are both relatively atomistic industries with tens of thousands of market participants (See Desvousges et al. 2002, pp. 16–23 for TER's earlier comments to UWAG on the nature of fish markets). The competitive nature of these markets invalidates the existence of long-run producer surplus in fish processing and retailing. In the NODA, EPA has apparently removed multi-market producer surplus from its estimate of benefits expected to accrue in commercial fish markets. Elimination of multi-market producer surplus is a clear improvement to EPA's benefits analysis.

Potential Improvements

Based on our review of the NODA, potential improvements include: incorporating a regional approach for national benefits; accounting for discounting and benefit timing; and relaxing the assumption that anglers catch all spared fish. The importance of correctly incorporating these factors was considered at length in our earlier comments. Areas of particular concern included extrapolation and aggregation methodologies, harvest rates, and fish maturation requirements.

Regional Aggregation Approach

EPA originally estimated national baseline losses by extrapolating data from the facilities in the five case-study areas to 539 in-scope facilities. As discussed in previous comments (see Heimbuch 2002 and Desvousges et al. 2002, pp. 44–48), several fundamental flaws in the previous EPA extrapolation methodology rendered those results unreliable. EPA now intends to evaluate impingement and entrainment losses as well as potential benefits from CWIS modifications on a regional level. EPA intends to aggregate regional benefits into national benefit estimates. <FN 7> EPA believes that these regional definitions "are both ecologically and economically meaningful, and offer a better scale of resolution upon which to base estimates of national impacts and benefits." <FN 8>

The impact of EPA's regional aggregation approach on the quality of benefit estimates depends upon appropriate biological extrapolation and the degree of regional homogeneity in economic factors. In particular, the ability to appropriately characterize regional biological benefits requires both accurate and representative I&E data, as well as an appropriate extrapolation method. Extrapolating data to multiple plants within a region requires a statistically valid normalization procedure that identifies and accounts for varying biological factors across facilities. <FN 9> Given an appropriate biological extrapolation, the value of regional aggregation for economic estimates depends upon similarity of preferences within a region. For example, aggregation of the North Atlantic region requires that people throughout the Northeast hold similar nonuse values. Thus, while we feel that regional aggregation is a conceptual improvement upon EPA's prior approach, the ultimate value of this change lies in its empirical implementation. Areas of concern include the accuracy and representativeness of underlying data, appropriateness of biological extrapolation, and demonstration of similarity for relevant economic factors within a region.

Proportionality between Stock and Harvest

In the original BCA, EPA apparently assumed that all fish spared by CWIS modifications and surviving to adulthood would be caught. Currently, EPA intends to correct this by assuming "linearity between stock and harvest" (See 68 Fed. Reg. 13547). In implementation, this adjustment implies that for example, "if 20% of the current commercially targeted stock is harvested, then 20% of any increase in stock due to this rule would be harvested." <FN 10> The exact implementation of this linearity between stock and harvest is not clear. However, comparing the number of landed and unlanded fish is instructive. <FN 11> We interpret this to mean that EPA expects approximately 20% of spared winter flounder to be harvested. Based on the limited data available in the record, we were unable to perform a detailed review of the merits of this assumption.

Account for Benefit Timing with Discounting

The final potential improvement is in EPA's accounting for benefit timing. In the original BCA, EPA assumed all fish species are commercially and/or recreationally harvestable at age 1. However, some more highly valued fish such as striped bass and black drum take more time to reach a harvestable age. <FN 12> Thus, any potential benefits to anglers will accrue in the future. According to the NODA, EPA benefit estimates will now reflect this consideration with appropriate discounting. Specifically, benefit calculations will now be affected by "the range of ages at which different types of fish are typically landed by commercial or recreational anglers and the discount rate applied in the analysis" (see 68 Fed. Reg. 13548). Completely evaluating EPA's methodology for calculating the timing of benefits is beyond the scope of this review. For a thorough treatment of appropriate discounting in this context, we refer the reader to previous TER comments (Desvousges et al. 2002).

1.3 Major Modifications

EPA's latest analysis of the benefits presumed to arise from 316(b) regulations is predicated upon growth in fish stocks due to decreased I&E. A small portion of these benefits accrues to recreational and commercial anglers through increased catch rates. The remainder of benefits is attributed to nonuse values for species that are commercially and recreationally valuable but not caught, and forage fish. Major changes to EPA's commercial, recreational, and nonuse benefit estimation methodologies are discussed in both this Executive Summary, and the following Detailed Discussion.

Commercial Fishing

EPA's latest analysis of commercial fishing benefits still bases benefit estimates on the gross revenue of lost commercial catch. However, while EPA's prior analysis assumed that producer surplus ranged from 40% to 70% of dockside value (gross revenue), EPA is currently considering a range of 0% to 40% of dockside value. <FN 13> EPA bases this adjustment on a review of current literature and recommendations made in comments on the EPA analysis at proposal. This adjustment is significant. However, EPA's methodology inappropriately characterizes the source and nature of societal benefits in this context.

The problem with EPA's approach lies in the misconception that the effect of I&E reductions can be approximated as some portion of increased dockside value. This notion is rooted in short-run production theory, which has no place in the analysis of benefits arising from I&E reductions. Short-run analysis is inappropriate in this context because any changes in harvest occurring as a result of reductions in entrainment and impingement will not occur immediately. <FN 14> This means, an appropriate analysis depends critically on the responsiveness of long-run prices to quantity changes. In our Detailed Discussion, we demonstrate an appropriate general framework for such an analysis. Our investigation indicates that societal benefits from §316(b) regulations under open markets should exceed gains observed with market restrictions. <FN 15> Using the assumptions of unit price elasticity and open markets we provide an illustrative example estimating that societal gains from the elimination of I&E in the North Atlantic region are $0.72 million as opposed to the EPA estimate of $0.28 million. The validity of this result depends upon correct estimates of commercial harvest increases, as well as the assumptions of unit price elasticity and open markets. Correctly valuing commercial benefits requires an in-depth study of fishery regimes and markets, as well as an appropriate framework for analysis.

Recreational Fishing

EPA plans to use region-specific random utility models (RUMs) with participation components to estimate losses to recreational fishing due to I&E. For the six coastal regions, EPA intends to use the National Marine Fisheries Service (NMFS) Marine Recreational Fishing Statistics Survey with the corresponding Add-On MRFSS Economic Survey (NMFS 1994, 1997, and 2000). For the Great Lakes, the Agency will use the 1995 Michigan Recreational Anglers survey. For the interior U.S. region, EPA will use the 2000 National Survey of Recreation and Environment and the 2000 National

Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service 1996 and 2001).

RUMs are the most widely accepted method for valuing recreational fishing. In the context of §316(b) regulations, RUMs provide the best opportunity for correctly valuing increased catch hypothesized to result from I&E reductions. However, unadjusted data from the surveys cited by EPA may lead to an upward bias in benefit estimates. This is caused by (1) sampling procedures that over-sample avid anglers and (2) anglers' tendency to overstate their level of fishing activity. <FN 16> Another concern is that EPA incorrectly measures the opportunity cost of time, resulting in an overestimate of benefits.

Regional random utility modeling is the most theoretically appropriate method for valuing increases in recreational catch. Correctly implemented, such an approach provides the best opportunity for doing so. Therefore we endorse this method. However, this endorsement is tempered by a number of concerns with the type of data and estimation methods that EPA intends to use. General concerns are detailed in the body of this report. However, given the complexity of random utility modeling, a thorough critique requires access to data and programs. These are not available in the NODA, or NODA docket, limiting the scope of this critique.

Nonuse

According to EPA, the majority of organisms that will be spared from I&E through CWIS improvements are forage fish and valuable species that are not landed by commercial or recreational anglers. It's reasonable to believe that in the aggregate, these fish are likely to have some societal value external to their consumption. However, because these fish are not used directly, they cannot be valued through traditional means.

When individuals are affected by changes in resources that they do not use, the resource is said to have nonuse value. <FN 17> Whether nonuse benefits should be included in a benefit cost analysis is somewhat controversial (Madariaga and McConnell 1987; Hausman 1993). A particular limitation to the inclusion of nonuse values in benefit-cost analysis is that these values are not revealed through behavior. <FN 18> In attempting to overcome this difficulty, economists have developed hypothetical valuation methods (Freeman 1993). Currently, contingent valuation (CV) is the most widely used technique for attempting to measure nonuse values. <FN 19>

Citing difficulties with regulatory scheduling and resource requirements, EPA eschews primary research in favor of a benefits transfer approach for nonuse valuation. EPA's approach first assesses respondents' values for habitats (eelgrass and wetlands) that play a significant role in the production of fish and shellfish. It then estimates the quantity of this habitat that would be required to replace fish and shellfish lost to I&E. EPA then combines this information with population data to produce what it hopes will be an indirect estimate of aggregate values for fish and shellfish lost to I&E. Using this approach, EPA concludes that $76 million per year or 95.78% of the benefits from I&E reduction in New England fisheries is attributable to nonuse values.

However, EPA's approach to assessing nonuse values is entirely inadequate. In particular, the presumption that values for eelgrass and wetlands can be transformed into nonuse values for fish is unfounded. Economic research indicates that nonuse values are largely tied to the intrinsic value of resources rather than service flows from those resources. For example, the bald eagle provides ecological service flows, as do other birds of prey. But the nonuse value of the bald eagle is derived from intrinsic characteristics that are completely unrelated to its ecological services. By comparison, a vulture provides valuable ecological services as a scavenger, but likely has little nonuse value. Given how closely nonuse values are tied to the unique characteristics of particular resources, similarity between resources being valued in the policy case and those examined in the study case is all the more critical in a benefit transfer of nonuse values.

As demonstrated in our specific comments, EPA attempts to overcome the vast difference between the transfer study's hypothetical valuation scenario and the 316(b) policy context with a series of adjustments. However, the dissimilarity between what is valued in the transfer study (substantial losses of wetlands and eelgrass) and what EPA is attempting to value (marginal increases in forage fish and unharvested commercial and recreational species) is so dramatic that any values produced through benefits transfer are meaningless. EPA's attempt to overcome this disparity results in the remarkable conclusion that over 90% of benefits due to §316(b) regulations can be attributed to growth in the stock of forage fish. The fallacy of this result can be demonstrated through consideration of use to nonuse ratios and an analysis of the resultant implications of natural stock variations. Table 1 details EPA benefit estimates for the North Atlantic region by category.

Table 1. EPA Benefit Estimates for the North Atlantic Region
[see hard copy for table]

EPA estimates the nonuse value of unlanded fish that are commercially and recreationally valuable concurrent with its valuation of forage fish. EPA apparently estimates nonuse values at approximately 30% of use values on a per-fish basis. <FN 20> The true magnitude of nonuse values for these species is unclear. However, the approach that EPA used to reach this conclusion is invalid. In developing nonuse values for commercially and recreationally valuable species, it is important to consider that nonuse values exist primarily for the resource, a viable fishery, and that nonuse values for individual fish are a reflection of their contribution to the stock. Thus, in a viable fishery, the use/nonuse should be heavily weighted toward use. However, as a fishery declines, each remaining fish becomes relatively more valuable in nonuse than in use, changing the use/nonuse ratio. EPA's analysis of nonuse values for important commercial and recreational species should include this consideration.

In the original BCA, EPA relied heavily upon the Fisher-Raucher approach to estimate nonuse values for commercially and recreationally valuable species. <FN 21> TER argued against this approach on the basis that the Fisher-Raucher approach is not relevant for a resource in which use implies consumption. In the NODA, however, EPA assigns significant nonuse values to forage fish. Unlike commercially and recreationally valuable fish, the use of forage fish does not imply their consumption. <FN 22> In this situation, a comparison with the use/nonuse value ratio of other resources may be appropriate. However, EPA presents no use value for forage fish. Thus, applying the Fisher-Raucher approach to EPA benefit estimates points out a fundamental inconsistency. Specifically, EPA reports massive nonuse values, but no use values for forage fish. The Fisher-Raucher approach implies that any resource with zero use value would also have zero nonuse value.

Another implication of EPA's nonuse valuation relates to the implied effect of natural population fluctuations on nonuse value. For the North Atlantic, EPA's predicted increases in commercial catch indicate that EPA anticipates approximately a 3% increase in commercial catch across species. EPA's assumption that there is a linear relationship between stock and harvest implies that there is an identical 3% increase in commercial fish stocks. Assuming the stock of forage species increases by the same magnitude as the commercial stock, the $76 million in nonuse benefits reported by EPA are due to a 3% increase in the stock of forage species. The natural variation occurring in many fish populations is typically orders of magnitude larger than 3% (Sissenwine 1984). Thus, by extension, EPA's result indicates that natural variation in stocks of forage fish are potentially worth billions of dollars per year in the North Atlantic alone. <FN 23> The suggestion that nonuse values are tied so dramatically to fluctuations in the stock of forage fish is nonsensical, as is EPA's conclusion that nonuse values respond dramatically to marginal increases in stock.

We conclude that EPA has failed to provide a credible approach to measuring nonuse values for 316(b) regulations. This lack of credibility can be directly traced to EPA's inability to articulate a coherent conceptual framework for nonuse values arising from §316(b) regulations. An appropriate conceptual argument should address these marginal changes in fish stocks on a regional basis. It should also recognize that these marginal changes may be swamped by the natural variability that occurs in fish stocks. Attempting to communicate such arguments in any type of stated preference study would be a significant challenge and unlikely to produce reliable benefit estimates.

These concerns also affect EPA's apparent intentions to estimate nonuse values for I&E reductions using a meta-analysis of studies containing both use and nonuse values. The studies listed at 68 Fed. Reg. 13575 are not on the docket. However, this table demonstrates the difficulty of calculating nonuse benefits for I&E reductions using any benefit transfer approach. <FN 24> Specifically, all of the studies listed (but one) are based on water quality improvements. To the extent that these water quality improvements are relevant for fish, they do not lead to marginal population changes. Rather, they improve the viability of the stock. A single study in EPA's list, (Olsen et al. 1991) does directly address fish increases. However, the values calculated are for doubling the population of salmon in the Pacific Northwest. This is quite a different situation than the marginal changes in less well-known species that comprise the majority of benefits expected to arise from I&E reductions.

In developing nonuse values for this regulation, EPA should be mindful of the elements that lead to significant nonuse values. Applying a concept that was originally intended to capture unmeasured values for a unique resource (the Grand Canyon) to this situation is questionable. To the extent that nonuse values do exist for this application, they are most likely for the stock of fish, not the individual. Thus, the nonuse value for a single fish should be based on its contribution to the stock. For most species, I&E reductions will have very little impact on stock. In fact, at optimal harvest, one fish more or less does not impact the viability of a stock at all.

These logical considerations highlight an additional inconsistency with EPA's approach toward calculating net benefits. Specifically, considering nonuse values is in keeping with EPA's belief that total value should be compared to total social cost. <FN 25> However, for reasons stated above, nonuse values for this regulation are likely negligible. In measuring costs, EPA determined that there were social costs to this regulation in addition to direct financial outlay. However, EPA deemed these costs inconsequential when compared with the effort required to estimate them. <FN 26> We submit that the nonuse values associated with this regulation fit into a similar category.

1.4 Summary

Our review indicates that EPA has potentially made some improvements in estimating the amount and timing of benefits arising from CWIS reductions. However, the EPA has not answered some critical questions about its plans for future reliance on the HRC and SRP methods. In addition, while EPA has potentially corrected some problems, it has introduced others. Consequently, EPA's benefit estimates, especially the nonuse benefits, are vastly overstated. A comparison of benefit sources across the two analyses demonstrates the magnitude of this problem. In the original BCA, benefit estimates for the Salem facility along the Delaware Estuary (comparable to the North Atlantic region) of approximately $23.2 million were distributed approximately 64% to commercial, 24% to recreation and 12% to nonuse. In the NODA, EPA estimates that the total benefits from reduction in I&E for the North Atlantic region is $79 million per year. Of this, $0.3 million (0.4%) is due to commercial benefits, $3.1 million (3.9%) is due to recreational benefits, and the remaining $75.6 million (95.7%) is from nonuse value. <FN 27>

This dramatic shift in the apportionment of benefits across categories is striking. In particular, the movement of benefits from use categories to the nonuse category is troubling. The remainder of this document addresses important aspects in EPA's estimation of commercial, recreational, and nonuse benefits, and provides some alternative benefit calculations to the extent that this was possible. In many cases, EPA's analytical intentions are partially developed but not completely implemented. Thus, our ability to evaluate some of the significant issues in the benefits analysis is limited.

[comment continued in 316bEFR.307.302]

Footnotes

1 Revised national benefit estimates will equal the sum of benefits from eight regions.

2 The issues identified are only partially relevant for the Northern California region because EPA did not estimate nonuse values for that region.

3 See Desvousges et al. (2002). Other economists with substantial expertise in natural resource benefits estimation have also commented forcefully against EPA's use of these methods. See Stavins July 2002 Comments 1.05 and August 2002 Comments 1.12; EPRI August 2002 Comments 1.74, Strand Appendix C; Detroit Edison Comments 1.65, Talhelm Appendix 2; Talhelm on behalf of Consumers Energy Co. August 2002 Comments 2.05.

4 These include evaluating impingement and entrainment (I&E), and I&E mortality at study plants; extrapolation from study plants to other plants in the region; translation of total I&E values to equivalent adults; calculation of forgone production and yield; and determining the acres of eelgrass or wetlands necessary to produce that number of equivalent adults.

5 See UWAG August 2002 comments and EPRI August 2002 comments.

6 This dramatic overstatement arises from a single inappropriate assumption about the life stages of impinged organisms. EPA did not provide enough information to assess this effect at other plants. However, current reviews strongly suggest that the same overestimate is likely to be true for much of EPA's data (Barnthouse 2003). Furthermore, this overstatement is due to a single factor. EPA's biological estimates are based on a series of assumptions that compound this problem.

7 This regional approach is discussed in the document entitled "Regional Methodology Used in the section §316(b) Phase II Notice of Data Availability."

8 These methods are presented in Chapter A5 of Part A of the section §316(b) Phase II Case Study Document. Changes in methods and analysis are provided in "Case Study Corrections and Clarifications" and "Impingement and Entrainment Methods."

9 For example, an important question is the degree of similarity between species at each plant. Species composition is

important in its own right. In addition, this factor influences biomass, age at impingement and trophic transfer rate (Barnthouse 2003).

10 These methods are presented in Chapter A5 of Part A of the section §316(b) Phase II Case Study Document. Changes in methods and analysis are provided in "Case Study Corrections and Clarifications" and "Impingement and Entrainment Methods."

11 For winter flounder in the North Atlantic region, the number of fish valued for recreational and commercial purposes (landed) is 1,742,461. The number valued for nonuse (unlanded) is 7,239,297.

12 Striped bass contribute the majority of benefits for the Northern California region. This means benefits from this species are heavily dependent upon correct consideration of benefit timing.

13 Producer surplus is the difference between the market price and the minimum price suppliers would be willing to accept for the product (Varian 1996).

14 Here we define the short-run as the period of time during which inputs to commercial fishing cannot be changed. The responsiveness of effort to availability within a commercial fishing season demonstrates that benefits from I&E reductions are best analyzed in a long-run context.

15 The outcome that societal benefits from increases in natural resource availability are greatest in competitive markets is a well-known implication of microeconomic theory.

16 Avidity bias is the over-sampling of frequent anglers. Recall bias is the tendency for anglers to overstate trip frequency.

17 Nonuse values are also referred to as existence or passive-use values.

18 Economists prefer value estimates generated through the revealed behavior of market actors as opposed to those based upon stated preferences.

19 In the NODA, EPA refers to CV as stated preference (SP). The term SP is often used in a different context. Here we use the term CV to refer to a survey-based approach for eliciting willingness-to-pay.

20 EPA says that 0.77% of I&E losses are commercially or recreationally valuable species that are not caught. Landed fish represent 0.15%, of the I&E losses, meaning that I&E in the region affects five times as many unlanded as landed fish. EPA recreational value for I&E elimination in New England is $3.07 million, nonuse values are $4.54 million. This means that on average, EPA values an uncaught fish (commercial or recreationally valuable) at approximately 30% (0.77 / 0.15 x 3.07 / 4.54) of a caught fish.

21 This approach assumes that nonuse values can be approximated as some portion of use values.

22 In their prior benefits assessment, EPA valued forage fish through their role as food for commercially and recreationally valuable species (trophic transfer). In the NODA, it is unclear whether or not EPA still values forage fish in this manner. If they do, this should be corrected, valuing both the existence of forage fish and their role as food for larger fish is double-counting.

23 In other WTP studies, EPA estimates the value of a human life to be $4.8 million and the value of avoiding an emergency room visit for asthma to be $194 per case (these are in 1990 dollars, see below) (taken from The Benefits of the Clean Air Act 1990 to 2010, [1999]). On this basis, marginal increases to the stock of forage fish 391,752 visits to the emergency room or saving 15.8 statistical lives each year.

24 Meta-analysis is a benefit transfer approach that statistically controls for differences across studies.

25 See page 1 of DCN 5-1001.

26 See § 316(b) Phase II TDD.

27 Commercial and recreational values are undiscounted, as stated at 68 Fed. Reg. 13578. Nonuse value is the low end of a

range stated at 68 Fed. Reg. 13579 of the NODA.

EPA Response

The comment states that EPA’s final rule analysis is improved in terms of “incorporating a regional approach for national benefits; accounting for discounting and benefit timing; and relaxing the assumption that anglers catch all spared fish.”

The comment addresses several issues that are no longer relevant to EPA’s final rule analysis.

The HRC method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see the response to comment # 316bEFR.005.035.

The SRP method is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the SRP method, please see the response to comment # 316bEFR.005.006.

The comment raises the issue of uncertainty in EPA’s analysis. Please see Chapter A6 of Part A of the Phase II Regional Study Document for a discussion of uncertainty in the context of EPA's analysis (DCN #6-0003). EPA notes that uncertainty analysis was impeded, in part, by a general lack of information in facility documents on the variance in facility I&E estimates.

For EPA’s response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316EFR.005.029.

EPA realizes that the facilities evaluated do not constitute a random sample of in scope facilities. It was not possible to develop a random sample in a post-hoc analysis of limited information that was not collected as part of a study designed for the purpose of estimating I&E on a national scale. EPA used monitoring information prepared by individual facilities in the analysis. This material was provided in numerous formats and many degrees of completeness. Data for most facilities were very incomplete or non-existent, preventing an individual case study on those facilities. A novel, statistically rigorous, study designed to account for varying biological factors was not practical because of the difficulties in performing the study and characterizing all biological characteristics relevant to each CWIS at the over 500 facilities in scope of the Phase II rule, and to then obtain appropriate, corresponding estimates of I&E loss rates. EPA attempted to reduce any potential misrepresentation by conducting extrapolation only within major regions. I&E data from multiple facilities in each region were used to develop each regional estimate. In some cases, all of the facilities with I&E data in a region were evaluated (e.g., California). Given that the goal of EPA’s analysis was to develop estimates of impacts and benefits at the national scale, EPA believes that its regional approach provided a reasonable basis for extrapolation.

The commenter is wrong to assert that EPA assumed that all fish spared by CWIS are harvested. In fact, only about 2% of the fish lost to I&E are recreational or commercial fishery species. In addition, EPA's analysis does not assume that all individuals of these fishery species are harvested. Rather, in EPA's analysis harvest depends on species-specific fishing mortality rates (usually less than 20%). EPA used a simple, static model of foregone harvest that assumes that I&E losses of harvested species result in a reduction in the number of harvestable adults in years after the time that individual fish are killed by I&E and that future reductions in I&E will lead to future increases in fish harvest. The approach does not require knowledge of population size or the total yield of the fishery; it only estimates the incremental yield that is foregone because of the number of deaths due to I&E. EPA recognizes that the assumption that the key parameters in its yield model are static is an important one that is not met in reality. However, by focusing on a simple interpretation of each individual I&E death in terms of foregone yield, EPA concentrated on the simplest, most direct assessment of the potential economic value of eliminating that death.

The comment endorses EPA's use of regional RUM modeling, with some caveats. See responses to comments 316bEFR.041.452, 316bEFR306.320, and 316bEFR337.010 for EPA's responses to comments concerning the RUM analysis.

For the final 316b rule analysis, EPA has not included quantitative measures of national benefits associated with nonuse values. However, the Agency has explored several approaches that indicate the potential significance of non-use values, including a peer-reviewed meta-analysis of non-use values. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The comment states that EPA's estimates of non-use value are around 30% of use values on a per-fish basis. It is not clear what numbers of fish the commenter is using. The comment states that the appropriate non-use value of individual fish is the value that reflects their contribution to the total stock of fish, so that, in a viable fishery, use values should be much larger than non-use values. If non-use values are 30% of use values then use values represent 70% of the value of these fish, a significant amount. EPA agrees that "as a fishery declines, each remaining fish becomes relatively more valuable in nonuse than use." The comment suggests that EPA should consider this fact in its analysis, but does not suggest a method for doing so.

The comment states that, because EPA presents no use value for forage fish, then non-use value for these fish must be zero. This comment has two flaws. First, EPA did include use values for forage fish that enter the food chain through trophic transfer to commercial and recreational species. Second, there is absolutely no basis for saying that a good must have measurable use values in order to have non-use values. Simply because the Fisher-Raucher approach implies that resources with zero use values have zero non-use values does not mean it is true. Numerous economic models have implications that are inconsistent with reality, simply because they are models which, by nature, are only approximations of reality. For example, many statistical functions pass through the origin. While these models may predict extremely well in the range of normal data, they may make no sense at all as they approach zero. Yet, these models are used every day in all kinds of economic analysis, very successfully, when applied with common sense.

The comment states that it is questionable to apply a concept originally intended to capture values for the Grand Canyon. However, non-use values are a conceptual category that apply equally on unique or common resources. The monetary valuation of unique and common resources is expected to be different. Nevertheless, non-use values have been measured and reported in the peer-reviewed literature for numerous resources that are not as unique and well-known as the Grand Canyon (e.g., small fish such as silvery minnow and striped shiner).. For example, see Berrens, R.P., P. Ganderston, and C.L. Silva. 1996. Valuing the Protection of Minimum Instream Flows in New Mexico. Journal of Agricultural and Resource Economics 21(2):294-309 (DCN #6-3110).

The comment states that, "at optimal harvest, one fish more or less, does not impact the viability of the stock at all." This may be true, but we are not talking about losses of one fish, but of millions of fish.

The comment concludes with the implication that, because the magnitude of total non-use values has increased from EPA's original analysis and the NODA analysis, that it cannot be correct. However, EPA's original analysis only considered a very small fraction of non-use values – those non-use values that accrue to commercial and recreational fishing users of the resource for the subset of species that have use values. In the revised NODA analysis, EPA included additional species that did not have use values, or that had only indirect use values, and these included a more reasonable population who are likely to hold these values.

Comment ID 316bEFR.307.302

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02

Benefit Estimation Methodology

[comment continued from 316bEFR.307.301]

DETAILED DISCUSSION: MAJOR CONCERNS WITH EPA'S BENEFITS ANALYSIS

The remainder of this report presents a detailed discussion of the new benefit estimates EPA presents for the North Atlantic region (for which the Agency estimated commercial, recreational, and nonuse values) and the Northern California Region (for which EPA estimated only commercial and recreational values). <FN 28>

Footnotes

28 EPA includes a "break even" analysis for Northern California. This analysis computes the magnitude of nonuse benefits required for benefits to equal costs under the assumption that costs, commercial benefits and recreational benefits are calculated correctly.

29 As reported by NMFS for the ten-year period of 1991 to 2001.

30 EPA's previously asserted that producer surplus was between 40% and 70% of dockside value.

31 EPA provides no evidence that 0% to 40% of increased dockside value is appropriate for a long-run situation. Nor does it provide an explanation why the high end of this range was selected for the benefit estimation.

32 Price adjustments in fish markets take place daily eliminating the potential for significant producer surplus.

33 Economic theory implies that the long-run supply curve in many markets is horizontal. This may not be the case in natural resource industries, so this assumption should be considered an approximation.

34 Producer surplus represents the benefits to suppliers of a product or service. Producer surplus is the difference between the market price and the minimum price suppliers would be willing to accept for the product (Varian 1996).

35 In response to EPA question 1, this downward shift in the supply curve is the appropriate manner to characterize the effect of increased fish stock on commercial fishing.

36 Price elasticity of demand is also called simply elasticity or own price elasticity. It refers to the percent change in quantity associated with a percent change in price.

37 These are undiscounted total annual benefits. As shown in the tables, the welfare gains from catching additional winter flounder account for more than 85% of the total net benefits.

38 In studies where demand systems are estimated using retail price and quantity data, (Wessells and Anderson 1992; Wessells and Wilen 1994; DeVoretz and Salvanes 1997), demand elasticities average around –1.

39 This is an apt description of a market with output restrictions but without barriers to entry.

40 In response to EPA question 3, this analysis presumes no producer surplus currently exists. However, measures of existing producer surplus are not required for this benefit calculation, only measures of changes in producer surplus.

41 EPA used the 1994 MRFSS surveys for the North Atlantic region and the 2000 MRFSS surveys for the Northern California region. EPA also proposes to use the 1997 MRFSS survey. The MRFSS surveys will be used for the six coastal

regions.

42 Source: http://www.st.nmfs.gov/st1/recreational/index.html

43 Because of difficulties and uncertainties in calculating nonuse values, EPA includes a “break even” analysis for Northern California. This analysis computes the magnitude of nonuse benefits required for benefits to equal costs under the assumption that costs, commercial benefits and recreational benefits are calculated correctly.

44 Contingent valuation (CV) is the most widely used hypothetical valuation technique. Stated preference (SP), conjoint, and contingent choice all refer to choice-based survey methods that can be used to measure nonuse values. While more complex than CV, these methods still require respondents to value unfamiliar hypothetical commodities. As a result, they are subject to similar problems with hypothetical bias as CV.

45 Hypothetical bias is the potential error that results from not confronting an individual with a real situation. CV responses and SP responses likely reflect hypothetical bias. The validity of hypothetical data is the degree to which it measures the point of interest (Mitchell and Carson 1989, p. 190).

46 The 1992 NOAA panel discussed 24 issues that should be considered to maximize the reliability of CV studies.

47 EPA presumes that eelgrass is only valued for its role in the production of fish and shellfish.

48 National Oceanic and Atmospheric Administration’s (NOAA’s) proposed natural resource damage assessment (NRDA) regulations list three basic issues that researchers should consider when selecting transfer values:
-comparability of the users and the natural resource and/or service being valued
-comparability of the change in quality or quantity of the resources and/or services
-the quality of the studies being transferred (59 Fed. Reg. 1148[1994]).

49 OMB Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations (68 Fed. Reg. 5492 Feb. 3, 2003).

50 Reference utility is the utility level associated with the current situation.

51 See EPA, “Estimating Total and Non-use Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV) (March 12, 2003) (DCN 5-1010), p. 3. This illustrates the substantial expertise needed for this type of decision-making.

52 Specific data sources for per-acre abundance estimates and details of data analyses are presented in chapters F5 and G5 of the §316(b) Phase II Case Study Document. We have not reviewed those biological data, and we offer no assessment of their validity.

53 The Peconic Estuary survey states that eelgrass is “fish and shellfish habitat.” Because EPA knows of no other use for eelgrass they presume that 100% of its value is habitat value.

54 Using The Rhode Island Salt Marsh Restoration: 2001 Survey of Rhode Island Residents EPA determines that the mean proportion of value for fish habitat ranges from 20 to 32%. The proportion of value associated with shellfish habitat ranges from 22 to 35%.

55 Freeman (1993) provides a discussion of the difficulties associated with disentangling the use and nonuse components of total value.

56 The Peconic Estuary System is located on the east end of Long Island, New York.

57 Here EPA references the findings of Johnston et al. (2002). This study found that residents throughout Rhode Island (32.4 miles from the coast) have values for wetland restoration actions. There is no reason to believe that these values are constant with respect to distance, or that this result is relevant for the current situation.

EPA Response

The comment states that EPA’s benefit transfer is flawed because it does not recognize limitations in the original study, and because of significant differences between the hypothetical choice scenario and the policy context, including the reference utility level, valuation scenario, and affected population. EPA does not monetize national nonuse benefits in the analysis of the final rule due in part to uncertainty associated with application of nonuse values from existing studies. However, EPA explores approaches for nonuse benefits transfer and has found potential for significant nonuse benefits to exist (see response to comment 316bEFR.303.301.

The comment states that the reference utility in the Peconic study will result in decreased in wetlands and eelgrass, while the reference utility with no new expenditures for the 316(b) scenario will lead to unchanged environmental conditions. However, if no new expenditures occur in the 316(b) scenario, conditions will not be unchanged, but will continue to deteriorate as fish are impinged and entrained over time.

The comment also states that changes anticipated by I&E reductions are marginal while changes estimated in the Peconic survey are significant. The Peconic survey statistically estimates values for marginal changes in acres of habitat, based on realistic described changes in habitat. The changes in habitat required in EPA's case study areas to compensate for lost fish are similar in magnitude to those given in the Peconic survey. EPA, in measuring the value of habitat required to offset losses of fish, is using the concept of resource-based compensation, as described in more detail in EPA's reply to comment #316bEFR.307.061.

The comment says that expected changes in fish stocks are within the range of typical population fluctuations and thus seems to imply that these losses of fish have no value. Again, EPA has used the value of habitat to provide a means of indicating the magnitude of losses to fish, based on the use of resource-based compensation.

For EPA's responses to the issues of relating fish habitat to fish production, use vs. non-use values in the original study, the concept of intrinsic non-use values, the appropriate extent of the affected population and similarities between the study population and policy population, and the magnitude of non-use values, please see EPA's responses to comments #316bEFR.307.061, #316bEFR.303.020, #316bEFR.304.002, #316bEFR.304.004, #316bEFR.328.010, and #316bEFR.338.042.

EPA notes that the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) rule. Instead, the Agency used this approach to provide useful information for policymaking officials to consider in otherwise reviewing a final conclusion over the final 316(b) Phase II rule.

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Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.02

Commercial Fishing Benefits

2.1 Commercial Fishing Benefit Estimates

EPA's benefit analysis assumes that a reduction in I&E improves commercial fishing through an increase in catch. EPA calculates the direct value of yearly commercial harvest lost to I&E by multiplying hypothesized landing increases by dockside prices. <FN 29> EPA converts the change in dockside value to a change in societal benefits by assuming that producer surplus is the only benefit to commercial fishing, and that producer surplus is between 0% and 40% of dockside value. <FN 30> In the actual benefits estimation, EPA employs 40% of dockside value. <FN 31>

In developing its methodology, EPA seeks specific input regarding:

1. The likelihood that supply curves will shift, thereby creating the context for generating greater net surplus
2. How best to incorporate fishery management regimes into the analysis
3. Estimates of normal profit and how to interpret them to estimate a more suitable measure of producer surplus
4. The likelihood and magnitude of price changes that may result from increased harvest.

In response to EPA's request, we consider two relevant situations. The first case is an open access fishery. In an open access fishery, new entrants are expected as long as the price of anticipated catch exceeds the cost of entry. The entry of new suppliers (or increased effort of existing suppliers) tends to reduce the stock of fish, raising the cost of catching fish for all participants. Suppliers will continue to enter as long as expected profits are above the normal rate of return for this class of investment. Entry ceases when the price and average cost of harvesting fish are equated at the industry level. At this point, producer surplus is eliminated. Thus, once all adjustments are made, markets reach equilibrium and there is no producer surplus. <FN 32>

This situation is shown in Figure 1. Here, the original long-run supply curve is horizontal and producer surplus (represented by the area between the price line and supply curve) is zero. <FN 33, 34> As the stock of fish increases because I&E is reduced, the cost of catching fish drops. Because a supply curve represents costs, permanent lower per fish harvest costs can be depicted by a downward shift in the long-run supply curve (LRS1 to LRS2). <FN 35> When all anglers face lower harvest costs, they compete to sell additional fish by lowering prices. This leads to a decrease in long-run equilibrium price (P1 to P2). Once competition has caused prices to adjust, there is no producer surplus. Thus, in a competitive situation, benefits do not accrue to commercial anglers. The advantage this sector gains due to lower costs is completely offset by lower prices.

There is a societal benefit to lower harvest costs. However, this benefit accrues to fish consumers. Consumers benefit through lower prices. This benefit can be estimated by calculating the increase in consumer surplus that is associated with lower harvest costs. Consumer surplus is the difference between what consumers are willing to pay (as represented by the demand curve) and market price.

The change in consumer surplus associated with lower costs in a competitive market is the shaded area depicted in Figure 1.

The increase in consumer surplus can be calculated mathematically by:

[see hard copy for equation]

Inputs to this calculation are existing price and quantity, expected change in quantity, and expected change in price. EPA employs existing price and quantity data in their current calculations. The change in quantity is already developed through expected reductions in I&E and resultant catch improvements. In order to estimate the change in the long-run equilibrium price, EPA should use the price elasticity of demand for fish. <FN 36>   For example, if the price elasticity of demand is –1.5 and the percentage change in quantity is 1%, then the estimated percentage change in price would be:

[see hard copy for equation]

Figure 1. Commercial Fish Market
[see hard copy for figure]

This information can be used to calculate the new price level and estimate the change in consumer surplus. In Tables 2 and 3 below, we present the expected increase in consumer surplus associated with an increase in North Atlantic catch for oceans and estuaries when the price elasticity of demand is unit elastic (–1). <FN 37>   Unitary elasticity indicates that price and quantity change by equal proportions but in opposite directions. In response to EPA's question 4, a brief review indicates that assuming unitary elasticity (–1) is appropriate for many commercial fish species. <FN 38>   We have employed this number in calculations here for illustrative purposes. A complete analysis should include a more thorough investigation into species and region specific own-price and cross-price elasticities.

The tendency for producer surplus to reach zero in the long-run is a well-known foundation of microeconomic theory (Mansfield 1988). However, producer surplus elimination through competition depends upon price changes. It may be possible to have some long-run producer surplus if there are market restrictions such as quotas or regulations. To address this situation and respond to EPA's question 2, we present a model of fish stock improvement under a fishery regime that restricts output.

Table 2. Estimating Gains in Consumer Surplus in Commercial Fish Markets (Estuaries) for the North Atlantic Region
[see hard copy for table]

Table 3. Estimating Gains in Consumer Surplus in Commercial Fish Markets (Ocean) for the North Atlantic Region
[see hard copy for table]

In this model, the government sets a quota on the quantity of commercial stock sold and the quota is the equilibrium quantity (Q1). <FN 39>   As shown in Figure 2, there is no initial long-run producer surplus. <FN 40>   As the reduction in I&E leads to an increase in the commercial stock, the long-run supply curve shifts down from LRS1 to LRS2. However, the quantity supplied remains at Q1 (the quota level) and the corresponding equilibrium price remains at P1. In this situation, there would be an increase in producer surplus, because the equilibrium price exceeds average costs. The producer surplus is the difference between production costs and price (the shaded area of Figure 2) or (P1 – P2) * Q1. In this manner, existing price and quantity information can be combined with price elasticity of demand estimates to anticipate changes in producer surplus when there are market restrictions.

Figure 2. Commercial Fish Market (with a Quota)
[see hard copy for figure]

Summary

EPA has improved its preferred approach for calculating commercial benefits. However, any approach basing benefits on dockside landings, is inappropriate. Economic theory states that prices will change in competitive markets when costs change. As demonstrated in Figure 2, if there are market restrictions, estimating producer surplus is appropriate. However, as indicated in TER's prior comments for UWAG, it appears that there are no barriers to entry for most relevant species and commercial markets (see Desvousges et al. 2002, pp. 16–23 for TER's earlier comments to UWAG on the nature of fish markets). For these reasons, TER believes that estimating the commercial benefits using consumer surplus instead of producer surplus may be an appropriate method. In addition, as Figures 1 and 2 illustrate, the change in consumer surplus in free markets exceeds the change in producer surplus when there are market restrictions. This is a standard result arising from the welfare loss associated with departure from competitive equilibrium caused by market restrictions (Perloff 2000).

Assuming unit price elasticity, and taking as a given all other input parameters used by EPA, the estimated annual net benefits or total increase in consumer surplus before discounting is $718,976 for the North Atlantic region as compared to EPA's estimate of $281,889. We offer this calculation, not as an alternative estimate of commercial benefits (which it is not), but as a demonstration of how EPA's approach incorrectly estimates commercial benefits. The magnitude of this error depends upon the elasticity of demand for fish. This estimate suggests commercial benefits with open markets and unit price elasticity would be somewhat higher than benefits based on producer surplus alone. However, total commercial fishing benefits remain a small fraction of the $79 million in yearly benefits that EPA attributes to elimination of I&E elimination in the North Atlantic.

EPA Response

EPA did not find evidence that projected changes in catch would be capable of creating significant changes in market prices, and EPA determined that there is potential for regulation of fisheries affected by this rule. As a consequence, EPA relied upon changes in producer surplus to value commercial fishing benefits, while recognizing remaining uncertainty about long-term market impacts. For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

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Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

Subject Matter Code 10.02.01.02

Random Utility Model (RUM)

2.2 Recreational Fishing Benefit Estimates

For the final rule analysis, EPA proposes employing random utility analysis to calculate recreational benefits arising from the reduction of I&E. As discussed earlier, EPA employs a geographic approach in its final rule analysis. According to the NODA, the estimated annual recreational benefits for the elimination of all I&E for the North Atlantic region is $3.07 million (undiscounted). The Northern California region estimate is $1.4 million (undiscounted). Table 4 summarizes EPA's recreational analysis on the basis of the geographic region, analytical technique, data source, survey type, recall period, methodology, and annual undiscounted benefits for complying with the preferred option.

Table 4. Summary of EPA's Recreational Analysis
[see hard copy for table]

Analytical Technique

EPA intends to employ region-specific random utility models (RUMs) to estimate benefits to recreational anglers. RUMs were initially developed to analyze transportation-mode choices (McFadden 1974). More recently, they have been applied to recreation-site choices (Schuhmann 1998; Ruby, Johnson, and Mathews 1998). The RUM estimates the probability that an individual will choose to visit a given recreation site. This probability depends on the characteristics of that site, the characteristics of available substitutes, and the travel costs to all the sites in a recreator's choice set. This focus on site characteristics means that RUMs can be used to estimate the value of marginal changes in attributes (such as catch rate). Thus RUMs are well suited for many regulatory analyses. In addition, federal agencies have approved their use for valuing natural resources. (See U.S. Environmental Protection Administration, 2000, and National Oceanic and Atmospheric Administration, 1996 [61 Fed. Reg. 439–510]). Correctly applied, random utility analysis presents the best opportunity for valuing increased catch hypothesized to result from I&E reductions. The following sections discuss EPA's data sources, as well as concerns with these data sources, and the analytical approach described by EPA.

Data Sources and Survey Issues

For their random utility analyses, EPA chose to employ the 2000 National Survey of Recreation and Environment and the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation for the interior region, the 1995 Michigan Recreational Angler Survey for the Great Lakes region, and MRFSS data combined with the corresponding Add-on MRFSS Economic Survey (AMES) <FN 41> for the six coastal regions. The first two data sources employ telephone surveys, and the MRFSS data uses a combination of telephone surveys and intercept surveys.

The National Survey of Fishing, Hunting, and Wildlife-Associated Recreation is primarily a telephone survey of more than 80,000 households nationwide and is conducted by the U.S. Bureau of

Census for the Fish and Wildlife Service. The purpose of the survey is to obtain information on the number of anglers, hunters, and wildlife-watching recreators in the United States. Respondents are limited to those at least 16 years old. The Michigan Recreational Angler Survey is a random digit dial (RDD) statewide telephone survey of more than 3,000 households. The RDD sample is stratified by county in proportion to the number of licensed anglers by county.

The National Marine Fisheries Service (NMFS) conducts the MRFSS on an annual basis. The MRFSS consists of two separate complementary surveys—a telephone survey and an intercept survey. The telephone survey is a random sample of more than 250,000 households. The telephone survey is used to identify households with saltwater anglers and to estimate marine fishing effort. The intercept survey or field survey provides catch information as trained personnel interview anglers at thousands of fishing sites across the United States. <FN 42>

The data EPA intends to employ come from RDD (telephone) surveys and intercept surveys. Intercept surveys select respondents at specific recreation sites. In this type of survey, over-representation of avid anglers occurs because the probability of surveying an angler is related to the number of trips the angler takes. This means that individuals who presumably value an activity most highly (frequent anglers) are disproportionately represented. The problem with this type of data for benefits estimation is that unweighted intercept data are not descriptive of the general population of anglers. Thus, while overall angling activity may be fairly represented, valuation estimates are incorrect. Appropriate population weights ensure that the sampled anglers are given importance proportional to the number of anglers they represent in the population. In the case of MRFSS data, the RDD telephone survey can potentially be used to adjust for avidity bias. Valid benefit estimates from MRFSS data depends upon an appropriate adjustment for avidity bias (see McFadden 1981).

Another problem with many telephone and intercept surveys for random utility analysis is that the responses of anglers typically exhibit recall bias. Recall bias is the demonstrated tendency of recreators to overstate the number of trips they take. Uncorrected, this leads to upward bias in benefit estimates. The MRFSS survey attempts to minimize this problem by limiting sampling to two-month trip-recall windows. However, daily trip logs are preferable. EPA's analysis should include an adjustment for recall bias (Westat Inc. 1989).

Analytical Concerns

Another concern with EPA's RUM estimation is in calculating the opportunity cost of time. The approach generally taken in the literature is to specify opportunity cost as one-third of the wage rate (McConnell and Strand 1981). However, in its analysis for the North Atlantic region, EPA's approach assigns the full wage rate to all respondents reporting lost wages. In this approach, these individuals travel costs are lost wages plus $0.30 per mile (1994 dollars) in traveling expenses. Travel costs for those who did not report losing income are $0.30 per mile. Thus, trip costs, and benefit estimates, depend heavily upon the validity of survey responses to questions about lost wages. For respondents reporting lost wages, forgone income must be correctly measured. It is unclear what question of the 1994 Add-on MRFSS Economic Survey provides justification for EPA assigning respondents to the "lost wages" category. Possibilities taken from the survey include:

26. Can you choose to work more or fewer hours per week?
28. Did you forgo any wages by taking this trip?

29. About how much money could you have earned if you hadn't taken this trip?

EPA's trip cost estimation technique focuses on wages lost due to travel time. For this reason, Question 28 from the 1994 Add-on MRFSS Economic Survey (which focuses on wages) is apparently the variable used to identify trip costs. This approach assumes that anyone losing wages lost the full pretax value of his or her average wage rate. This is an extremely generous allowance for the opportunity cost of time, which will tend to inflate value estimates (See Desvousges et al. 2002, pp. 33–35 for TER's earlier comments to UWAG on trip cost estimation and opportunity cost of time). For the Northern California region, EPA estimates opportunity cost as one-third of the wage rate for all respondents. EPA provides no explanation for employing different opportunity cost of time specifications in each region.

Summary

EPA is now using regional RUMs to estimate recreational benefits from the reduction in I&E. For this type of analysis, RUMs are the preferred method. However, it is likely that EPA's recreational benefit estimates are overstated due to incorrect population weights arising from avidity bias, uncorrected recall bias, and nonstandard specification of the opportunity cost of time. The complexity of random utility modeling means that a detailed critique requires access to programs and data underlying benefit estimates. These were not available for the two regional analyses EPA presented. For this reason, it is not possible to completely evaluate these factors at this time.

EPA Response

EPA agrees that "correctly applied, random utility analysis presents the best opportunity for correctly valuing increased catch hypothesized to result from I&E reductions." However, EPA does not agree with the commenter that its RUM approach is improperly applied. It appears that the commenter did not fully understand the data used and EPA's analysis. EPA did not use the 2000 National Survey of Recreation and Environment, as mentioned in the comment.

EPA follows standard and generally accepted practices for sampling methodology, calculation of trip costs, and participation modeling. See also response to comments number 316bEFR.041.452 for details regarding sampling, trip costs, and participation modeling.

Comment ID 316bEFR.307.305

Subject Matter Code 10.02.04.01
Peconic-based approach

Author Name David E. Bailey

Organization Hunton & Williams obo Utility Water Act Group

2.3 Nonuse Benefit Estimates

In the NODA, EPA calculates nonuse values for only the North Atlantic Region. <FN 43> According to EPA calculations, 99.85% of total age 1 equivalent I&E losses in the North Atlantic region will never be caught by commercial or recreational anglers. Of this figure, 0.77% are recreationally and commercially valuable species. The remaining 99.08% are forage fish. Because these fish are never landed, their value is not included in EPA's commercial and recreational benefit categories. The appropriate benefit category for unlanded fish is termed nonuse. In contrast to the former BCA, the great majority of value from reductions in I&E are now attributed to nonuse benefits.

Nonuse values cannot be measured through observation because actions are not required to experience them (Freeman 1993). For this reason, economists have developed hypothetical valuation methods. These methods presume that nonuse values can be elicited with an appropriately designed survey. <FN 44> In practice, these surveys' reliance on hypothetical scenarios greatly undermines the reliability of resulting nonuse value estimates. <FN 45> As a result, the true magnitude of nonuse values is controversial. The major source of this controversy is the inability to externally validate nonuse value estimates with methods that do not themselves rely exclusively on hypothetical responses.

Although the validity of estimates based on hypothetical surveys is questionable, these are the only methods currently available for calculating nonuse benefits. For this reason, hypothetical survey practitioners generally attempt to establish validity through meticulous study design (Freeman 1993). This may consist of multiple rounds of focus groups and pretesting to appropriately characterize the valuation scenario and affected population. <FN 46> Even under the best of circumstances, developing a valid hypothetical survey requires great care and precision.

EPA does not attempt to estimate nonuse values with an original survey. Instead, EPA transforms values from a study that measures local preferences for aquatic habitat in the Peconic Estuary. This approach is flawed because it does not recognize the limitations of the primary study for generating dollar value estimates of the commodity considered in the valuation exercise. Within their text, Opaluch et al. (1995) specifically state that their study is more appropriate for calculating relative values than dollar estimates.

"However, we believe that the relative values of resources [derived from the contingent choice survey] are more reliable than are the dollar estimates of the values and recommend that relative values, rather than dollar values, be used in the process of selecting management actions" (Opaluch et al. 1995).

Proceeding under the assumption that the underlying study generates reliable dollar value estimates for habitat, EPA takes the following six steps in developing nonuse values for I&E reductions in the North Atlantic.

Step 1: Assess public values for fish and shellfish habitats.

EPA employed results from a site-specific study of environmental preferences for aquatic habitat in the Peconic Estuary (Johnston et al. 2002). This study elicited willingness-to-pay for coastal wetlands and eelgrass using the contingent choice method. Model results estimate that nonusers are willing to pay $0.054 per year per household for each additional acre of wetlands and $0.052 per year per household for each additional acre of eelgrass.

Step 2: Adjust habit values to reflect portion attributable to fish habitat.

Wetlands provide a variety of services. Thus, EPA allows that respondent values for wetlands are not solely due to their role in fish production. <FN 47> EPA adjusts for this factor with information from Rhode Island Salt Marsh Restoration: 2001 Survey of Rhode Island Residents. EPA interprets the results of this survey to mean that fish production accounts for approximately one-third of wetland value.

Step 3: Estimate per-acre production as per-acre density.

Because the exact role of wetlands and eelgrass in fish production is unknown, EPA relies on a survey of experts to identify species produced in wetlands and eelgrass. In place of production data, EPA estimates that production is equivalent to density. In this manner, EPA calculates that an acre of tidal wetlands produces between 205 and 351 winter flounder per year and that an acre of eelgrass produces 101 northern pipefish per year.

Step 4: Estimate quantity of habitat required to replace I&E losses.

The presumption that abundance of eelgrass directly represents production of fish allows EPA to calculate the amount of habitat needed to offset I&E losses. For example, production estimates of between 205 and 351 winter flounder per acre are combined with I&E loss estimates to calculate that between 25,589 and 48,813 acres of wetlands are required to offset uncaught winter flounder losses in the North Atlantic. For eelgrass, estimates were 1,205 acres for scup and between 105 and 180 acres for threespine stickleback.

Step 5: Combine data to estimate per-household values for fish and shellfish losses.

At this point, EPA has household habitat values and estimates of the number of acres of each habitat required to offset I&E losses. With this information, EPA calculates per-household per-year willingness to pay for I&E losses.

Step 6: Extrapolate per-household results to wider area to get total results.

Per-household willingness to pay estimates represent average losses. However, nonuse values depend critically upon the number of affected individuals. Based on the estimated value per acre to residents of counties abutting affected water bodies, EPA estimates that the nonuse value of restoring 25,589 acres of coastal wetlands is $73.9 million. Nonuse value solely for restoring 1,205 acres of eelgrass is $16.1 million.

In developing this exercise, EPA conducts a benefits transfer. Recent research has questioned the reliability of benefits transfer (Loomis et al. 1995; Downing and Ozuna 1996; Kirchoff, Colby, and La France 1997). However, practical considerations dictate that applied welfare analyses for environmental resources must often rely on benefits transfer. Both NOAA and EPA have suggested criteria to maximize transfer reliability. <FN 48> However, these suggestions do not specifically address the transfer of nonuse values. For these values, outcomes are particularly sensitive to the underlying hypothetical scenario. This concern underlies the Office of Management and Budget (OMB) admonishment that the hypothetical choice situation “corresponds closely with the policy context to which estimates will be applied.” <FN 49>

EPA’s benefits transfer is inappropriate because of significant differences between the hypothetical choice scenario and policy context. Areas of particular concern include the reference utility level, valuation scenario, and affected population. To demonstrate the magnitude of these problems, we have included a question taken from the Peconic Estuary survey. This is the primary survey instrument underlying EPA’s estimates of nonuse values for I&E reductions.

[see hard copy for table]

One major difference between the survey scenario and the valuation scenario associated with §316(b) regulations is in the reference utility. <FN 50> In the Peconic Estuary study, each survey question asked respondents to choose either the current situation or one of two hypothetical programs to restore or protect resources. In the sample question above, the reference utility or “No New Action” option is associated with no new expenditures. However, inaction leads to a dramatic decline in wetlands (25%) and eelgrass (10%). This outcome is the expected situation in the Peconic Estuary as determined by a Technical Advisory Committee. It is based on historical declines in habitat and expert judgment.

The reference utility associated with I&E reductions is quite different from that related to habitat in the Peconic Estuary. In particular, §316(b) regulations address modifications of CWIS at existing facilities. Thus, an appropriate characterization of the benefits associated with §316(b) regulations is that “No New Action” be associated with no new expenditures and unchanged environmental conditions. In the Peconic Estuary study, the respondent who selects the “No New Action” column pays nothing, but must accept a decline in habitat. The effect of transferring values with this disparity is that the transferred values will be overstated, when compared to a situation in which no decline in current conditions occurs in the absence of an expenditure.

An additional problem with EPA’s transfer is in the type of change considered in the valuation scenario. EPA’s transfer approach associates a number and type of fish with habitat improvement. For example, EPA relates fish to habitat using rates of 205 winter flounder per acre of wetlands and 101 pipefish per acre of eelgrass. EPA’s interpretation of values for habitat in terms of values for fish requires that respondents value both existing habitat and habitat changes for production and no other purpose. This requires that survey respondents understand the productive capacity of these habitats. It also requires that respondents are not valuing benefits of eelgrass or wetlands that EPA has not explicitly considered.

In developing its benefits transfer, EPA first convened two panels of experts, one to assess species associated with the Brayton Point Station, and one to assess species associated with the Pilgrim Station. These experts identified impinged and entrained species at each station that might be restored by provision of certain types of habitat. EPA notes that those panels came to different conclusions about the effectiveness of restoration techniques, based on site-specific differences affecting each species. <FN 51> EPA then based its per-acre habitat productivity calculation for these fish on per-acre counts of fish by site and type of habitat. <FN 52>

It is unlikely that survey respondents understand the productivity of wetlands and eelgrass in the manner required for this transfer. Certainly, EPA has provided no support for the proposition that they would have. Even if respondents were capable of such calculations, the survey did not indicate that they should do so. In fact, the survey only notes that eelgrass is habitat for fish and shellfish. The role of wetlands in fish production is not stated. Furthermore, even if respondents could assess the role of these habitats in fish production, the survey makes no distinction between the use and nonuse benefits of eelgrass and wetlands as fish habitat. Finally, the measure of production employed by EPA, abundance, is at best a very poor approximation for productivity. For these reasons, any values elicited by this survey cannot accurately represent values for fish.

It is doubtful that Peconic Estuary survey respondents have an accurate understanding of the role of habitat in fish production. Even if respondents do correctly understand the productive capacity of habitat, EPA's transfer requires that the value of this productive role be separated from any other value. EPA assumes that the entire value of eelgrass arises from its production of fish and shellfish. Having no direct knowledge that this is the case, EPA relies upon assertion and a parenthetical statement in the Peconic Estuary survey. <FN 53> EPA relies on an additional study to conclude that 30% of wetlands is attributable to fish production. <FN 54> In so doing, EPA has assumed that wetlands and eelgrass have no intrinsic nonuse value. This conclusion is strongly at odds with the ideas underpinning EPA's nonuse analysis. If people have strong nonuse values for forage fish, we should expect that they value aquatic vegetation and wetlands similarly. As a result, the values EPA attributes to habitat include both the habitat's value in producing wildlife and an intrinsic nonuse value. <FN 55>

Nonuse valuations with minimal bias appropriately characterize the relationship between willingness-to-pay and the type and size of environmental change being valued (Freeman 1993). Dissimilarity between the type of change being valued in the survey setting and valuation context undermine the reliability of EPA's benefits transfer. A further problem with transferring results from the Peconic Estuary study to a §316(b) regulation context is that the existing quantity and change in quantity being valued are very different. In particular, the changes anticipated by I&E reductions are marginal, while those considered in the survey are significant. For example, the Peconic Estuary survey set the existing stock of wetlands at 16,000 acres and the existing stock of eelgrass at 8,800 acres. The survey asked about the value of potential changes to the stock of eelgrass and wetlands that ranged from 10% to 25%. In the North Atlantic, fish stocks tend to be large and variable (Sissenwine 1984). Changes to fish stocks expected to arise from §316(b) regulations are comparatively minor. For example, EPA presumes that I&E reductions will lead to a 4% change in commercial catch of winter flounder. EPA's stated assumption of linearity in harvest implies that uncaught winter flounder likewise increase by 4%. According to EPA Guidelines for benefits transfer, both the base and extent of the change should be similar. EPA's transfer does not meet this criterion. In addition, the extent of change anticipated in fish stocks is within the range of typical population fluctuations.

Lack of similarity in reference utility and valuation scenarios invalidates EPA's calculated per-household nonuse values for I&E reductions. EPA compounds this problem by inappropriately identifying the population affected by 316(b) regulations. A significant aspect of developing nonuse estimates is in definition of the relevant population. EPA's benefits transfer relies upon responses to a questionnaire that elicits local preferences for habitat restoration in the Peconic Estuary. <FN 56> EPA takes per-household per-year values from this small, affluent area and applies them to a benefit population of either 210,357 or 737,711 households. EPA arrives at 210,357 households because that is the number of households in counties abutting affected water bodies. EPA's alternative benefit population of 737,711 households is the number of households within 32.43 miles of a facility that would be affected by §316(b) regulations. <FN 57>

Both the EPA's Guidelines and NOAA's NRDA regulations stipulate that reliable benefits transfer requires that affected populations are comparable. This is particularly important when one considers the source of nonuse values. Small per-household values can become quite large when aggregated over a significant population. Thus, the number of individuals holding nonuse values is as integral to the calculation of total nonuse benefits as is value per household. Appropriately identifying the geographic extent of the population with nonuse values and the effect of location on these values is essential to correctly identifying aggregate nonuse values (Johnson et al. 2001). EPA's assumption that the preferences of a small group of affluent individuals living in coastal communities represent those of millions of people is without merit and likely leads to overstated nonuse benefit estimates.

Summary

EPA expects that the great majority of benefits from 316(b) regulations are nonuse. However, research on the nonuse values associated with marginal changes in fish populations is not available. Because one result of aquatic habitat restoration/preservation is increased production of fish and shellfish, EPA feels that values people hold for these habitats may be indicative of the values they hold for fish and shellfish. Based on this presumption, EPA attempts to transfer values from a survey wherein respondents indicated preferences for preservation/restoration of eelgrass and wetlands. In so doing, EPA violates its own principals for benefits transfer and ignores research into the sensitivity of elicited nonuse values.

In particular, the EPA Guidelines (p. 87) permit transferring study results only when the basic commodities are essentially equivalent and where the baseline and the extent of change are similar. This clearly is not the case. Various types of scenario misspecification create a divergence between what the respondent understands about the choice situation and what the investigator hopes the respondent understands. Furthermore, a poor understanding of the affected population leads to bias in the aggregation of nonuse values. EPA's attempt at calibrating values to enhance the reliability of this transfer has dubious value in any circumstance. This approach is particularly questionable when transferring nonuse values. Surveys designed to elicit nonuse values typically go through extensive testing to minimize hypothetical bias. Unfortunately, hypothetical bias cannot be eliminated using the type of post-administration, ad hoc methods employed by EPA.

We conclude that EPA's approach to nonuse values is inconsistent with both sound theory and good empirical practice. Economic theory implies that nonuse values are most important for unique resources with high awareness levels. Yet, EPA finds that the great majority of nonuse benefits from its proposed Phase II §316(b) regulation are attributable to the nonuse values of forage fish. Our review of the available information provided by EPA and the current economic literature on nonuse values indicates that if nonuse values were relevant for the §316(b) regulations, they would be quite modest. It is unclear how nonuse values from I&E reductions should be evaluated. However, EPA's attempts at benefits transfer indicate that the available research cannot support the required evaluation. EPA should bear in mind that in this circumstance, misinformation does not inform policy (Smith 1992).

EPA Response

This commenter first summarizes EPA's procedure for estimating non-use values using benefit transfer from the Peconic Estuary study. The commenter then argues that EPA's benefits transfer is inappropriate because of significant differences between the hypothetical choice scenario and policy context. Specific concerns include the reference utility level, valuation scenario, and affected population.

EPA disagrees that the reference utility is significantly different between the Peconic Estuary survey scenario and the valuation scenario associated with §316(b) regulations. Under both scenarios, the reference utility or "No New Action" option is associated with no new expenditures. Inaction leads to a decline in wetlands (25%) and eelgrass (10%) under the Peconic Estuary survey scenario. Inaction under the valuation scenario associated with §316(b) regulations is also likely to lead to further decline in the affecter resources. For example, the fishery data suggest that the Mount Hope Bay fishery, one of the affected resources, has been declining in the last two decades. The Agency did not try to estimate the level of abundance that a healthy fishery would achieve once the adverse effects of CWS are controlled, along with continued management of fishing and continued water pollution control improvements, and then base its benefits analysis on that level. Rather, the EPA's analyses were simply based on existing plant data concerning losses to the plant intakes. The Agency, however, points out that "inaction" leads to continued losses of fishery resources that are likely to contribute to further decline in fisheries.

For EPA's response to comments regarding using habitat values to estimate values for fish and similarity between the study and policy resources, please see the response to comment #316bEFR.307.061.

For EPA's response to comments regarding the connection between values for habitat and values for fish and shellfish and respondents perception of the role of habitat in fish production, please see the response to comment #316bEFR303.020.

For EPA's responses to comments regarding comparisons of population demographics between the study region and policy region, please see the response to comment 316bEFR.304.004.

For EPA's response to comments regarding the allocation of values for various wetland services using the Johnston, et al. study, please see the response to comment #316bEFR.303.021.

EPA notes that the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) rule. Instead, the Agency used this approach to provide useful information for policymakers to consider in determining the final 316(b) Phase II rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Lynne H. Church

On Behalf Of:

Electric Power Supply Associaton
(EPSA)

Author ID Number:

316bEFR.308

Comment ID 316bEFR.308.001

Subject Matter Code SUP

General statement of support

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

In general, EPSA believes EPA’s preferred approach recognizes the need for site specificity as opposed to a one-size-fits-all approach. EPA’s focus on alternative fish protection technologies, that permits facilities to develop site specific standards based on cost-cost or cost-benefit tests, and use voluntary restoration measures as an alternative to technologies is the basis of this recognition. EPSA sees each of these components as critical to an effective workable rule.

EPA Response

Today's final rule maintains the desired flexibility for both the permittee and the Director to determine the most appropriate and cost-effective means for meeting the requirements of today's rule. EPA also notes that compliance alternative 5 allows a site-specific determination to be made based on cost-cost and cost-benefit considerations.

Comment ID 316bEFR.308.002

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA has introduced significant new information into the record on the cost and efficacy of alternative technologies to meet applicable impingement and entrainment performance standards. The information is formatted into eleven cost modules and increases the cost estimates for alternative technologies. EPSA agrees with EPA's point that it is not possible to provide estimates for all technologies for the various site-specific circumstances that Phase II facilities will encounter. However, EPSA remains concerned about those facilities that cannot meet the performance standards with alternative technologies due to site-specific circumstances. We, therefore, believe it is critical to include the option to develop a site-specific performance standard in EPA's proposal.

As EPSA commented on the EPA Phase II proposal in August, 2002, we support EPA's preferred approach which regards those Phase II facilities that employ closed-cycle cooling to be in compliance with 316(b) Best Technology Available (BTA) requirements. Further, EPSA supports EPA's decision not to consider cooling water flow reduction through use of wet or dry closed-cycle cooling as a compliance requirement. EPSA believes that the costs and associated environmental disadvantages of retrofitting Phase II facilities, particularly in the context of the minimal environmental benefits, do not support use of this intake structure technology on a national or waterbody basis for compliance. EPSA further notes that EPA's proposed costs for wet closed-cycle retrofits in the waterbody/capacity based option underestimated their cost. Information supporting this underestimation was placed into the Docket by EPRI and DOE, and more recently was presented at the EPA's BTA symposium (ref. Maulbetsch and Micheletti Presentations).

EPA Response

The commenter has summarized parts of the NODA; therefore, no response to this portion of the comment is necessary. Please refer to the preamble for a discussion of the framework of the final rule. EPA notes that the final rule contains a site-specific compliance alternative.

EPA also notes that facilities with closed-cycle, recirculating cooling systems may demonstrate compliance under the first compliance alternative at § 125.94(a)(1). However, EPA is not requiring closed-cycle cooling at all facilities, as described in section VII.E of the preamble to the final rule. Please refer to the response to comment 316bEFR.029.004 for a discussion of EPA's estimates for recirculating cooling systems.

Comment ID 316bEFR.308.003

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

In the NODA, EPA requested that stakeholders comment on the need for and definition of "significantly greater than". EPSA also believes that States should be given the flexibility to interpret the "significantly greater than" cost tests in a manner consistent with their individual environmental resources agencies. States with over-harvested commercial fisheries may wish to value these resources differently than inland fisheries where the fishery may be based on catch and release stocking programs, or where there is no commercial or recreational fishery present. EPSA believes that "significantly greater than" costs should be defined as any costs that are demonstrated to be greater than EPA's estimated cost of compliance, or benefits of compliance, after uncertainty in the estimates is taken into account.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 045.012.

Comment ID 316bEFR.308.004

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

EPSA believes that EPA should provide clarification on the relationship of the new technology modules to the cost-cost test. The Docket and NODA seem to indicate the Technology Database is being used, but the specifics of this use are currently not clear.

EPA Response

The final rule in 125.94(a)(5)(i)(A) - (F) specifies the basic steps a facility would undertake to calculate the costs considered by the Agency in establishing the applicable performance standards. The relevant requirements and process are discussed in sections VII and IX of the final preamble.

Comment ID 316bEFR.308.005

Subject Matter Code 7.04

Streamlined Technology Option

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA supports use of the streamlined technology option as an additional compliance option. EPSA believes there is merit to both of the streamlined alternatives EPA discussed in the NODA. Results of EPA's research on the conditions under which fine-mesh wedgewire screens achieve a high level of protection support a streamlined approach based on that alternative. The final Phase II regulations will result in development of new alternative technologies or new data generated on existing alternative technologies that will provide the basis for a streamlined approach for other technologies.

EPA Response

EPA appreciates Electric Power Supply Association's support of EPA's Approved Design and Construction Technology option.

Comment ID 316bEFR.308.006

Subject Matter Code 10.02

Benefit Estimation Methodology

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPA has made revisions to the national benefits estimate for the 316(b) proposed preferred alternative. EPSA finds EPA's methods for assessing the benefits to users-- commercial and recreational fishing--to be generally reasonable in concept. However, we also support the comments on their application made by TER, Dr. Ivar Strand and Dr. Robert Stavins as submitted by UWAG and EPRI.

EPA Response

For EPA's responses to specific comments on commercial fishing methods please see response to comments # 316bEFR.005.029 and # 316bEFR.323.016.

For EPA's responses to specific comments on recreational fishing methods presented in the NODA please see responses to comments #316bEFR.041.452, #316bEFR.337.010, and #316bEFR.306.320.

Comment ID 316bEFR.308.007

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Lynne H. Church
Organization Electric Power Supply Associaton (EPSA)

EPSA also believes that EPA’s efforts to develop benefits estimates on a regional basis are an improvement over the previous national benefits estimate.

EPA Response

EPA agrees with the commenter. EPA has greatly expanded its analysis since the case studies were presented at proposal. EPA's final analysis evaluates many more facilities (a total of 46) and extrapolates I&E estimates within regions rather than across a waterbody type nationwide. Seven regions are evaluated-5 coastal regions (North Atlantic, Mid-Atlantic, South Atlantic, Gulf of Mexico, and California); the Great Lakes region; and the Inland region. I&E data from multiple facilities in each region were used to develop each regional estimate. In some cases, all of the facilities with I&E data in a region were evaluated (e.g., California). Given that the goal of EPA's analysis was to develop estimates of impacts and benefits at the national scale, EPA believes that this regional approach is more appropriate for the national benefit estimates. See the regional study document for detail, DCN # 6-0003.

Comment ID 316bEFR.308.008

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

With respect to non-use benefits, EPSA strongly supports EPA's decision not to base the benefits assessment on the habitat replacement cost method. However, EPSA strongly disagrees with EPA's new efforts to quantify non-use benefits of the rule. EPA's benefit transfer approach is based on a "willingness- to-pay" survey conducted by the National Oceanic Atmospheric Administration (NOAA) that creates wetlands to produce equivalent fish to offset impingement and entrainment losses. The willingness-to-pay survey was based on respondents' inclination to pay for wetlands lost as a result of damages. EPSA certainly supports the use of mitigation or restoration measures, such as wetlands creation, as a means of achieving the performance standard. However, wetlands are an inappropriate basis for the benefits quantification.

In the 316(b) context, the rule is not intended to generate wetlands on anything close to the scale assumed by EPA in the benefits assessment, rather the rule is intended to reduce impingement and entrainment. Use of this new benefits assessment is troubling because this value comprises 90% of the overall benefits assessment, dwarfing the estimated commercial and recreational values. Again, EPSA supports the detailed comments made by TER, Dr. Ivar Stand and Dr. Robert Stavins on the non-use benefits assessment.

EPA Response

EPA understands that the rule is not intended to generate wetlands. The benefit transfer method used by EPA is not based on a survey conducted by NOAA, but on a survey conducted by Economic Analysis, Inc. for the Peconic Estuary Program, funded under the National Estuary Program. This benefit transfer method used by EPA was intended to value the habitat required to compensate for, or offset, losses of fish and shellfish. For further details, please see EPA's response to comment #316bEFR.307.061.

Comment ID 316bEFR.308.009

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA is also concerned with EPA's overall use of multiple conservative assumptions that make national benefits of the proposed rule highly unrealistic. These assumptions include:

- Assumption of No Entrainment Survival – While EPSA agrees that currently available entrainment data do not provide a sound basis to adjust entrainment baseline calculation data on a site-specific basis, these data are suitable for developing a reasonable range of outcomes for a national benefits estimate.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.308.010

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA is also concerned with EPA's overall use of multiple conservative assumptions that make national benefits of the proposed rule highly unrealistic. These assumptions include:

- Failure to Assume Impingement Survival – EPA has acknowledged in the rule that there can be substantial survival of impinged organisms. In fact, EPA's impingement performance standard is stated in terms of a reduction in impingement mortality. However, in EPA's assessment on the national benefits of the rule it does not appear to have assumed any impingement survival. Impingement survival can be quite high for some species as discussed by ASA in a recent presentation made at EPA's BTA Technology Symposium.

EPA Response

EPA took into account impingement survival in all cases where such information was provided in the facility documents that were used. Please see response to Comment 316bEFR.074.201 for a discussion of "multiple conservatisms."

Comment ID 316bEFR.308.011

Subject Matter Code 10.01.02.02

Fish Population Modeling

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA is also concerned with EPA's overall use of multiple conservative assumptions that make national benefits of the proposed rule highly unrealistic. These assumptions include:

- Failure to Assume Any Compensatory Response for Any Species – EPA has assumed no compensatory reserve for any species in any waterbody type. For purposes of the national benefits estimate, clearly such an assumption would be inappropriate for over harvested commercially important species. However, for many species such as gizzard shad and threadfin shad that often dominate impingement and entrainment in much of the Eastern United States, there is no commercial and/or recreational harvest and these species have a fairly large compensatory reserve. As a result, a reduction in impingement and entrainment for these species may cause little or no change in populations (i.e. benefits) for these species. At a minimum, some conservative assumptions could be made for unharvested species that would improve the benefit estimate. There is certainly far less uncertainty associated with such an estimate than the uncertainty associated with EPA's estimate of non-use benefits.

EPA Response

Please see responses to Comment 316bEFR.074.201 on the issue of "multiple conservatisms," Comment 316bEFR.005.009 on fish population modeling, and Comment 316bEFR.025.015.

Comment ID 316bEFR.308.012

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPSA is also concerned with EPA’s overall use of multiple conservative assumptions that make national benefits of the proposed rule highly unrealistic. These assumptions include:

- Assumption of Age 1 Plus for Impinged Fish – The NODA states that since some impinged fish are older than Age 1, EPA has increased the estimate of impinged fish reaching maturity by assuming age 1 plus rather than age 1. In fact, the vast majority of impinged fish are young of the year (YOY) and are less than age 1. Thus, rather than achieving its goal of refining its estimate, EPA has instead significantly worsened its estimate since the technically appropriate measure would be to assume impinged fish are age 1 minus.

EPA Response

The commenter expresses concern EPA's assumptions about the age distributions of impinged fish. EPA has revised its assumptions about the age distributions of impinged fish in a manner that acknowledges that YOY may be abundant among impinged fishes, as described in the EPA response to Comment 316bEFR.029.105. For a discussion of multiple conservative assumptions, please see EPA's response to Comment 316bEFR.074.201.

Comment ID 316bEFR.308.013

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPSA is also concerned with EPA's overall use of multiple conservative assumptions that make national benefits of the proposed rule highly unrealistic. These assumptions include:

- Trophic Transfer Assumptions – EPA indicates in the NODA that it is now assuming a net trophic transfer rate of 20%. The assumption is based on a NOAA document used for the purpose of assessing Natural Resource Damages for the Great Lakes. The NOAA document indicates that it used a range of values for estimation purposes and selected 20% as the best estimate. But an examination of the more recent papers listed by NOAA, based on a fairly robust examination of aquatic trophic models determined a mean transfer rate of 10%, with only a few of the 140 estimates used in 48 trophic models being 20% or higher. Thus, use of the 20% is unnecessarily conservative and inappropriate as a basis for the benefits assessment.

EPSA believes that the national benefit estimate of the preferred option should be revised. The compounding effect of the multiple conservative assumptions used in the benefits assessment creates an estimate that is highly unrealistic. EPA should consider developing a benefits assessment model that is based on more realistic assumptions, identifying the sensitivity of the model to those and perhaps provide a range of benefits depending on the nature of the aquatic resources impacted.

EPA Response

For EPA's response to the issue of multiple conservatisms, please see response to Comment 316bEFR.074.201.

In its final analysis, EPA assumed a trophic transfer efficiency of 10% based on a review article in Nature by Pauly and Christensen (1995) (see DCN #6-1004).

Comment ID 316bEFR.308.014

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 7.02

Performance standards

EPSA supports EPA's proposed clarification of the calculation baseline and the principles discussed in the proposed definition. In particular, the definition of the baseline as 3/8 in. mesh to differentiate impingeable from entrainable organisms is quite helpful. EPSA continues to support use of the hypothetical design criteria as a method of allowing facilities that have installed fish protection measures to be provided with the opportunity to take credit for those measures. However, EPSA also supports the "as built" approach as an alternative and that would eliminate assumptions required by the hypothetical baseline calculation.

In addition, EPSA supports EPA's proposal to allow different but comparable facilities to share in the cost and effort to calculate baselines. This concept has been used with much success and cost savings at facilities on the west coast.

EPA Response

EPA is adopting an "As Built" approach to determining the calculation baseline as part of today's rule. As stated in § 125.93, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline.

The calculation baseline against which compliance with the performance standards should be assessed is defined in § 125.93 as an estimate of impingement mortality and entrainment that would occur at a site assuming (1) the cooling water system had been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard 3/8-inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source waterbody; and (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment. EPA has used this definition because it represents the most common default conditions the Agency could identify, while providing a clear and relatively simple definition. Based on comments received on the Phase II NODA , EPA has added additional criteria to the calculation baseline to provide clarity to the analysis. (EPA's proposed changes to the calculation baseline were discussed in the Phase II NODA, see, 68 FR 13580). In many cases, existing technologies at the site show some reduction in impingement and entrainment when compared to this baseline. In such cases, impingement mortality and entrainment reductions (relative to the calculated baseline) achieved by these existing technologies should be counted toward compliance with the performance standards. In addition, operational measures such as operation of traveling screens, employment of more efficient return systems, and even locational issues should be credited towards reduction in impingement mortality and entrainment. The calculation baseline may be estimated using: historical impingement mortality and entrainment data from your or another facility with comparable design, operational, and environmental conditions; current biological data collected in the waterbody in the vicinity of your cooling water intake structure; or current impingement mortality and entrainment data collected at your facility. See section IX of the preamble to today's rule for a discussion of how the calculation baseline is used to compare performance with the rule's performance standards.

Comment ID 316bEFR.308.015

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 21.03

Monitoring requirements

The NODA requests comment on compliance monitoring issues such as use of total numbers vs. total biomass and use of Representative Important Species (RIS). Compliance monitoring to demonstrate compliance with the performance standards needs to be done in a manner appropriate for the method selected to achieve compliance. In other words, compliance monitoring to demonstrate compliance of a facility that chose to use restoration measures will be different than monitoring done to evaluate compliance using technologies. Similarly, the nature of compliance monitoring to evaluate whether an alternative technology is meeting the compliance standard is highly dependent on the nature of the alternative technology selected.

Compliance monitoring for restoration measures will also vary depending on the nature of the restoration measure selected. In the case of an aquaculture project, the species, sizes and numbers of individual fish released can be stated very quantitatively. However, for habitat creation measures, such as a wetland restoration project used to offset entrainment losses, compliance might logically be based on total biomass production.

The design of compliance monitoring studies for technologies needs to be flexible since the nature of the monitoring will vary depending on the technology used and whether it is designed for meeting the impingement performance standard or both the impingement and entrainment performance standard. For example, some technologies such as fine-mesh traveling screens with fish handling systems are designed to collect and return fish to the source waterbody in good condition. Such technologies are not designed to reduce the number of organisms or the biomass of impinged or entrained organisms. Therefore, compliance monitoring must be designed to quantify the ability of the technology to meet the standard by reducing mortality.

In contrast, fine-mesh wedge-wire screens generally replace conventional traveling screen systems. Since the slot width of these screens is well below the 3/8 in. mesh standard traveling screen size and is combined with surface area design features to ensure proper flow, the need for compliance monitoring is virtually eliminated with this technology. For technologies such as the barrier net, it will be necessary to perform compliance monitoring in a manner that compares impingement levels before and after barrier net deployment (with appropriate methods used to measure relative abundance between years). However, for use of an aquatic filter barrier (AFB) to meet the entrainment performance standard, compliance monitoring could be performed after AFB deployment by comparing the densities or numbers of organisms inside and outside the AFB to demonstrate compliance, eliminating the need to address inter-year variability.

EPA Response

Please see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.308.016

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 21.04

Determination of compliance

EPA requested comments on whether compliance monitoring for entrainment should be based on numbers or biomass. EPA correctly noted that for biomass, eggs and early life stages would have a very small biomass relative to later life stages. EPSA believes that the decision on which metric to use should be based on what is appropriate for the technology and the site-specific circumstances.

If a facility chooses to focus on numbers it is important to keep in mind that very early life stages (eggs and prolarvae) will dominate the numbers, and, therefore, the determination of compliance. This would be inappropriate since the majority of these early life stages have huge natural mortality losses regardless of cooling water intake structure entrainment. This problem is easily addressed by converting the various life stages of entrainable organisms to equivalent juveniles. This allows each life stage to be properly weighted for compliance purposes.

An equivalent juvenile conversion is a logical endpoint for entrainable organisms as they transition from entrainable to impingeable organisms. Using biomass has the opposite effect as later larval stages will dominate the biomass even though the number of organisms per unit weight will be very small relative to the number of eggs and larvae. Again, this issue can be addressed by converting the number of organisms into equivalent juveniles before calculating the biomass. From a practical standpoint, it will be desirable to count these life stages and then do a biomass conversion based on literature value weights rather than actually attempting to collect eggs and weigh them. It may make sense in the case of forage species to focus on biomass since their value is primarily as a food source for commercially and/or recreationally important species, while numbers or volume may be a more relevant focus for commercially and recreationally important species.

EPA requested comment on whether compliance should be based on an individual species-by-species basis, RIS, or total numbers or biomass. EPSA believes compliance based on demonstrating compliance for each species and life stage would be unworkable. First, for many entrainable organisms it is simply not possible taxonomically to differentiate species for eggs and early life stages. Short of requiring a DNA analysis, taxonomy will be limited to family or genus for these life stages depending on species. Second, for technologies such as barrier nets that require collecting data before and after deployment to assess compliance with the performance standard there will always be instances where species will be impinged after net deployment that were not present prior to deployment. A single such occurrence would result in failure of the performance standard. EPSA, therefore, believes that the RIS and total species numbers or biomass are the only viable alternatives. Use of RIS has been widely used in the past and has proven effective and manageable. It also results in protection of the most biologically important or valued species, as determined by the States' own natural resources agencies, which should be the overall intent of the regulation.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see , e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.308.017

Subject Matter Code 21.04
Determination of compliance

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA believes that impingement and entrainment performance standards should not be applied in the same manner as a water quality standard or technology based standard such that exceeding the performance standard is viewed as an enforceable noncompliance. While methods are clearly available to quantify the level of performance for alternative technologies they simply do not have the level of precision associated with the Part 136 methods for monitoring pollutants. Because the nature of this issue deals with many species of organisms, many technologies, and many site-specific circumstances, the final regulations must accommodate this variability if the final rule is to be workable.

EPSA strongly believes that a facility's responsibility for failing to achieve the performance standard should be limited to installation of additional technologies, establishment of operational measures, or use of voluntary restoration measures to achieve full compliance with the performance standard. EPSA believes this is completely reasonable as long as the facility submitted the compliance plan (i.e. specifying the technology or restoration plan) with documentation for Agency review and approval, constructed and operated the compliance measures in conformance with the approved plan and collected adequate biological performance monitoring data to demonstrate compliance. The facility simply will not know if compliance has been achieved until after monitoring has been completed, and it is unreasonable to subject the facility to fines and penalties if it has acted in good faith.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.308.018

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Restoration Measures

EPA requested comment on several requirements for use of restoration measures that included quantification of uncertainty, use of adaptive management plans and peer reviews. In concept, EPSA does not have strong opposition to any of these requirements and notes they have been employed in many instances when restoration measures were implemented under State 316(b) regulatory programs. For peer reviews, EPSA recommends that deference should be given to State natural resource management agencies to determine the necessity for such reviews, as they may have Agency resources capable of evaluating the proposed restoration measures. Also, the level of formality of adaptive management plans and uncertainty quantification should be adjusted according to the size and complexity of the proposed restoration measure.

EPA Response

Under the final rule, permitting authorities determine the necessity of an independent peer review for any particular restoration measure. EPA believes the requirements for restoration measures in the final rule give permitting authorities and permit applicants the flexibility to conduct analyses commensurate with the complexity of a given restoration measure.

Comment ID 316bEFR.308.019

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

EPSA is very concerned with the form and schedule of the Phase II rule implementation. EPSA continues to believe that implementation of Phase II regulations would be best achieved through establishing a schedule for compliance through the NPDES permit as opposed to starting the process through the Form 2C application. The availability and review of much of the information that EPA contemplates for a demonstration study could be evaluated during permit renewal negotiations. However, the collection of new biological data, evaluation of alternative technologies and use of site-specific performance standards or restoration measures would be best implemented through a schedule placed as a special condition in the NPDES permit. It is important that several key issues be considered in implementation of the final rule:

- EPA must carry through on its promise of guidance to facilitate rule implementation.

- Delegated NPDES States must amend their State NPDES regulations to incorporate the rule, and EPA should consider the time required for States to complete this action when addressing the timing of compliance.

- Some level of baseline impingement and entrainment data will be necessary in most instances as a starting point for making compliance decisions. Baseline data is necessary for evaluating the form and scale of any restoration measures. Baseline data is also necessary to evaluate alternative technologies and determine if a site-specific performance standard is necessary. Finally, baseline data is necessary to determine the extent of additional biological monitoring for calculation baseline compliance studies (depending on the nature of the technology selected). While many facilities have conducted baseline studies under state 316(b) programs, in many cases this information may not reflect current conditions or the facility may need to do some level of sampling to determine whether or not it is reflective of current conditions. Due to the natural variability of biological populations, time needs to be allotted for facilities to conduct 2-3 years of baseline quantitative study depending on the waterbody type and technology being considered.

- EPSA believes that the timeframe from selection of a compliance technology to deployment for even the most simplistic technology (e.g. barrier net) is a minimum of one year and significantly longer for other technologies. This timeframe is based on the time required for (1) production of detailed engineering drawings, (2) obtaining necessary permits which could include waterway construction and tidal or non-tidal wetland permits, etc., (3) review and approval of NPDES permitting authority, and (4) vendor selection and construction. Weather could also delay construction depending on when regulatory approvals are completed.

- It is important to recognize that consultants are not currently staffed to support compliance, nor are vendors geared to provide technologies if all facilities are expected to comply at the same time. Again, phasing in the rule through the NPDES permit would distribute the workload to consultants and production of technology alternatives by vendors in a more reasonable manner.

EPA Response

This comment is addressed in other responses in subject code 21.09.

Comment ID 316bEFR.308.020

Subject Matter Code 21.04
Determination of compliance

Author Name Lynne H. Church
Organization Electric Power Supply Associaton (EPSA)

316(b) Requirements After Compliance with the Performance Standard is Achieved

EPA requested comment from stakeholders on what requirements and/or additional monitoring should be required once initial compliance with the regulations is achieved. EPSA members are very concerned that compliance with the 316(b) regulations not be and endless do-loop of technologies and/or monitoring. EPSA believes that once compliance with the performance standards has been demonstrated, as long as there is no significant change to the design and operation of the BTA, no further action should be required on the part of the permittee. The only exception would be the deployed technology or restoration measure does not achieve full compliance with the performance standards and additional actions are necessary to achieve full compliance.

EPA Response

EPA disagrees that monitoring should be conducted only to gather information or should be discontinued if a facility achieves the performance standards. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027.

Comment ID 316bEFR.308.021

Author Name Lynne H. Church

Organization Electric Power Supply Associaton (EPSA)

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

EPA wants to apply capacity utilization only to steam cycle units. EPSA supports the Agency's revised definition of Capacity Utilization Rate as it more adequately addresses cooling water usage at combined cycle facilities.

EPA Response

EPA notes that the comment agrees with EPA's approach to capacity utilization rate thresholds based on steam cycles only. As such, no further action based on the comment is required.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Aubrey D. McKinney & Paul E. Davis

On Behalf Of:

Tennessee Wildlife Association &
Tennessee Dept of Environment &
Conservation

Author ID Number:

316bEFR.309

Comment ID 316bEFR.309.001

Author Name Aubrey D. McKinney & Paul E. Davis

Organization Tennessee Wildlife Association & Tennessee Dept of Environment & Conservation

Subject Matter Code 2.04.06

Restoration measures in place of technologies

It is critical that restoration be maintained as a regulatory option under Section 316 of the Clean Water Act.

EPA Response

Permittees may use restoration measures as a means to comply with the requirements of the final rule.

Comment ID 316bEFR.309.002

Author Name Aubrey D. McKinney & Paul E. Davis

Organization Tennessee Wildlife Association & Tennessee Dept of Environment & Conservation

Subject Matter Code 1.01

Comment period

We have only recently learned that the official comment deadline is June 2, 2003. However, because of the importance of this issue, we request that our additional comments and recommendations be accepted into the record as well.

TWRA and TDEC will be providing additional comments and recommendations with information related to actual mitigation projects conducted under Section 316 (a & b) of the Federal Clean Water Act. We will provide this recommendations in a timely manner.

EPA Response

EPA accepted and considered all comments. EPA considered those that were submitted after the official close of the comment period to the extent it was able. Those comments were included in the public rulemaking record.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James F. Stine

On Behalf Of:

The National Rural Electric Company
Association (NRECA)

Author ID Number:

316bEFR.310

Comment ID 316bEFR.310.001

Subject Matter Code MISC
Miscellaneous comment

Author Name James F. Stine
Organization The National Rural Electric Company Association (NRECA)

This comment letter was replaced by an updated letter from the author. Please see 316bNFR.403.

EPA Response

Please see EPA's response to the comment referenced in the comment text.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mark V. Carney

On Behalf Of:

PG & E Energy Group

Author ID Number:

316bEFR.311

Comment ID 316bEFR.311.001

Subject Matter Code OPP

General Statement of Opposition

Author Name Mark V. Carney

Organization PG & E Energy Group

PG&E NEG's previously submitted comments on the initial Phase II rule identified critical flaws in the legal, technical, biological and economic analyses presented by EPA in support of its proposed approach to implementing Section 316(b) at existing facilities. These flaws included numerous instances in which EPA relied on unsupported and arbitrary assumptions and applied scientific and technical analyses that were unreasonable or wholly invalid. The cumulative effect of the errors in the EPA's documentation was to produce estimates of the costs of EPA's proposals that were unrealistically low and estimates of their biological and economic benefits that were unfounded and vastly inflated.

Given the severity of these flaws, PG&E NEG welcomed EPA's decision to release a NODA presenting revisions to the proposed rule and to the supporting documentation. Unfortunately, PG&E NEG's review of the NODA and the materials in the NODA docket indicates that, although EPA has made improvements to some aspects of its analyses, these improvements are overshadowed by significant uncorrected errors and by new errors introduced by the methods EPA uses in place of flawed analyses presented in the original Phase II rule. These errors result in estimates of the costs and benefits of the proposed rule that remain highly distorted and biased. Furthermore, EPA has continued to use these analyses to justify regulatory approaches that have not been demonstrated to be necessary or achievable and that exceed its authority under the Clean Water Act.

EPA Response

No response is required, as this comment summarizes the author's comments. Each issue is addressed individually in subsequent responses.

Comment ID 316bEFR.311.002

Author Name Mark V. Carney
Organization PG & E Energy Group

Subject Matter Code 7.02
Performance standards

Appropriateness of Technology and Costs of Implementation

In the NODA, EPA significantly revised its approach to estimating the costs of implementing the technologies proposed for use under its preferred option. This revised analysis resulted in a significant upward adjustment of the costs of implementing those technologies.<FN 2> However, EPA's analysis remains inadequate to demonstrate the feasibility of attaining the performance standards at all or most facilities by implementing those technologies. Indeed, it is far from clear that Salem Harbor Station, Manchester Street Station or Brayton Point Station can achieve the proposed performance standards using any of the suggested technologies, due to their use of saltwater for cooling and other site-specific factors <FN 3> The circumstances of these facilities are far from unique and demonstrate the shortcomings of EPA's reliance on a uniform set of performance standards, as well as the critical importance of making site-specific evaluations readily available <FN 4>

Footnotes

2 See 68 FR at 13524 col. 3.

3 Fine mesh screens, one of the technologies proposed by EPA in its original rule to reduce both impingement and entrainment, cannot be used in salt water because of clogging. As PG&E NEG noted in its original comments, fabric filter barriers are also unusable at Brayton Point Station and Salem Harbor Station, because they would interfere with shipping traffic, and at Manchester Street Station, due the presence of a nearby hurricane barrier.

4 Below, PG&E NEG discusses how EPA's proposed cost-cost and cost-benefit tests should be interpreted to allow appropriate access to a site-specific determination.

EPA Response

EPA disagrees. While there may be some facilities that have difficulty meeting the performance standards under compliance options 2, 3 or 4, EPA expects this will be the exception rather than the norm. EPA agrees with the commenter that the circumstances of all facilities may be unique and in part for this reason, adopted performance standards instead of specifying a single Best Technology Available. In the event the performance standards are unattainable, compliance option 5 allows a facility to request a site-specific determination of best technology available for minimizing adverse environmental impact. Facilities are also authorized to seek approval from the director for compliance to be evaluated in accordance with a Technology Installation and Operation Plan.

Comment ID 316bEFR.311.003

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA's failure to adequately demonstrate the feasibility of attaining the performance standards using these technologies also casts considerable doubt on whether EPA's estimates of costs accurately reflect the expenditures needed to comply with the performance standards.

The flaws in EPA's revised cost analysis are even more serious with respect to the "waterbody/capacity" option, which would require installation of cooling towers at certain facilities withdrawing cooling water from estuaries or oceans.

EPA Response

For discussion of the feasibility of attaining the performance standards, see section VII.B of the preamble to the final rule. For further discussion of the correlation between costs of the final rule technology basis and the performance standards, see response to comment 316b.EFR.317.012.

Comment ID 316bEFR.311.004

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 2.04.01

Require closed cycle cooling

PG&E NEG strongly disputes EPA's position that it has authority under Section 316(b) to require cooling towers at any facility.<FN 5>

Footnotes

5 See Comments of PG&E National Energy Group on EPA's Proposed 3 16(b) Rule for Phase II Existing Facilities, 5 § III. A.1 (August 7,2002).

EPA Response

In this final rule, performance standards are not based on cooling tower technology, however, one of five compliance alternatives is the reduction of flow commensurate with the use of cooling towers, since such a level of performance meets the rule performance standards. See preamble to the final rule, particularly sections III, VII, and VIII.

Comment ID 316bEFR.311.005

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

However, even setting aside the question of EPA's authority, it is apparent that EPA has significantly underestimated the costs of retrofitting existing facilities with cooling towers by using unreasonably low cost assumptions and by failing to consider the substantial impact of site-specific factors. Because of these flaws, PG&E NEG believes this option should be withdrawn from further consideration.

In his comments on the NODA, Professor Robert Stavins reviewed the analyses developed by the Department of Energy ("DOE") for the capital cost of retrofitting cooling towers at four representative facilities.<FN 6> Professor Stavins found that DOE'S capital cost estimates in its initial report, which were based on limited, publicly-available site-specific information, were between 65% and 104% higher than those that would be produced by EPA's costing methodology.<FN 7> An addendum to the initial DOE report indicated that the inclusion of additional site-specific information submitted by the facilities after the initial analysis was completed results in further upward revisions of these estimates. Professor Stavins found that, once all relevant information was considered, the DOE estimates of the costs associated with cooling tower conversions at these facilities could be between 230% and 310% greater than would have been estimated by EPA.<FN 8>

The existence of systematic downward bias in EPA's approach to estimating costs is further supported by a comparison of the capital cost estimates prepared by Stone & Webster, Inc. for a cooling tower retrofit of Brayton Point Station <FN9> with estimates based on EPA's cost method. In preparing its estimate, Stone & Webster, a company with decades of experience in power plant construction, undertook a detailed review of what would be required to perform a retrofit at Brayton Point. Its analysis identified a number of site-specific considerations that would add to the difficulty of performing the retrofit, and therefore to the costs of doing so. The estimate that Stone & Webster developed on the basis of this site-specific information is 150% greater than the estimate that would result using EPA's approach.<FN 10>

Footnotes

6 See An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants ("DOE Retrofit Analysis") (DOE, October 8,2002); Addendum to Report An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants ("DOE Retrofit Addendum") (DOE, January 22,2003).

7 See Stavins Comments, p. 6

8 See Stavins Comments, p. 7

9 Stone & Webster's cost estimate for Brayton Point Station, submitted as part of Brayton Point Station's Final Demonstration for renewal of its permit under Section 3 16(a) and 3 16(b) of the CWA, was independently reviewed by Bechtel Power Corporation, another firm with extensive experience in building and modifying power plants. Bechtel reported that it was "in overall agreement" with Stone & Webster's estimate, although it identified some areas in which costs could actually be higher than Stone & Webster had calculated. Both the Stone & Webster and Bechtel cost estimates can be found in the docket for the Brayton Point Station NPDES Permit, MA0003654, EPA Region I.

10 Stavins Comments, p. 7

EPA Response

The Agency has not based the final rule on closed-cycle wet cooling technology retrofits. As such, the commenter’s concerns have been met.

Comment ID 316bEFR.311.006

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

DOE'S studies also indicate that EPA's assumption in the original proposed 316(b) rule that cooling tower retrofits can be accomplished with only four weeks of downtime on average for non-nuclear facilities would not necessarily be accurate once site-specific factors are taken into account. To the contrary, DOE found that, for at least two of the four facilities studied, extended outages could be required to retrofit cooling towers.<FN 11> In addition, DOE emphasized that reliable estimates of outage durations could not be made without a detailed engineering analysis.<FN 12> The case of Brayton Point Station is again instructive. Because of a number of unique site-specific factors affecting the retrofit of cooling towers at Brayton Point, Stone & Webster found that it would require seven additional months of downtime, above any scheduled outages, to complete the work. <FN 13>

Footnotes

11 Information presented in the DOE study indicated that the outage time required to retrofit the Hudson Generating Station would last between two and three months. DOE Addendum, p. 9. For the Big Bend Station, DOE found that the necessary outage would "significantly exceed a scheduled outage," but concluded that the precise duration of the outage would require a detailed engineering analysis. DOE Addendum, p. 6.

l2 DOE Addendum, p.6.

13 Stavins Comments, I.B

EPA Response

The Agency has not based the final rule on closed-cycle wet cooling technology retrofits. As such, the commenter's concerns have been met.

EPA notes for the record that its estimates of construction downtime for cooling tower retrofit projects exceed those of the Department of Energy's analysis for two of four cases. Therefore, in relation to the issue of construction downtimes alone, the commenter's assertion that the DOE study shows that the Agency has dramatically under-represented this factor is in error. Nonetheless, the Agency has not based the final rule on wet cooling towers, in part, based on the uncertainty related to predicted construction downtimes and the potential for extended downtimes approaching 7 to 10 months, as evidenced by the real-world, empirical retrofit projects documented in the Agency's record.

Comment ID 316bEFR.311.007

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

In light of the foregoing, it is clear that EPA's present costing approach systematically understates the very high costs associated with the imposition of cooling tower retrofits under the waterbody/capacity option. Unfortunately, EPA has made no attempt in the NODA analysis to adjust its capital cost estimates for any facilities, or to modify its estimates of downtimes for non-nuclear facilities. EPA's continued reliance on data demonstrated to be in error is particularly troubling given that EPA has never provided, either in the original proposal or the NODA, any sound biological basis for imposing cooling tower retrofits on all facilities that meet the waterbody and capacity criteria EPA has proposed to adopt. Having failed to identify any valid basis for imposing the waterbody/capacity option, or to assess accurately the true costs of doing so, EPA should eliminate this alternative from further consideration.

EPA Response

The Agency has not based the final rule on wet closed-cycle cooling technology retrofits. As such, the commenter's concerns have been met.

Comment ID 316bEFR.311.008

Author Name Mark V. Carney
Organization PG & E Energy Group

Subject Matter Code 10.02
Benefit Estimation Methodology

Benefits Estimates

In its previous comments, PG&E NEG identified numerous flaws in the biological and economic estimates used to develop EPA's benefits estimates for the proposed 316(b) rule. These flaws included errors in the biological assumptions used to calculate lost production that led EPA to vastly overstate the benefits of reducing losses from impingement and entrainment ("I&E"). These exaggerated biological benefits were compounded by flawed economic analyses that produced dramatically inflated estimates of the economic benefits reduced I&E would provide to commercial and recreational fishermen. In addition, EPA applied wholly invalid methods for estimating non-use benefits, including the Habitat Replacement Cost ("HRC") method, which used the cost of replacing fish lost to I&E by improving fish habitat as a measure of non-use benefits.

EPA's revised benefits analysis corrects several significant flaws in this analysis. However, the positive impact of these corrections is dwarfed by EPA's failure to correct even more significant errors and by its inclusion of a new, but no less invalid method for calculating non-use benefits.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values in the analysis of national benefits due to uncertainty in monetizing non-use values at the national level. The Agency, however, has explored several approaches that indicate the potential for significant non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, Non-Use Meta-Analysis Methodology, and Chapters C6, D6, and G6 of the final Phase II Regional Studies Document (DCN #6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA disagrees with the assertion that EPA's I&E analysis is flawed. Please see EPA's responses to comment 316bEFR.029.105 regarding the age of impingement, Comment 306.092 regarding the detection of ecological impacts, comment 316bEFR.074.101 regarding EPA's calculation of production foregone, comment 316bEFR.074.042 regarding multiple conservatisms, comment 316bEFR.005.009 regarding fish population modeling, and comment 316bEFR.025.015 regarding compensation.

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.311.009

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Author Name Mark V. Carney

Organization PG & E Energy Group

Biological Benefits

EPA's analysis in the NODA of the biological benefits associated with I&E reductions is, unfortunately, even worse than the analysis used in the original proposed 316(b) rule. In the NODA, EPA adjusts its calculation of the biological benefits associated with the I&E reductions under the proposed rule by increasing the trophic transfer rate, which measures the effect of reduced losses of forage fish on harvested species, from 2.5% to 2O%.<FN 14> EPA also revises its earlier assumption that entrained fish are age 1 and instead assumes that entrained fish may be age 1 or older.<FN 15> As UWAG discusses in its comments,<FN 16> both of EPA's assumptions are inaccurate and both impart an upward bias to the calculated impact of reducing I&E.

The revised trophic transfer rate of 20% is unjustifiably high, based on the relevant literature. <FN 17> As a result, EPA has clearly overestimated the positive effect of reduced losses of forage fish on the yield of harvested species. This overestimate is compounded because EPA now assumes that all lost production of forage fish would have been consumed by harvestable species, when in fact many forage fish are consumed by intermediate predators. <FN 18>

More significantly, EPA's revised assumptions regarding the age of impinged fish ignore the fact that, in many if not most cases, young-of-the-year ("YOY")--less than one year-old fish--account for the majority of fish impinged.<FN 19>This difference is important, because YOYs have a far lower natural survival rate. As a result, losses of this life stage would have a much smaller impact on fish of harvestable age than would losses of older fish. EPA's use of older life stages leads the agency to overestimate the effect of I&E reductions on commercially or recreationally valuable fish.<FN 20>

Footnotes

14 See 68 FR at 13546 col. 1.

15 See 68 FR at 13546 col. 2.

16 See UWAG Comments, X.C. (trophic transfer) & X.D. (production foregone).

17 Englert Comments, p.4.

18 Englert Comments, p.4.

19 UWAG Comments, X.D.

20 UWAG Comments, X.D.

EPA Response

Please see EPA's response to Comment 316bEFR.305.004 regarding trophic transfer efficiency. Please see response to Comment 316bEFR.029.105 regarding the age distribution of impinged fish.

Comment ID 316bEFR.311.010

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Although these new errors introduced in the NODA are substantial, even greater overstatement of the biological benefits of I&E results from uncorrected errors identified in EPA's original analysis. In its previously submitted comments, PG&E NEG called attention to the fact that EPA's calculation of production foregone contained two serious errors. First, instead of using life-stage initial and final weights to compute initial biomass values and life-stage growth rates, EPA used mean weights of individuals at the midpoint of the life stage. Because mean weights are greater than initial weights, this results in a systematic upward bias in the calculation of production foregone. Second, EPA used life-stage weights that were far too heavy, sometimes thousands of times too heavy. The cumulative effect of EPA's errors was to produce vastly exaggerated estimates of the biomass lost due to I&E, and thus of the benefits of reducing I&E impacts.<FN 21>

A review of the data reprinted in the NODA makes clear that EPA has perpetuated these errors in its new national benefits analysis.<FN 22> In addition, the data relied upon in EPA's estimates of production foregone are riddled with errors and inconsistencies. For example, Table 1-5 1 in Appendix 1 to the NODA shows larval weights for winter flounder at Brayton Point Station and Millstone that are 10,000 times heavier than larval weights listed for the Pilgrim Power Plant in Table 1-52, despite the fact that the egg weights listed for all three plants are the same. In addition, the larval weights in Table 1-5 1 are 1,000 times larger than the egg values, despite the fact that EPA's own consultant indicated that larval weights should be only slightly greater than egg weights.<FN 23>

Footnotes

21 See Comments of PG&E National Energy Group on EPA's Proposed 316(b) Rule for Phase II Existing Facilities, Appendix XI1 (reprinting Comments of Thomas L. Englert, dated August 6,2002). Englert Comments, p. 3.

22 Englert Comments, p.3.

23 See Response to UWAG Questions re: Phase I1 Proposal Record, DCN 5-2379, p. 9 (Revised December 2,2002).

EPA Response

The commenter notes some problems concerning the assumed size of certain species of fish and the corresponding effects on calculation of production foregone. In response to similar comments, EPA has revised many such parameters, as noted in the EPA's response to EFR.305.003 on its production foregone calculations.

The regional differences noted by the commenter result from EPA's intentional use of geographically-relevant parameters whenever they were available.

Comment ID 316bEFR.311.011

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

A further upward bias is introduced into the biological benefit estimate by EPA's continued refusal to assume that any organisms survive entrainment,<FN 24> despite many studies showing that, at least for some species, survival rates can be quite high. As UWAG has noted, while EPA may have concerns about the representativeness or soundness of specific studies of entrainment survival, this does not justify assuming, contrary to all the available evidence, that there is no survival. Instead it suggests the need for appropriately addressing the uncertainty, perhaps through use of sensitivity analysis in EPA's calculations. <FN 25> The erroneous assumption of zero survival is particularly significant given that several of the technologies proposed, such as fine mesh screens, reduce entrainment while increasing the number of organisms that are impinged. Unless EPA uses reasonable estimates of both impingement and entrainment survival, EPA's performance requirements could have the perverse result of increasing overall mortality.<FN 26>

In light of the foregoing, it is clear that EPA's estimates are highly unreliable and overstate by a significant amount the biological benefits that could be expected to result from the cooling water intake technologies EPA has proposed. These calculations must be significantly revised to accurately identify the biological losses due to I&E and the benefits of reducing those losses.

Footnotes

24 68 FR at 13545, col. 3.

25 See UWAG Comments, 5 X.B.

26 See Englert Comments, p. 2. This perverse result could also occur if flow reduction measures are used as a means of reducing the numbers entrained. Reduced flows, including reduced flows due to closed-cycle cooling, may lower the numbers of individuals entrained but increase entrainment mortality, because of the higher temperature increases that occur in the system. This could offset or even eliminate the benefits EPA associates with reduced flows. Englert Comments, p. 2.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.311.012

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02

Benefit Estimation Methodology

Use Benefits

EPA's use benefits analysis in the NODA addresses a number of criticisms of its earlier approach to calculating use benefits.<FN 27> In particular, EPA now discounts the future benefits to users, reflecting the delay in time between when I&E reductions occur and when the fish "saved" by these reductions are available for commercial and recreational fishing. EPA has also utilized a more reasonable method for calculating recreational fishing benefits and has eliminated its erroneous assumption that the benefits from increased fish catch could far exceed the benefits to commercial fishermen and their direct consumers. EPA is to be commended for addressing a number of the flaws in this component of its analysis, but, because the biological inputs to this analysis remain grossly overstated -- as discussed above -- the values EPA has calculated for these benefits remain similarly overstated. Furthermore, the effect of these improvements, which result in a downward adjustment to EPA's estimate of use benefits, is overwhelmed by the inflated values of non-use benefits discussed below.

Footnotes

27 See generally Stavins Comments, II.B.

EPA Response

The comment states that EPA made a number of improvements in its analysis for the final rule analysis. The comment states that biological inputs "remain grossly overstated," and therefore benefits estimates are overstated.

EPA disagrees with the assertion that EPA's I&E estimates are overstated. Please see EPA's responses to Comment 316bEFR.029.105 regarding the age of impingement, Comment 306.092 regarding the detection of ecological impacts, Comment 316bEFR.074.101 regarding EPA's calculation of production foregone, Comment 316bEFR.074.042 regarding multiple conservatisms, Comment 316bEFR.005.009 regarding fish population modeling, and Comment 316bEFR.025.015 regarding compensation.

The comment also states that EPA's non-use benefit estimates are inflated. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values for national benefits due to uncertainty in monetizing non-use values for this rule. The Agency, however, has explored several approaches that indicate the potential magnitude for significant non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002). EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020

regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.311.013

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Non-Use Benefits

In its comments on the original proposed Phase II rule, PG&E NEG commented extensively on EPA's use of the invalid HRC method to estimate non-use benefits. PG&E NEG noted that, by using restoration costs as a proxy for benefits, the HRC approach is fundamentally incompatible with sound economic analysis. In addition, PG&E NEG advised EPA that the biological basis for the HRC method contained numerous errors. In developing its estimates of the amount of habitat needed to replace fish lost to I&E, EPA chose habitat types for some species that would do little or nothing to increase the numbers of fish, and relied on a method for calculating the population increase that would result from additional habitat that was biologically irrational. This resulted in estimates of the amount of habitat required that were both wholly unreliable and grossly overstated, leading to correspondingly exaggerated estimates of non-use "benefits." In the NODA, EPA makes no mention of the HRC method, which makes clear that EPA has recognized that this method has no place in a valid benefits analysis.<FN 28>

Unfortunately, EPA has adopted in its place an alternative approach<FN 29> to estimating non-use benefits that is equally incompatible with accepted economic practice and EPA's own Guidelines for Preparing Economic Analyses. In this approach, EPA first estimates the amount of habitat that would be required to replace species lost to I&E , using the same deeply flawed biological assumptions that formed the basis of the HRC analysis. EPA then attempts to develop per-household "willingness to pay" ("WTP") values for the fish production associated with that habitat. Finally, EPA extrapolates those WTP values to hundreds of thousands of households it claims would be expected to hold those values.

The problems with this approach are numerous and fundamental. First, EPA has done nothing to address the serious problems with the biological underpinnings of the HRC approach that were strongly criticized by PG&E NEG, and others, as completely inadequate to evaluate the use of habitat restoration to increase fish production. Among other critical errors, EPA has failed to identify appropriate types of habitat to increase the production of many species.<FN 30> For example, EPA assumes winter flounder populations would be enhanced by tidal wetlands habitat. Yet EPA itself has previously acknowledged that winter flounder do not rely on tidal wetlands for completing their life cycle.<FN 31> EPA also continues to use the abundance of species in a particular type of habitat as a proxy for the fish production that will result from increasing that type of habitat.<FN 32> However, it is well established that the number of fish that are found in a type of habitat at a particular point in time says little or nothing about whether that habitat fulfills a critical life function, or whether an increase in the habitat will increase production.<FN 33> These and other critical errors preclude reliance on EPA's estimates of the benefits that will result from the assumed habitat restorations.

Footnotes

28 The NODA also makes no mention of two other flawed "avoided cost" estimation methods used in the original proposed 316(b) rule, the "societal revealed preference" method and the "forage fish replacement cost" method. While PG&E NEG believes EPA's rejection of these methods is clear from their absence from the NODA, PG&E NEG is disappointed that EPA did not make this position explicit. It would be unfortunate if EPA's failure to do so were interpreted elsewhere as

supporting the continued use of these approaches. PG&E NEG requests that EPA specifically address this issue in the final rule.

29 This approach and its results are outlined in pages 13567-13575 of the Federal Register. Additional background information is contained in docket documents, including DCN 5-1010 (March 12,2003 Memorandum of Tudor et al. to 316(b) Record).

30 See French-McCay Comments, pp. 4-6.

31 See Section 3 16(b) Existing Facilities Case Studies, Chapter F3 (Brayton Point Case Study). EPA makes similar errors with respect to Pollock and other species. French-McCay Comments, pp. 5-6.

32 See 68 FR at 13569.

33 French-McCay Comments at pp. 6-8.

EPA Response

EPA does not use the Habitat-Based Replacement Cost (HRC) method in the benefits analysis for the final section 316(b) Phase II rule. However, EPA believes that the HRC method is a useful tool for comparing the cost of various technologies to prevent adverse environmental impacts, with the costs of offsetting adverse impacts not addressed by those technologies. EPA disagrees that the contents of the NODA indicate a change in EPA's position about the valid use of HRC.

In regards to the commenter's assertion that it is incorrect to assume that species abundance is a proxy for productivity, EPA notes that species abundance is a reasonable proxy for secondary productivity under the following conditions assumed by EPA and supported by the available data: the production to biomass ratio is 1; all of the annual production occurs during the time of sampling; and there is no turnover.

EPA relied on the judgment of local experts regarding preferred restoration alternatives. For further information on the biological foundations of the HRC, please refer to the document "Habitat-based Replacement Cost Method" (DCN #) and EPA's responses to comments 316bEFR.029.113 and 316bEFR.041.454.

Comment ID 316bEFR.311.014

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02.04.01

Peconic-based approach

Furthermore, EPA' s method for developing economic benefits values from habitat restoration contains invalid assumptions and arbitrary judgments at every step. The following summarizes a number of these errors:<FN 34>

EPA begins by using a survey-based valuation study of habitat restoration alternatives, conducted for the Peconic Estuary, as a source of per-household WTP values for habitat restoration. In doing so, EPA fundamentally misuses the Peconic Estuary study. As comments submitted by two of study's authors make clear, the express purpose of the study was to identify relative preferences among restoration alternatives, not absolute values.<FN 35> Although the methods used by the authors allowed for the derivation of dollar values, these values were found not to be robust -- indeed, the authors specifically cautioned in the published study against relying on these values.<FN 36> Significantly, the authors also found evidence that the dollar values reported "might not only be unreliable, but generally biased upwards " due to "symbolic" considerations which, for example, could lead some to express excessively high willingness to pay values for restoration out of a desire to "take action to help the environment."<FN 37>

EPA Response

For EPA's response regarding the soundness of value estimates from the Peconic study, please see the response to comment #316bEFR.304.002.

Comment ID 316bEFR.311.015

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Mark V. Carney

Organization PG & E Energy Group

EPA next assumes that the values for eelgrass and wetlands it takes from the study can be treated as including the value that the respondents place on the ability of the habitats to increase fish and shellfish populations. Again, this assumption is one that the studies ' authors expressly reject as invalid. As the authors note, the questionnaire used in the study indicated "only in very general terms that eelgrass is a habitat for fish and shellfish. No quantitative information whatsoever was provided regarding the significance of eelgrass or wetlands as a habitat for fish and shellfish."<FN 38> Furthermore, wetlands were not even identified as fish habitat even in general terms. EPA's assumption therefore violates the fundamental requirement for sound stated preference surveys that, in order to be able to be able to express a valid opinion about value, respondents "must have available to them information about the commodity [fish and shellfish production] and its attributes that is sufficient to allow them to assign it a value."<FN 39> Because of this, the authors conclude "...it is not reasonable to treat the values given to the eelgrass and wetlands resources themselves as reflective of the values that would be placed on the production offish and shellfish.<FN 40>

Using these values, EPA makes wholly unjustified assumptions as to the proportion of non-use value ascribed to eelgrass and wetlands by study respondents that reflects the value of each type of habitat's fish production potential. For eelgrass, EPA assumes that all of the value is due to fish production. For wetlands, EPA assumes that one quarter of the value is due to fish production, despite the fact that respondents were not even told in the original study that wetlands served as habitat for fish. These assumptions are completely unsupported and arbitrary.

Footnotes

38 Opaluch & Grigalunas Comments, p. 2.

39 Opaluch & Grigalunas Comments, p. 3; [316bEFR304].see also Stavins Comments, 0 111.

40 Opaluch & Grigalunas Comments, p. 3.

EPA Response

For EPA's response to comments regarding the connection between values for habitat and values for fish and shellfish, please see the response to comment #316bEFR303.020.

For EPA's response to comments about using habitat values to estimate values for fish, please see the response to comment #316bEFR.307.061.

For EPA's response to comments regarding the allocation of values for various wetland services using the Johnston, et al. study, please see the response to comment #316bEFR.303.021.

Comment ID 316bEFR.311.016

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Mark V. Carney

Organization PG & E Energy Group

Having derived these purported per-household values of "fish production services," EPA then treats them as reflecting the non-use values placed on reductions of I&E. Although EPA characterizes this step as a "benefits transfer," EPA has in fact completely ignored fundamental criteria governing the use of benefits transfer methods, in particular the requirement of similarity between the circumstances of the original study and the study to which the benefits are transferred.<FN 41> The dissimilarities in this case are obvious and profound. There is simply no reason to believe that individuals' non-use values for the fish habitat services of wetlands and eelgrass - even if appropriately measured, which they most certainly were not in this case - are equivalent to the non-use value individuals would place on the fish themselves, or, more precisely, on reductions in the loss of fish due to I&E <FN 42>

Footnotes

41 Stavins Comments, III .

42 As the authors of the study note, EPA's application of the study further departs from the requirement of similarity by its failure to account for significant differences in the demographic characteristics of the populations of the source study -- the Peconic Bay Estuary -- and the areas to which EPA then applies the results. Opaluch & Grigalunas Comments, pp. 3-4.

EPA Response

For EPA's responses regarding the similarity of the study to the policy context, please see EPA's responses to comments #316bEFR.307.061, and #316bEFR.303.020.

Comment ID 316bEFR.311.017

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02.04.01

Peconic-based approach

The final step of the analysis requires EPA to determine the number of households to which its per-person "values" should apply. For the NODA, EPA chooses two populations: all households in counties abutting a given power plant and all households within 32.4 miles of a power plant. Obviously, the choice of the number of households is critical to the ultimate value EPA calculates. Yet EPA provides no rational explanation that could justify its choices. Instead, for this critical step EPA makes what is in effect an entirely arbitrary judgment-indeed a judgment that can only be arbitrary, since there is no basis on which the agency could possibly conclude that these entirely manufactured values are held by anybody.

EPA Response

The comment states that EPA has no basis to make a judgment of the affected population for its non-use benefit transfer. EPA disagrees. EPA believes that it has conservatively estimated the extent of the affected population in the study area based on households in counties abutting the affected water body, and households within 32.4 miles of the affected water body. The 32.4-mile figure was chosen based on results from the Rhode Island wetlands study. This study showed that Rhode Island residents who live in the most western parts of Rhode Island and as far as 32.4 miles from Narragansett Bay value wetland restoration in the Bay (see Chapter C6 the final Phase II Regional Studies Document, DCN #6-0003).

In the Peconic study, the survey was conducted only in the towns surrounding the Estuary, so it is impossible to determine from the survey results whether Long Island residents living at a distance from the Estuary would also value habitat improvements in the Estuary. However, evidence suggests that this is likely to be true. The Peconic study included a second survey of recreational users of the Estuary, which found that people traveled great distances to visit the Estuary and recreate there, indicating that these people would likely value the Estuary's habitats. They simply were not asked these questions, so the extent of the market for restoration and protection of the Peconic Estuary's services has not been conclusively determined.

The Agency also reviewed additional studies to identify the effect of distance on WTP for non-use values. Empirical evidence from economic literature suggests that EPA has chosen a conservative means of determining the affected population.

For example, a study by Pate and Loomis (1997) found that respondents outside the political jurisdiction in which a study site is located were also willing to ascribe stated preference values to the amenity being studied. The study was designed to determine the effect of distance on willingness to pay for public goods with large non-use values. Specifically, the study evaluated environmental programs designed to improve wetlands habitat and wildlife in the San Joaquin Valley. It compared WTP values for households residing in the San Joaquin Valley, California, to values for California households outside the Valley, and to households in Washington State, Oregon, and Nevada. The study found that WTP values for California residents outside the Valley were 97.7 percent of the

WTP of the Valley residents; WTP values for Oregon residents were approximately 27 percent of the WTP of the Valley residents. (The distances to these locations outside the valley exceed the 32.43-mile radius used in EPA's analysis.) (See DCN #6-2503 for detail).

A natural resource damage assessment study conducted by Schulze et al. (1995, DCN #5-1302) examined the effect of distance on household WTP to cleanup the Clark Fork River Basin in Montana, which had been polluted by hazardous waste from mining activities. The study surveyed Montana residents and asked their WTP for partial and complete cleanup of the site, which would result in improvements to surface water, groundwater, soil, vegetation, and wildlife. More specifically, the partial cleanup program, for example, would improve water quality, but trout populations would remain below normal, and about one-fourth of the habitat lost for wildlife species would be restored. The authors examined the effect of distance on WTP by grouping respondents based on the distance between their residences and the resource site. Respondents residing between 101 and 200 miles from the Clark Fork River Basin were willing to pay 49.7 percent of those respondents residing within 100 miles. The group of respondents residing more than 500 miles driving distance from the Clark Fork River Basin were willing to pay 18.5 percent of those within 100 miles. (See DCN #5-1302 for detail).

Comment ID 316bEFR.311.018

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02.04.01

Peconic-based approach

In light of EPA's repeated disregard of economic principles in performing this "analysis," the values it produces simply cannot be taken seriously as estimates of the benefits associated with reductions in I&E. This is precisely the conclusion of the authors of the underlying study, who state unequivocally in their comments on the NODA that "...we believe that EPA 's use of the PES study is not a valid application of B-T [benefits transfer] and that the values calculated in the Tudor et al. memorandum can not be considered to accurately identify the benefits associated with EPA 'proposed cooling water intake technologies."<FN 43> PG&E NEG does not consider it coincidental the "values" that EPA derives from this approach are extraordinarily large, dwarfing the "use" values that EPA developed using traditional methods of economics analysis. Indeed, as UWAG notes, of EPA's overall estimates of the benefits of its supposed rule, over 97% are attributable to non-use benefits associated with the per-household method.<FN 44> It is profoundly unfortunate that EPA has found it necessary to resort to such a wholly invalid method to justify its proposed rule.

Footnotes

43 Opaluch & Grigalunas Comments, p. 4.

44 See UWAG Comments, X.E.4.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.311.019

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Cost Tests

In the NODA, EPA requests comment on whether it should further define the meaning of "significantly greater" as that term is used in two cost tests included in the proposed rule. These cost tests allow a facility to obtain a site-specific determination of technology if it can demonstrate that its costs are "significantly greater" than the costs estimated by EPA for the proposed rule or, alternatively, than the benefits to be achieved from compliance with the performance standards. PG&E NEG agrees with UWAG that a uniform interpretation of "significantly greater" is desirable as a means of providing consistency across states and EPA regions.<FN 45> PG&E NEG also agrees with UWAG's position that "significantly" should be interpreted in its scientific sense - as costs that are measurably greater than EPA's estimated compliance costs or, alternatively, than the estimated benefits, once uncertainties are taken into account.<FN 46> In this sense, the "significance" of greater costs will be determined by consideration of the precision of the estimates and of the magnitude of the measured difference between facility costs and EPA costs, or facility costs and estimated benefits.

Footnotes

45 See UWAG Comments VIII.

46 See UWAG Comments, VIII.A.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.311.020

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Restoration Measures

The NODA proposes three new requirements for facilities seeking to use restoration measures in lieu of, or in addition to, technology to meet the performance standards. Specifically, EPA proposes that applicants be required to: (1) document the magnitude and sources of uncertainty in restoration proposals; (2) submit plans that use an adaptive management approach to monitor progress and make adjustments during the implementation phase; and (3) obtain peer review of their restoration proposals.<FN 47> PG&E NEG agrees with UWAG that each of the foregoing can, in appropriate circumstances, be a useful element in developing a restoration plan.<FN 48> At the same time, PG&E NEG is concerned that rigid application of these requirements could prevent many worthwhile restoration proposals from being implemented, especially if EPA insists on restoration measures replacing fish on a species-specific basis.

Footnotes

47 68 FR at 13541-13542.

48 See UWAG Comments, 9 X.A.3.

EPA Response

EPA believes the three principles identified by the commenter are sufficiently helpful and important to include in the final rule as requirements. EPA believes the requirements, however, give permit applicants and permitting authorities flexibility to produce analyses commensurate with the level of complexity of a given restoration measure. The requirements are intended to reduce uncertainty associated with restoration measures and enhance their performance.

For a discussion of the use of out-of-kind restoration measures in the context of the final rule, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.311.021

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

In order for restoration measures to result in increased production of a species, all the other requirements for increased production must also be present, such as sufficient sources of food, adequate water quality, etc. In other words, at the time the restoration is implemented, that species ' level of reproduction must be limited by habitat (which is the input being increased) and not by other factor.<FN 49> However, as a practical matter it is very difficult to determine in advance--or even during implementation--what factors are limiting the reproductive success of a particular species. As a result, there will often be very large uncertainties about the success of the restoration effort with respect to a single species; uncertainties that may be difficult even to adequately quantify. <FN 50> These uncertainties can undermine the possibility of obtaining meaningful peer review and cannot be resolved solely through use of adaptive management techniques.<FN 51>

In her comments, Deborah French-McKay notes that these uncertainties can be significantly reduced if EPA is flexible in its definition of acceptable restoration measures. In particular, uncertainty can be significantly reduced in many cases if reductions in fishing pressure and restocking programs are used as means of mitigating losses due to I&E.<FN 52> Such approaches are also much more likely to be successful, especially where fishing pressure is a dominant source of mortality. Uncertainty can also be reduced if fish are considered by trophic level, rather than on a species-specific basis.<FN 53> Considering restoration on an ecosystem level is already commonly done in the Natural Resources Damages context. Aggregated this way, it becomes possible to estimate, with reasonable precision, which restoration measures will result in production gains to the ecosystem, even if it remains impossible to be certain which species will experience those gains. Use of these methods is also likely to result in more effective peer review, as there is a greater knowledge base for using these methods and quantifying the uncertainties involved.<FN 54> Similar flexibility will be required in the use of adaptive management techniques. Understanding the changes that are occurring and adapting restoration activities appropriately would be very difficult, time-consuming, and in some cases virtually impossible -- especially if EPA were to insist on species-by-species replacement. A more realistic approach would be to develop specific goals about the scope and functionality of the project, perhaps through the use of performance standards, rather than to require a strict demonstration of the maintenance of the species. <FN 55>

Footnotes

49 French-McCay Comments, p. 4.

50 French-McCay Comments, p. 9.

51 See generallv French-McCay Comments, pp. 9-1 1.

52 See French-McCay Comments, pp. 9-10. 52.

53 See French-McCay Comments, p. 10.

54 See French-McCay Comments, p. 10.

55 See French-McCay Comments, p. 10.

EPA Response

For a discussion of the uncertainties associated with restoration measures, see EPA's response to comment 316bEFR206.055. EPA believes the use of adaptive management and peer review may not entirely eliminate these uncertainties but can help reduce them.

Because of the uncertainties associated with restoration measures, they may not be a feasible choice for every site.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

Any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.311.022

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Mark V. Carney

Organization PG & E Energy Group

Ultimately, PG&E NEG believes that the goal of making effective restoration measures a viable alternative to technology will be best served if the three principles identified by EPA are incorporated as guidance, or factors to be considered, rather than as rigid rules. In appropriate cases, and coupled with the use of trophic levels to measure production gains, they can improve the reliability and effectiveness of restoration plans. Rigidly applied, they may serve as bars to the implementation of restoration projects that in reality will produce significant benefits.

EPA Response

EPA believes the three principles identified by the commenter are sufficiently helpful and important to include in the final rule as requirements. At the same time, however, the rule gives permit applicants and permitting authorities flexibility to produce analyses commensurate with the level of complexity of a given restoration measure. The requirements are intended to reduce uncertainty associated with restoration measures and enhance their performance.

Comment ID 316bEFR.311.023

Author Name Mark V. Carney
Organization PG & E Energy Group

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

EPA has missed an important opportunity in the NODA to correct fundamental errors in its original analyses so that they reflect sound science and to develop a final proposed rule that is technically feasible and justified on the basis of the record that has been developed. The limited improvements EPA has made in certain parts of its analysis are overwhelmed by the uncorrected errors that remain, and new errors introduced in the NODA, including:

- Clear errors in EPA's cost analysis, and in particular in the analysis of costs associated with the retrofit of cooling towers at existing facilities, resulting in substantial underestimates of the unacceptably high costs of this option;

EPA Response

The Agency has not based the final rule on closed-cycle, wet cooling technology retrofits. As such, the commenter's concerns have been met.

Comment ID 316bEFR.311.024

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 7.02

Performance standards

EPA has missed an important opportunity in the NODA to correct fundamental errors in its original analyses so that they reflect sound science and to develop a final proposed rule that is technically feasible and justified on the basis of the record that has been developed. The limited improvements EPA has made in certain parts of its analysis are overwhelmed by the uncorrected errors that remain, and new errors introduced in the NODA, including:

EPA Response

The commenter's concerns are detailed more extensively elsewhere. Please see the response to comments 316bEFR.311.001 to 316bEFR.311.026.

Comment ID 316bEFR.311.025

Author Name Mark V. Carney
Organization PG & E Energy Group

Subject Matter Code 10.02
Benefit Estimation Methodology

EPA has missed an important opportunity in the NODA to correct fundamental errors in its original analyses so that they reflect sound science and to develop a final proposed rule that is technically feasible and justified on the basis of the record that has been developed. The limited improvements EPA has made in certain parts of its analysis are overwhelmed by the uncorrected errors that remain, and new errors introduced in the NODA, including:

EPA Response

The comment states that, while EPA's final rule analysis includes improvements, uncorrected errors remain. The comment does not specify these errors.

For EPA's responses to specific comments on commercial fishing methods please see response to comments # 316bEFR.323.016 and 316bEFR.005.029.

For EPA's responses to specific comments on recreational fishing methods presented in the NODA please see responses to comments # 316bEFR.041.452, comment #316bEFR.337.010, and comment #316bEFR.306.320.

For the final 316b rule analysis, EPA has not included quantitative measures of benefits associated with nonuse values due to uncertainty in monetizing non-use values for this rule. The Agency, however, has explored several approaches that indicate the potential for significant non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.311.026

Author Name Mark V. Carney

Organization PG & E Energy Group

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA has missed an important opportunity in the NODA to correct fundamental errors in its original analyses so that they reflect sound science and to develop a final proposed rule that is technically feasible and justified on the basis of the record that has been developed. The limited improvements EPA has made in certain parts of its analysis are overwhelmed by the uncorrected errors that remain, and new errors introduced in the NODA, including:

- An estimate of economic benefits dominated by grossly overstated non-use estimates of non-use values derived using a wholly invalid method -- one which the authors of the studies on which EPA relies have expressly rejected.

Given these serious flaws, EPA has not demonstrated that its proposed rule represents a valid application of the “best technology available’’ standard of Section 316(b) or a sound policy for addressing the environmental impact of cooling water intake structures.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA does not agree that the benefit transfer method is “wholly invalid.”

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Finally, the Agency notes that although two of the authors of the original studies on which EPA relied for this benefits transfer submitted comments on behalf of the regulated industry, two other investigators of the original studies (Dr. Marisa Mazzotta and Dr. Robert Johnston) served as EPA's consultants for the cost benefit analysis of the final Section 316(b) Phase II regulation.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Deborah French McKay

On Behalf Of:

Applied Science Associates, Inc.

Author ID Number:

316bEFR.312

Comment ID 316bEFR.312.001

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Failure to Identify Appropriate Restoration/Enhancement Techniques that Provide Net Gains in Species Productivity: The preferred restoration alternatives for I&E species have not been based on a biological assessment of what is limiting to the populations and what action(s) could best enhance the production of the species in question. The choices appear to have been made from an a priori selection of desired habitat restoration alternatives (either saltmarsh or SAV) and whether a species is observed at any time in those habitats. While, for some I&E species, restoration of saltmarsh or SAV may be beneficial to its production, EPA has inappropriately estimated the net gain in production that would result from the restoration of specified amounts of this type of habitat. The life history of the I&E species needs to be researched carefully to identify the limiting factor(s) for the population during each life stage. The limiting factor is typically very different at different life stages. Thus, the restoration technique needs to be targeted to specific life stages and provide something that is limiting to the growth and survival of that life stage.

[The text above is from the summary on page 3. The text below can be found on pages 4-6 of the comment letter.]

Failure to Identify Appropriate Restoration/Enhancement Techniques that Provide Net Gains in Species Productivity

EPA asserts that it has chosen the preferred restoration alternative for offsetting I&E losses for those species included in the NODA (p. 13568, for the list of species considered p. 13550). However, to the contrary, the restoration alternatives suggested by EPA, coastal wetlands and eelgrass, will do little or nothing to increase production of several of the species considered. In order for the restoration technique to be of assistance to the particular species whose losses are being mitigated, the productivity of the species needs to be limited by something provided by the restoration project, such that there is a net gain in production. For example, if survival is controlled by predation, providing a refuge from predation would improve production. If however, food is more limiting to growth and survival, restoration that provides additional food or feeding habitat would be the appropriate choice to improve production. Thus, the life history of the I&E species needs to be researched carefully to identify the limiting factor(s) for the population during each life stage. The limiting factor(s) are typically very different at different life stages. Thus, the restoration technique needs to be targeted to specific life stages and provide something that is limiting to the growth and survival of that life stage.

Specifically, in the NODA and supporting document ("Estimating Total and Nonuse Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV)", DCN 5-1010), EPA has failed to identify appropriate restoration/enhancement techniques that would provide net gains in species productivity for winter flounder and pollock. As the amount of habitat needed to offset I&E losses is based on an inappropriate choice for winter flounder, the scales of habitat restoration used in the NODA analysis are unsubstantiated and overstated.

Winter flounder

EPA assumes winter flounder populations would be enhanced by tidal wetland restoration. However, as EPA itself acknowledges in the Section 316(b) Existing Facilities Benefits case Studies (Appendix A and in Chapter F3 of the Brayton Point case study), winter flounder do not prefer or rely on tidal wetlands (salt marshes) for completing their life cycle. The eggs, which are adhesive and demersal, are usually found on mud, sand or gravel bottom, with sand being the most common substrate (Pereira et al. 1999). Presence of vegetation may or may not be a factor in selection of spawning location. In Point Judith Pond, Rhode Island, the greatest concentration of eggs was found in the vicinity of a tidally submerged gravel bar with eggs clumped on gravel substrate or attached to fronds of algae (Crawford and Carey 1985; Pereira et al. 1999). Highest densities of newly settled winter flounder have been found on muddy substrates (Saucerman 1990; Howell and Molnar 1995; O'Connor 1997; Pereira et al. 1999). Larvae are often found near fine sand and gravel. There is also a high degree of variability in the habitat utilization of young-of-the-year (YOY, Goldberg et al. 2002). Some studies have found winter flounder YOY to be more abundant on unvegetated substrates (Sogard and Able 1991; Sogard 1992), while others have found them to occur in a variety of habitats, including seaweeds (Able et al. 1989), marsh creeks (Rountree and Able 1992) and to a lesser extent eelgrass (Goldberg et al. 2002). Adult winter flounder are found primarily on mud, sand, cobble, rocks or boulders (Pereira et al. 1999). Although winter flounder may be found in salt marshes, no stage of their life history appears to be linked specifically to salt marsh habitat. Therefore, the productivity of the species would be unlikely to exhibit significant changes due to salt marsh restoration. Thus, EPA's choice to restore tidal wetlands in order to mitigate winter flounder is inappropriate.

Winter flounder are limited in production by fishing, predation and other sources of mortality, not by availability of wetland habitat. Winter flounder age 3 and older are over-fished, and are limited by fishing mortality (NFSC 2003). Additionally, cormorants, jellyfish, and other predators have increased exponentially throughout northeast US waters over the last 20 years, which is undoubtedly reflected in higher mortality rates. Potentially, food resources could be limiting, particularly to younger stages. Thus, appropriate restoration techniques would need to decrease mortality, such as by reducing fishing pressure or predation, or provide food resources to increase growth. Provision of saltmarshes for winter flounder to inhabit, along with other more preferred habitats, would do nothing to increase winter flounder stocks. However, saltmarsh might increase food resources that indirectly increase survival and/or growth of winter flounder. In this case, the appropriate scale of restoration would be based on net gains due to increased food production, not abundance observed in saltmarshes, as proposed by EPA (see discussion below).

Pollock

EPA assumes pollock populations would be enhanced by eelgrass (SAV) restoration. However, pollock do not prefer or rely on SAV for completing their life cycle. Spawning occurs over hard substrate near coastal slopes and banks, and the eggs and larvae are pelagic and free floating, being found in depths of 50-250 m (Hardy 1978; Cargnelli et al. 1999; Collette and Klein-MacPhee 2001). Juveniles have been found over a variety of substrates, including sand, mud, or rocky bottom and vegetation (Hardy 1978). In southern New Jersey, YOY were prominent in spring collections in subtidal marsh creeks (Cargnelli et al. 1999), but have shown no sign of relying on eelgrass. Adult pollock are unselective of bottom type, and are often associated with sediments ranging from gravels to clay (Scott 1982; Cargnelli et al. 1999). The productivity of the species would be unlikely to exhibit significant changes due to SAV restoration. Thus, EPA's choice to restore SAV in order to mitigate pollock is inappropriate.

Other Species

Similar arguments could be made for other species, even if certain life stages inhabit tidal wetlands or SAV (as EPA has selected as the preferred alternative) at some time of the year. The observation of a species in a particular habitat does not infer that it is dependant on the habitat, or, more importantly, that the species' production will be enhanced by restoration of the habitat. The species' production may be limited by factors unrelated to habitat availability, such as over-fishing, conditions during over-wintering, predation, etc. If in fact, for example, a life stage is limited by food availability, and the restored habitat increases food available to the target species, then the restoration choice might be appropriate (although not necessarily the more efficient approach to enhance the target species). For example, bluefish do not prefer or rely on tidal wetlands, spending a large portion of the life cycle (i.e., as eggs, larvae, and adults) in the open ocean. Juveniles have been observed to feed on forage fish, which in turn are sometimes associated with wetlands (Fahay et al. 1999). Thus, there is a potential that wetlands would increase fish prey production and so food supply for bluefish. However, the net gain to bluefish production is not equivalent to the observed abundance of that species in or near wetlands.

EPA Response

In the HRC case studies presented at proposal, each species with quantified I&E losses was assigned to a restoration alternative from among the following categories: SAV restoration, tidal wetlands restoration, artificial reef creation, increase fish passages, improve water quality, and improve water quality/reduce fishing pressure. The assignment of each species reflected the consensus of a panel of local experts about which single action would most benefit the species in the general habitat where the I&E losses were being experienced.

For example, for the Brayton Point Station HRC analysis, the focus was on actions that could be taken in the waters of, and connected to Mt. Hope Bay and Narragansett Bay. These assignments were made recognizing that local fish populations could be experiencing population pressure from other sources (e.g., commercial fishing) and that some species could benefit from a range of actions. However, to complete the HRC scaling selection of a single, preferred restoration action was required.

With this focus on incorporating local knowledge and information, it is possible that species assignments to particular categories of restoration actions could contradict findings from other regions regarding species habitat use and preferences. However, selecting a preferred restoration alternative based on information on local habitat utilization and constraints is entirely appropriate and should be a component of any reasonable restoration efforts aimed at offsetting local impacts.

Finally, EPA disagrees with the commenter's concerns about some of the specific habitat assignments made by local experts. For example, EPA notes that the commenter recognizes that for winter flounder there is “a high degree of variability in the habitat utilization of young-of-the-year (YOY, Goldberg et al. 2002)”. The commenter also notes that YOY are also found in marsh creeks (Roundtree and Able, 1992). EPA believes that this demonstrates that emphasis should be placed on the habitat use of local populations.

Further, EPA disagrees with the commenter's objection to the selection of tidal restoration for winter flounder given the observation that winter flounder are found in sub-tidal creeks (i.e., marsh creeks) which are a feature tidal wetlands (personal communication K. Raposa, Narragansett Estuarine Research Reserve, 2001, DCN # 4-1763).

Comment ID 316bEFR.312.002

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Improper Use of Abundance data to Estimate Production: In the NODA examples, which are based on analyses in the proposed rule, EPA has failed to properly calculate the net production gained by habitat restoration/enhancement techniques. In particular, EPA incorrectly used abundance as a proxy for production. The correct methodology is to use production foregone on the loss side of the equation, and balance this with production gained by all age groups owing to the restoration. To quantify the net gain in production, EPA must develop estimates of the increased production rate in the restored habitat as compared to the habitat that previously existed, and also account for any losses of production due to the restoration activities themselves. This is normally done by population modeling, or at the ecosystem level using food web modeling. If EPA intends to perform the calculation on a species by species basis, it needs to develop population models for each species and identify the limiting factor(s) to each population. The restoration alternative would need to address the limiting factor(s) and ameliorate them. EPA has not performed such an analysis, and instead has incorrectly assumed that presence in the habitat infers limitation by that habitat, as well as that production gained is numerically equivalent to abundance measured by field samples. This use of abundance data is inappropriate and unreliable to estimate production.

[The text above is from the summary on page 3. The text below can be found on pages 7-8 of the comment letter.]

Improper Use of Abundance data to Estimate Production

While production is the appropriate scalar for measuring the gains of restoration, EPA has stated that data are lacking and so has used instead abundance estimates, corrected to age-one equivalents, as measures of production (p. 13569 of the NODA, as well as in Chapter F5-5 of the proposed rule). In other words, they have implicitly assumed both that the habitat is limiting to production and there is a 1:1 ratio between biomass and production (biomass being the standing stock or abundance of certain life stages at a given instant in time). Furthermore, EPA implicitly assumed that the standing stock is not turned over in time, and that those individuals observed at the sampling time are all the individuals that will be produced that year at that age sampled.

An analogy that illustrates the problem of using standing abundance as a proxy for production is as follows. If replacement income is sought for a person loosing his job, it is the annual salary that should be replaced. The quantity of dollars present in that person's wallet at any one time (when someone happened to query him) may be larger if their salary is larger, but there is not a one-to-one equivalence between his income and the amount in his wallet on a single day, or even with the average of what is in his wallet on a random sampling of days. Only if the person is paid his annual salary on one day of the year, if he places all of that salary in cash in his wallet, and if the sampling is made on the day he takes home his money, will the standing amount in this wallet be equivalent to annual salary.

Assuming that the habitat is in fact limiting to production of a species, the assumption of a production-to-biomass ratio of 1:1 is invalid for short-lived species that reproduce multiple times a year or at varying times during the year, such as for many of the forage fishes. Also, if a species has a protracted spawning period, such that individuals pass through a life stage using a particular habitat at varying times, the snap-shot standing abundance at any given time would not capture all the production in the habitat. If in fact the habitat were limiting to production, all life stages in the population use the same habitat, and the species spawns over a limited season, the standing abundance could be indicative of annual production of age-one equivalents. However, life histories of the species being considered are not this simple, making the assumption that production equals abundance invalid.

The details of the data used for estimating production from abundance for I&E species are not provided in the proposed rule documentation (nor in the NODA). Based on the standard life stage tables for the I&E species, it is apparent that abundance does not measure all the production for most (if not all) I&E species:

- The I&E species spawn over at least three months, and many species have more protracted spawning periods (Appendix A and Chapter F3 of the proposed rule). Thus, there is turn-over of individuals, with new individuals replacing those moving into older stages. The assumed age of the animals for the abundance data used has not been documented, and the uncertainty introduced by error in this assumption, as well as by the mortality rate estimate for the remainder of the first year of life, would be extremely large.

- Winter flounder do not preferentially use salt marshes as nursery grounds. Thus, the abundance observed in salt marshes is not indicative of production gained, as animals likely move in and out of the habitat sampled. Certainly the abundance in open water habitat is not indicative of production in tidal wetlands, as erroneously assumed by EPA.

- Forage fish such as stickleback, reproduce at varying times of the year, and predation rates are high, making a standing stock abundance at a single time a poor indicator of annual production.

The correct methodology is to use production foregone on the loss side of the equation, and balance this with production gained by all age groups owing to the restoration. If survival is increased from the sampled stage to age-one equivalents, or if production of older age classes is improved, the use of abundance corrected to age-one equivalents using the same survival rate as in less advantageous habitat provides an underestimate of the net gains of the restoration. While data are lacking in the form of production rate per unit area, estimations may be made using population modeling.

If young-of-the-year (YOY) abundance data are used to estimate age-one equivalent production per unit area of habitat, it is important to take into consideration the seasonal pattern of the species of spawning and development. It is not accurate to assume that abundance from any time of the year is indicative of production, because of the sampling of different age cohorts and potential turnover of individual over time. Again, the correct methodology is to estimate production over the life span of the individuals gained by the restoration.

Finally, it appears that EPA assumed that all the abundance observed in existing tidal wetlands and SAV would be a net gain in production if the habitat were created. In fact, the habitat would be an alteration of existing habitat, meaning that production associated with the habitat in its current form would be replaced by the new habitat's production. In the case of SAV, eelgrass would presumably be planted in unvegetated shallow waters. The tidal wetlands projects considered in the proposed rule were to alter Phragmites-dominated wetlands to Spartina-dominated saltmarsh. Because these types of habitat alterations would produce both losses and gains, they may not ultimately have the desired effect in enhancing the target species fish production, as I discussed in more detail in my 5 August 2003 letter commenting on the proposed 316(b) rule. This uncertainty needs to be considered by EPA.

EPA Response

Please see EPA's response to Comment 316bEFR.029.113 regarding EPA's assumption that abundance can be a reasonable proxy for production.

Comment ID 316bEFR.312.003

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Using the Maximum Acreage for Any Single Species Offsets Much More than the I&E Losses and Fails to Account for All Ecological Services Provided by Habitat Restoration/Enhancement Projects: EPA has proposed using the maximum calculated acreage required to offset a single species as the basis for the scale of restoration (p. 13569 of the NODA). This greatly over-compensates for other species losses, if one-for-one replacement in kind is required, and fails to recognize that most of the ecological services provided by I&E losses are as food to the marine food web. The purpose of habitat restoration/enhancement should be to provide a net improvement in fish production and not to offset each individual one-for-one with the same species affected by I&E. One-for-one replacement would only be warranted if the population is limited by the size of the spawning stock. If abundant eggs are produced by the spawning stock, such that the population is limited by other factors other than the supply of new eggs to the population, one-for-one replacement of that species is not needed.

[The text above is from the summary on page 3-4. The text below can be found on pages 8-9 of the comment letter.]

Using the Maximum Acreage for Any Single Species Offsets Much More than the I&E Losses and Fails to Account for All Ecological Services Provided by Habitat Restoration/Enhancement Projects

EPA has failed to account for the full range of ecological services provided by the proposed restoration techniques. EPA's approach begins from the assumption that all individuals need to be replaced in kind. However, a given restoration technique can provide many services, including increasing productivity of other species of similar ecological role to the target species. These services also mitigate the losses associated with I&E. As a result, EPA's approach would lead to significant overcompensation of the overall losses due to I&E.

Continuing with the winter flounder example: some of the services of winter flounder larvae are to become prey to larger organisms. Those larger organisms are flexible enough to eat other species of prey, as is the case for most marine predators. Thus, the prey service provided by (age-one) winter flounder can be replaced by production of another or several equivalent prey species. The replacement of winter flounder need only be enough to provide services unique to that species, i.e., larger winter flounder that survive the predation and fishing pressure and contribute to the next generation via reproduction. To the extent that a restoration plan is scaled to produce 100% of the winter flounder lost due to I&E, and also produces additional amounts of equivalent prey species, there will be overcompensation for the lost winter flounder.

The same point would be made for other species. Some of the services of the species and life stages entrained and impinged are to repopulate the local spawning and fishery stock of that species, while other individuals serve as prey to the food web. As most marine animals are opportunist feeders, replacement of similar sized fish prey would replace those ecological services. Thus, it may be argued that much (if not all) of the mitigation should be in the form of increased production of similar prey to those lost to I&E. This approach has been used in the restoration of many species injured by the North Cape oil spill in Rhode Island (French et al. 2001), and in other NRDA cases, as well as development mitigation projects in development projects.

The basic approach is to select a biological restoration or enhancement activity that will provide a net gain in terms of fish production, such as creating seagrass beds or wetlands (salt marsh) that provide habitat and food services to fish, such that there is a net increase in the total fish production of the ecosystem. Seagrass and wetlands have been shown to be more productive in terms of weight of fish produced per unit area than unstructured habitats. However, because some species prefer open bottom, while others prefer these structured habitats, the net fish production gain may not be of the same species as the losses. It may nonetheless be appropriate if it results in production of similar sized fish which provide ecological services to the food web, as well as other ecological and human (fishery) services, and so this is compensatory to the losses (French McCay et al. 2001).

EPA Response

The HRC analyses conducted for proposal are not used to estimate benefits for the final rule. Additional information on the HRC method and its uses is provided in the document entitled "Habitat-based Replacement Cost Method" (DCN #6-1003).

Comment ID 316bEFR.312.004

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Documentation of Sources and Magnitude of Uncertainty: The use of restoration to mitigate some or all of I&E losses makes good biological and management sense. However, the replacement of specifically-identified species one-for-one and in-kind by habitat restoration would be difficult to quantify (because of the limits of biological knowledge on the species of concern) and highly uncertain. In view of this uncertainty, EPA should be clear in its allowance of flexibility in the choices of restoration options, including projects that (1) reduce mortality to fishing and other causes, (2) replace missing individuals using restocking techniques, or (3) provide equivalent ecological services. This flexibility should be provided in the case examples as well, so as not to provide a model for inappropriate restoration choices.

[The text above is from the summary on page 4. The text below can be found on pages 9-10 of the comment letter.]

Documentation of Sources and Magnitude of Uncertainty

The use of restoration to mitigate some or all of I&E losses (p. 13541-13543 of the Federal Register notice for the NODA) makes good biological and management sense and I am supportive of EPA's proposal in concept. However, the replacement of specifically-identified species one-for-one and in-kind by habitat restoration would be difficult to quantify (because of the limits of biological knowledge on the species of concern) and highly uncertain. As a result, EPA's new proposal that applicants must document the sources and magnitude of uncertainty, while an appropriate goal, is in practice likely only to be possible qualitatively, as anticipated by EPA on page 13542 of the NODA. It is very difficult to determine what is limiting a population, to link production to a specific habitat restoration approach, and to quantify the benefits to the species of a habitat restoration project. In the case of winter flounder, such documentation would be impossible to obtain if wetland restoration is used. Thus, EPA will need to be flexible in applying any such requirement and the considerations will need to be site- and species-specific.

Furthermore, in view of the uncertainty of habitat restoration in increasing fish production for specific target species, EPA should be clear in its allowance of flexibility in the choices of restoration options. In particular EPA should make clear that restoration options can include projects that (1) reduce mortality to fishing and other causes, (2) replace missing individuals using restocking techniques, or (3) provide equivalent ecological services.

As fishing mortality is high and limiting to many I&E species, it is more likely that addressing this major limitation to population size will be successful in increasing species production than habitat restoration. One way to reduce harvest is to provide alternatives for fishermen and consumers. This might involve stocking (or culture) of the same or alternative species or restoration to increase fish production generally, and thereby decrease fishing pressure on the target species of concern.

The use of appropriately designed restocking programs is more certain than habitat restoration when aiming at specific species. Restocking directly addresses the lost use as a fishery, which, for example, is a particular concern for winter flounder for which tidal wetland restoration would be of little use. In my previously-submitted comments on the proposed rule (dated 5 August, 2003), I have discussed use of and uncertainties of restocking and its potential as an alternative to restore I&E species. In addition, restocking might be implemented in conjunction with habitat enhancement to increase the production of the target species.

The use of a biological restoration or enhancement activity that will provide a net gain in terms of fish production generally, to offset I&E losses, was discussed in section 3 above. The fish and other biological production gained need not be entirely one-for-one in kind with I&E losses if the ecological and human services of the I&E individuals are replaced. Services of food production for predators, including humans, may be met with similar species that function in ecologically similar ways (e.g., are of the same trophic level). The documentation of uncertainty would be much more direct, involving the uncertainty of successful habitat restoration that would be expected to provide fish and invertebrate production. There is considerable established practice in the documentation of success for habitat production (e.g., for SAV see Fonseca et al. 1998).

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

For a discussion of the need for quantitative analysis in the restoration measure context, see EPA's response to comment 316bEFR.202.035.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.312.005

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Adaptive Management: While using an adaptive management plan for the restoration project's) is a worthy goal; in practice it will be very difficult. EPA should be flexible in its requirements for restoration options, monitoring and adaptive plans.

[The text above is from the summary on page 4. The text below can be found on pages 10-11 of the comment letter.]

Adaptive Management

While using an adaptive management plan for the restoration project's) is a worthy goal; in practice it will be very difficult, for many of the same reasons outlined in the foregoing sections. Having to show and quantify the benefits to individual I&E species, and adapt the plan as monitoring proceeds, will have many practical limitations and in some cases will be virtually impossible. Because of this, a strict application of adaptive management principles could prove highly discouraging to the use of restoration.

Each species would need to be studied and monitored in detail, including demonstration of the enhancement of species production over and above the baseline condition had the restoration not been performed. Thus, detailed understanding of changes in the populations would be required as fishing mortality and other ecologically-relevant changes ensued. The language EPA has suggested is somewhat vague on what would be required, perhaps appropriately so, but this will likely lead to protracted disagreements and may well discourage the use of restoration all together, which is not a desired result. It would be more realistic to be more specific in the goals of the project, such as to restore so many acres of habitat to a certain level of functionality, or to provide fish ladders with specific performance standards (etc.), than to require strict demonstration of the maintenance of a species in a water body at a level that would have been achieved under section 125.94.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.312.006

Author Name Deborah French McKay

Organization Applied Science Associates, Inc.

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Independent Peer Review: The use of peer reviewers is appropriate in principle. However, it is highly likely that the reviewers will comment that the project benefits are uncertain and they will not provide any easy answers for EPA, states and others involved in reviewing restoration proposals.

[The text above is from the summary on page 4. The text below can be found on page 11 of the comment letter.]

Use of Peer Review

The use of peer reviewers is appropriate in principle. However, if habitat restoration is proposed to offset specific species' lost production, it is highly likely that the reviewers will comment that the project benefits are very uncertain. The level of uncertainty may also result in outside reviewers being more influenced by their biases of what they would like to see happen, than what would be scientifically advisable. Reviewers would be more likely to agree with general rather than species-specific goals, for example to the concept that wetlands and SAV increase fish production in general as this is well accepted. In addition, consideration of the effects of restoration by trophic level, rather than by individual species -- an approach used in NRD restoration, as noted above -- may make peer review more effective. In any event, , peer review will not provide any easy answers for EPA, states and others involved in reviewing restoration proposals.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of peer review in intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022). Peer review provides a useful tool for bringing current and specialized expertise to bear on the use of a restoration measures. This is particularly important given the continued progress restoration science continues to make.

EPA believes restoration measures may not be appropriate for every site, in some cases because of uncertainties about the design, implementation, performance and/or assessment of the measures. EPA believes it is best for all parties to consider the uncertainties and discuss potential solutions before investing substantially in a particular restoration measure. This process is also important because of the potential limits, both practical and within the structure of the final rule, on the resources available for implementing restoration measures. This limit in the final rule is a function of a permit applicant's ability to apply for a site-specific performance standard should costs of compliance with the requirements of the final rule exceed the costs estimated by EPA.

In the final rule, the permitting authority has the flexibility of determining the necessity of independent peer review.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

A. Christopher Gross

On Behalf Of:

KeySpan Corporation

Author ID Number:

316bEFR.313

Comment ID 316bEFR.313.001

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

BTA Determination

We wish to reiterate our preference to a site-specific approach to implementing 316(b). The EPA's proposed process of determining BTA is flawed in that it appears to only allow for demonstration of BTA by meeting specific percentage reductions in fish impingement mortality and total entrainment numbers, or demonstration that costs of meeting that reduction would be significantly greater than its benefits. The process as proposed is inappropriately skewed toward the application of engineering controls for determining BTA. It still makes no allowance for a demonstration that the plants may have been historically operating for decades without a demonstrable adverse impact on populations of fish in the adjacent waterbodies. It also fails to recognize that certain plants may even have a positive effect on local and regional fish communities that is appreciated by the human population. Our plants, and others, have been extensively studied over the years. Those results have been scrutinized by regulators at the state and federal level as well as the lay public, as we described in our earlier response, and found acceptable.

Our studies, as have studies at other stations, have demonstrated that the plants have not caused adverse environmental impact (AEI) when judged in relation to the definition proposed by EPRI and UWAG: "adverse environmental impact is a reduction in one or more representative indicator species that 1) creates an unacceptable risk to a population's ability to sustain itself, to support reasonably anticipated commercial or recreational harvests, or to perform its normal ecological function and 2) is attributable to operation of the cooling water structure." We are dismayed that EPA did not define or address AEI in the NODA and we would hope that such a definition will appear in the final regulation. We would then expect that AEI would be used as the yardstick on a case by case basis to make the 316(b) determination.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative. Please refer to the preamble for more information.

EPA disagrees that the rule is "skewed toward the application of engineering controls for determining BTA." Under four of the five compliance alternatives in the final rule, a facility is potentially able to demonstrate that its existing intake technology meets the performance standards. As examples: 1) a facility with an existing closed-cycle cooling system meets the standards under the first alternative; 2) a facility demonstrates that its existing intake technology meets the standards under the second alternative; 3) a facility that has an existing approved technology and the appropriate set of site conditions meets the standards under the fourth alternative; and 4) a facility can seek a site-specific demonstration that its existing technologies meet the performance standards under the fifth compliance alternative.

However, EPA does not wish to imply that most or all facilities in the above scenarios will meet the performance standards. To the contrary, a goal of today’s rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that today's performance standards will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.313.002

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code 12.03.02

Entrainment survival chapter

We also note with dismay that EPA still does not accept the principle of entrainment survival in its calculations despite numerous studies that prove that many organisms can successfully survive the entrainment process, just as many fish are known to survive impingement. In our opinion there is no rationale for ignoring the results of numerous entrainment survival studies that have been conducted at great expense to advance the knowledge base concerning power plant effects.

And we note that the principles of compensation and density dependence are still not recognized despite being recognized by the scientific community and intuitively obvious to nearly all except the staunchest opponents of power plants. These principles should also be incorporated into the final regulations.

As EPRI is submitting a rigorous defense of survival, compensation, and density dependence and other technical issues in their detailed comments, we will not address them further here. We have participated with EPRI in the preparation and review of their analyses, and support Peru's detailed comments. We also support the comments supplied by EEI and UWAG.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis. Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation.

Comment ID 316bEFR.313.003

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code 10.02

Benefit Estimation Methodology

The calculation of the economic benefits and costs of applying BTA play a crucial role in whether or not existing facilities would qualify for site-specific BTA determinations. In addition, the manner in which the economic calculations are considered in the decision process is also critical to which technologies might be required for the site-specific cases. We remain concerned that EPA has employed inappropriate methodology and models in development of their economic criteria. For instance, EPA appears to have employed avoided costs as a measure of benefits, which assumes that individuals would voluntarily pay those replacement costs.

EPA Response

The avoided costs methods are not used in the cost benefit analysis for the final Section 316(b) Phase II rule. For EPA's response to comments on the HRC method, please see response to comment #316bEFR.005.035. In addition, EPA no longer uses hatchery costs to estimate impacts on forage species. Instead EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter A5: Methods Used to Evaluate I&E.

Comment ID 316bEFR.313.004

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

We particularly question non-use valuations and the assumptions behind them and do not believe them to be supported in the literature or in practice.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.313.005

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code 9.0

Costs

We also question the validity of using habitat replacement costs to measure benefits, but agree that habitat enhancement is a valuable tool that could be used to offset any demonstrated adverse impact of plant operation. In general, it seems basic economic principles have been misapplied or rigged to produce the desired result. It would seem to be more appropriate to apply actual costs of production lost against mitigation costs. And finally, we believe that EPA has seriously underestimated the costs of providing off-stream cooling (now apparently off the table, we are pleased to note) or other mitigative measures to plants located on saline waters. Once again, we will leave the detailed analyses and critique of the economic analyses to the comments that will be provided by EPRI, UWAG and EEI

EPA Response

Under the final rule, the Agency allows use of restoration measures to minimize or to help to minimize adverse environmental impacts deriving from impingement and entrainment of aquatic organisms.

Regarding the costs of providing "off-stream cooling", the Agency does not base the requirements of the final rule on closed-cycle recirculating wet cooling towers (referred to as "off-stream cooling" by the commenter). EPA notes that the commenter provides no evidence or any detailed discussion of how it believes the Agency has underestimated the costs of "other mitigative measures" for plants located on saline waters. The Agency believes that it has provided reasonable estimates for the difference in costs between fresh and saline waters for the mitigative technologies forming the basis of the final rule. See the Technical Development Document for detailed information related to the Agency's methodology for estimating the costs of mitigative technologies other than cooling towers and the incorporation of costs for plants located on saline waters.

While the Agency agrees that the HRC and hatchery costs are costs of replacement and not benefits, the Agency believes that understanding what it would cost residents in an area to replace CWIS losses could be a very useful tool in the regulatory process and also informs decisions on the use of restoration. The HRC like the HEA is a process that requires the analyst to systematically evaluate the losses caused by a CWIS, quantify them, and then consider the steps that would be necessary to replace these individuals and species. The species by species consideration of losses, even if not monetized, could be a useful tool in considering the environmental effect of CWIS losses. For further detail on the HRC method, please see EPA's response to Comment 316bEFR.005.035 and the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

Comment ID 316bEFR.313.006

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name A. Christopher Gross

Organization KeySpan Corporation

We are still unsure of the sequence and timing of activities required on the part of the applicant and the agency to demonstrate and determine BTA for a plant. We again submit that demonstrations of compliance should be triggered by incorporation of such a requirement in the NPDES permit renewal process. In other words, if the permit administrator or his designee, upon review of the applicant's renewal application, determines that the applicant's CWIS may not be BTA, the issue could be addressed through a formal process and, if necessary, the permit could be modified to include a condition that the applicant then demonstrate, through studies or other means, that the CWIS is BTA. Absent such a process, the applicant would have to presume that his CWIS might not meet the BTA standard and would preemptively, and perhaps unnecessarily, expend considerable time, effort and resources on a speculative assessment of risk. He might also have to initiate studies prior to the regulations becoming final in anticipation of providing a BTA demonstration at his next NPDES permit renewal application when, in hindsight, such actions may be determined to have not been necessary.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

EPA has also provided a tremendous degree of flexibility by offering four compliance alternatives and a site-specific determination of BTA with varying study requirements. Please see response to 316bEFR.034.005 for details.

Comment ID 316bEFR.313.007

Subject Matter Code 21.02

Director's role in determining requirements

Author Name A. Christopher Gross

Organization KeySpan Corporation

We must assume that the proposed rules are intended to be implemented by EPA or designated representatives on a consistent national or regional basis. We are concerned that individual state permit administrators will not be constrained by the proposed rules but may use them as a stepping stone to ratchet up restrictions on an applicant. With deregulation of the industry this could put certain regions or companies or individual plants at a competitive disadvantage, which could ultimately create an adverse impact upon electric reliability and cost to the consumer. We urge that EPA require consistency of approach and evaluation on a national or at least regional scale. Failing such a leveling of the playing field, local regulators may advance individual agendas, which could cause excessive energy costs and diminish energy reliability without commensurate improvement to aquatic populations.

EPA Response

Please refer to EPA's response to comment 316bEFR.027.008.

Comment ID 316bEFR.313.008

Author Name A. Christopher Gross

Organization KeySpan Corporation

Subject Matter Code MISC

Miscellaneous comment

We certainly appreciate the effort that EPA has put into producing the proposed regulations. However, the proposed regulations and information provided by the NODA document leave many questions unanswered and they still do not allow applicants to consider scientifically verified aspects of natural population dynamics such as entrainment survival and compensation. We respectfully submit that any regulation that will significantly affect the cost and reliability of electrical energy must incorporate the best scientific information available, not ignore it. We are concerned that the proposed regulation does not do so; instead, it will raise costs to achieve benefits that good science suggests will be illusory.

EPA Response

Please see response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality for the benefits analysis for this rule. Please see response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analyses.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Joe Mayhew & Tony Wagner

On Behalf Of:

American Chemistry Council

Author ID Number:

316bEFR.314

Comment ID 316bEFR.314.001

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Subject Matter Code 7.04

Streamlined Technology Option

ACC Supports The Identification Of Streamlined Or Preferred Technologies That Would Be Designated As the Best Technology Available For Certain Intakes

ACC concurs with EPA that the Comprehensive Demonstration Study required in the Phase II proposed definition could represent significant costs. Permittees should not be required to demonstrate that the Best Technology Available (BTA) is indeed BTA for each facility. Many of ACC's members have small intakes (< 50 MGD) on large rivers and estuaries and will therefore be primarily regulated under EPA's forthcoming Phase III rules. In these situations, the Comprehensive Demonstration Study could represent a significant portion of the total compliance cost to be borne by both small businesses and larger facilities in a competitive chemical manufacturing sector in the US. We recommend that EPA continue gathering data on the performance of cooling water intake structure (CWIS) technologies and determine whether a certain BTA exists that is capable of meeting the proposed impingement and entrainment reduction requirements.

With respect to BTA and streamlined alternatives, we maintain that EPA should consider design factors, aside from technologies, which may provide equivalent protection to the environment. Design factors could include intake placement, intake orientation relative to stream flow, intake velocities and stream velocities. For example, a facility cooling water intake flow that constitutes less than 10% of the stream flow, and has an acceptably low intake velocity, may not warrant the technologies required of larger intakes.

EPA Response

For the purpose of today's final rule, the performance standards set by EPA reflect best technology available (BTA). For an explanation of why the performance standards represent BTA, please see the final rule preamble section VII. 2. Because EPA has provided enormous flexibility for facilities in how they might opt to achieve BTA, EPA disagrees that permittees should not have to demonstrate BTA at their facilities. Furthermore, EPA has included the option of a Technology Installation and Operation Plan, by which a facility, with the approval of the Director, may demonstrate compliance with the rule by showing that it has installed, and is properly operating and maintaining protective technologies.

In response to the comment that EPA should consider design factors when establishing BTA and streamlined alternatives, EPA agrees. The structure of today's final rule considers factors such as waterbody type, capacity utilization rate, intake flow rate, ambient biological and physical conditions, cost, and existing technologies when establishing BTA for a given facility. Furthermore, EPA has provided any interested party the means to submit to the Director for approval an alternative approach for complying with today's rule. For additional details on the Approved Design and Construction Technology option (commonly referred to as the "streamlined technology"), please see the final rule § 125.99(b), and EPA's response to comment 316bEFR.306.062.

Comment ID 316bEFR.314.002

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

EPA Should Give The Permittee The Greatest Possible Amount Of Flexibility To Meet The Regulations, So That Cost-Effective Solutions Can Be Implemented

EPA should not place constraints on the technology options a permittee can evaluate to meet the requirements of the regulations. If a site specific alternative shows that an existing intake has a minimal adverse environmental impact, the permittee should not be required to provide additional technology, regardless of the cost considerations. EPA should allow the greatest possible amount of flexibility to meet the regulations, so that cost-effective solutions can be implemented.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative. Please refer to the preamble for more information. With regard to the commenter's statement on "minimal adverse impact," EPA notes that the site-specific determination of best technology available would include a consideration for costs and benefits and if the facility was found to be employing the best technology available for minimizing AEI, then no further technologies would be required.

If the commenter was referring to a facility that purportedly has a history of minimal or no adverse environmental impact, then please refer to the response to comment 316bEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities. EPA disagrees that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b).

Comment ID 316bEFR.314.003

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Independent Peer Review Will Add Unnecessary Expense And Delay

A peer review requirement for restoration projects will certainly increase the expense of restoration projects and most likely will delay implementation. In most cases it is likely that a permittee will propose a restoration plan developed with the aid of consultants or experts in the field. The requirements for restoration plans already contain safeguards to ensure that the project will achieve its goals. The Director should have the ability to review the restoration plan and approve or request additional information without an additional layer of review.

EPA Response

Under the final rule, the permitting authority has the flexibility to determine the need for independent peer review of a restoration measure. For additional discussion of peer review, see EPA's response to comment 316bEFR.312.006.

Comment ID 316bEFR.314.004

Author Name Joe Mayhew & Tony Wagner
Organization American Chemistry Council

Subject Matter Code 7.02
Performance standards

Use Of A 3/8-Inch Mesh Size Traveling Screen As A Baseline Condition Is Inappropriate

ACC believes that EPA should not require 3/8-inch traveling screens as part of the baseline condition. A traveling screen is a sophisticated technology system that will reduce impingement/entrainment of fish on the intake screen. Facilities that already have this system should be entitled to take "credit" for this technology. The baseline condition should not consider components of the intake structure beyond a trash rack/bar screen.

EPA Response

EPA disagrees that the use of a 3/8-inch mesh screen as part of the baseline calculation is inappropriate. This allows a more consistent estimation of the organisms that are considered "entrainable" vs. "impingeable" by specifying a standard mesh size that can be related to the size of the organism that may potentially come in contact with the cooling water intake structure.

EPA disagrees that a traveling screen alone can be considered a "sophisticated" technology system with regard to reducing impingement mortality and entrainment. Entrainable organisms are generally smaller than 3/8 of an inch and would not be affected by a standard 3/8-inch traveling screen. Credit, as discussed by the commenter, would not apply. Similarly, impinged organisms typically need additional measures to ensure their safe return to the source water, such as lift buckets, fish return troughs, low-pressure spray washes, etc. EPA believes the calculation baseline presented in today's final rule is appropriate.

Comment ID 316bEFR.314.005

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Subject Matter Code 7.02

Performance standards

"As Built'' Approach To Determining Calculation Baseline

ACC supports the idea of flexibility in determining compliance with the rule's requirements. However, it is extremely difficult to quantitatively measure impingement in many situations. An example would be a submerged intake in a deep channel of a river. The theoretical baseline method will also be problematic. In these cases, 316(b) permitting requirements and compliance should continue to be determined on a case-by-case basis, at the discretion of the Director. ACC also supports the flexibility to allow a facility to use sampling data from other nearby facilities to calculate its baseline, assuming the data can be reasonably extrapolated to the facility (i.e., similar technology used, similar intake volumes, etc.).

EPA Response

Please see response to comment 316bEFR.314.005.

Comment ID 316bEFR.314.006

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Subject Matter Code 21.04

Determination of compliance

Options for Evaluating Compliance With Performance Standards

The options for evaluating compliance with the performance standards should be flexible and varied, taking into consideration percent intake of waterbody, location of intake on waterbody, type of waterbody, CWIS technology employed, etc. This approach would be consistent with the current NPDES program, where the amount of parameters and the frequency of monitoring vary based on the size of the discharge and the pollutants of concern. ACC believes that not all dischargers should have to evaluate compliance with performance standards based on the number of fish and larvae lost due to impingement and entrainment.

Once the technology has been shown to meet the performance requirements, the permittee should only have to demonstrate that the technology employed continues to operate effectively. For those permittees that must meet a performance standard, they should have the option to use either the enumeration of all fish, regardless of taxonomy or the representative species approach, using either absolute numbers, or wet or dry weight (biomass), to determine compliance with the impingement mortality and/or entrainment performance standards. Moribund fish should not be included in the calculation of compliance with the performance standard. For many species--shad for example--winter die offs of significant numbers of fish are common. At some facilities, these moribund fish may be the primary fish collected on the intake screens. Since the intake structure is not responsible for their deaths, ACC believes that these types of fish should not be included in the calculation of compliance of the performance standard.

For those facilities that must meet a performance standard, averaging periods for determining compliance with the performance standard should be as long as possible, i.e., the duration of the permit (5 years). This will reduce the variability caused by temporal and spatial abundance of organisms being impinged or entrained. Because of the inherent spatial and temporal variability of fish abundance, uncertainties around the effectiveness of technologies due to site-specific factors, and the inability to determine compliance with the performance standard over a short period of time, we maintain that it would be unreasonable to enforce the proposed performance standard during the first permit cycle. Facilities that do not achieve the performance standard at the end of their first permit cycle should be given the opportunity to use the collected data to modify their CWIS technology, or possibly re-evaluate their baseline calculation if it is based upon theoretical and not measured data. Facilities that implement CWIS technologies to reduce adverse environmental impacts should not be penalized until given the opportunity to optimize these technologies.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan. EPA also disagrees that a facility that is out of compliance should not be subject to enforcement actions.

Comment ID 316bEFR.314.007

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

ACC Supports Extensions Of Time For Facilities That Must Renew Their Permits Shortly After Promulgation Of The Phase II Rule

For permittees that have already applied for a permit renewal, and are thus in the period of agency review of the application, we believe the permittee should not have to redo its application due to the promulgation of the Phase II rule. In such a case, ACC recommends that the succeeding five-year permit term be the time in which the permittee must comply with the new rule.

Similarly, if the Phase II Rule is promulgated very near the time when a permittees renewal application is due (for example, between 365 and 180 days before its permit expires), we suggest that it would be counter productive to require the permittee to adjust its application process to the new rule. The practical difficulties in preparing a permit application, especially if biological monitoring is needed, should not be imposed until the succeeding permit term after the Phase II Rule becomes final.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.314.008

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Joe Mayhew & Tony Wagner

Organization American Chemistry Council

Once BTA Has Been Determined And No Significant Cooling Water Increases Occur, There Should Be No Further Need For A Section 316(b) Analysis

ACC believes that a Section 316(b) analysis should be a one-time only requirement. That is, once "best technology available" has been determined for a facility, installing and operating that technology should relieve the facility of further Section 316(b) reviews. The "location, design, construction, and capacity" of the cooling water intake structures are matters of design and construction, not operation. Congress could not have intended that facilities be in the business of redesigning, demolishing, and reconstructing their intake structures every five or ten years.

For each NPDES permit renewal cycle, a permittee could certify that there have been no changes that would affect the design of the intake structure. From this, the Director should then accept the original Section 316(b) analysis and BTA determination. However, ACC does support the need for a new Section 316(b) analysis if there have been significant changes in plant operations or the design of the intake structure that may lead to adverse changes to the aquatic populations.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to comment 316bEFR 041.126.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Ronald H. Hixs

On Behalf Of:

Florida Light and Power Company

Author ID Number:

316bEFR.315

Comment ID 316bEFR.315.001

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 7.01.03

Option 3--Site-specific determination

To reiterate previous UWAG, EEI and FPL comments, FPL would still prefer a fully site-specific approach to determining BTA for minimizing environmental impacts that might be attributed to power plant intake structures. This approach has been in effect since 1977 (EPA guidance) and has been extremely effective.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Comment ID 316bEFR.315.002

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

Since it doesn't appear that the 1977 guidance will "stand", FPL supports the current "preferred alternative" in the proposed rule rather than any water body/capacity-based approach.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.315.003

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 7.01.03

Option 3--Site-specific determination

In addition, it is critical that the site-specific alternative due to economic criteria option, along with voluntary restoration /mitigation and operational measures remain in the final rule.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.315.004

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Under this section, EPA invited comment on whether the Agency should adopt a quantitative definition of ""significantly greater", and if so, what specific ratio would be appropriate.

FPL realizes that not defining "significantly greater" may result in differences from region to region or state to state, but it would give those agencies the ability to make policy judgments based on the actual and/or perceived value of resources in that region or state. Therefore, FPL is not in favor of EPA adopting a quantitative definition of "significantly greater".

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.315.005

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival

FPL agrees with UWAG that, "Although EPA is correct to assume no survival of entrained organisms for the "baseline" condition in determining compliance, it should not forbid the use of sound data that show some survival, where such data exist. Sound data on entrainment survival should be accepted to show compliance with the entrainment performance standard of 60-90% reduction." FPL also believes it would be appropriate for EPA to allow permittees to propose entrainment survival studies that would be evaluated by the permitted, based on EPA guidance.

EPA Response

Please see response to comment 316bEFR.307.035 which is the comment referred to by the author of this comment.

Comment ID 316bEFR.315.006

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Restoration

As in our original comments on the proposed Phase II rule, FPL applauds EPA for recognizing the benefits of voluntary restoration that a facility might employ in lieu of, or in conjunction with, technological approaches and voluntary operational restrictions. We would like to reiterate our comments on this very important issue.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

The final rule allows the use of restoration measures both in lieu of and as a supplement to design and construction technologies and/or operational measures.

Comment ID 316bEFR.315.007

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 11.0

Role of Restoration

FPL believes that restoration measures should be expanded to the largest extent possible and should make sense from an ecosystem standpoint and not be inhibited by political boundaries. For instance, mitigation or restoration that could be conducted in an estuary impacts numerous types of fish and shellfish that spend portions of their lives there. Many of these organisms later move to open ocean waters and can move up and down along the coastline.

EPA Response

For a discussion of the appropriate spatial scale on which to conduct restoration measures, see EPA's responses to comments 316bEFR.212.001 and 316bEFR.059.008.

Comment ID 316bEFR.315.008

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

FPL agrees that activities such as habitat conservation are an appropriate component of a facility's restoration efforts. Other appropriate components are activities such as stormwater management or connecting facilities using septic tanks located near a water body to a POTW. These activities don't directly replace organisms (like stocking) or sea grass (like restoration) but could play a major part in the recovery of an ecosystem.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

For a discussion of ancillary benefits associated with restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.315.009

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 11.12

RFC: Restoration banking

FPL feels that innovation should be the driver and all reasonable approaches to restoration/mitigation should be considered. For instance, the development of mitigation banks, such as those allowed by the 404 program, could have a major positive impact on an aquatic ecosystem located next to them. This additional value could result in more banks being developed and therefore more restored habitat for all types of aquatic, as well as terrestrial, creatures.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. Restoration measures must meet the requirements described in the final rule.

For a discussion of trading programs, see the preamble to the final rule.

Comment ID 316bEFR.315.010

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

In the NODA, EPA states that it is considering requiring the following practices during the development of restoration projects:

- Documentation of sources and magnitude of uncertainty in expected restoration project performance

- Creation and implementation of an adaptive management plan

- Use of an independent peer review to evaluate restoration proposals

FPL agrees with UWAG that all of these approaches may be useful, depending on the nature and complexity of the proposed restoration measure. We also believe that the decision on whether or not to require these practices should be made by the permitting agency on a case-by-case basis, with these factors used as tools, rather than absolute requirements.

EPA Response

For a discussion of the usefulness and flexibility in the use of the practices described by the commenter, see EPA's response to comments 316bEFR.307.047 and 316bEFR.311.022.

Comment ID 316bEFR.315.011

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Compliance Timelines, Schedules and Determination

EPA has suggested two options for allowing additional time to facilities that are required to apply for a permit renewal soon after promulgation of this rule. The first requires the applicant to submit required studies, etc. within one year after their current permit expires. The second option allows information to be submitted two years after the original application was due (18 months after the permit expired). The second option might be acceptable for those facilities that have permits expiring the full year after the rule is promulgated, however some facilities will have permits expiring soon after the rule is effective. For this reason, a minimum of 3 years must be allowed from promulgation of the rule to the first full, "Comprehensive Demonstration Study" being required to be submitted. This time would allow a permittee to read and understand the new rule, budget appropriately, conduct studies, etc. This time frame does not take into account the amount of time a State might require for adopting the rule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.315.012

Author Name Ronald H. Hixs

Organization Florida Light and Power Company

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Determining Capacity Utilization Rates

FPL agrees with EPA that the new rule should only apply to the "steam electric part" of the facility when determining "capacity utilization rates".

However, EPA's proposed definition (as well as the concept) of "capacity utilization rate" may unfairly penalize some facilities. EPA's proposed definition of capacity utilization rate is,

"Capacity utilization rate means the ratio between the average annual net generation of the steam electric part of the facility (in MW) and the total net capacity of the steam electric part of the facility (in MW) multiplied by the number of available hours during a year. The average generation must be measured over a five year period (if available) of representative operating conditions."

The problem with this definition is the use of and possible definition of "available." As EPA notes in the proposed rule,

"The Agency's record demonstrates that facilities operating at capacity utilization factors of less than 15 percent are generally facilities of significant age, including the oldest facilities within the scope of the rule. Frequently, entities will refer to these facilities as peaker plants, though the definition extends to a broader range of facilities. These peaker plants are less efficient and more costly to operate than other facilities. Therefore, operating companies generally utilize them only when demand is highest and, therefore, economic conditions are favorable. Because these facilities operate only a fraction of the time compared to other facilities, such as base- load plants, the peaking plants achieve sizable flow reductions over their maximum design annual intake flows."

As noted above, a unit may not be operated for economic, maintenance or other reason (including permit driven operational limits). It doesn't seem important as to why the unit is or isn't operating, just the fact that it isn't operating reduces the flow, and thereby, impingement and entrainment. As these are generally older units, they may require extensive maintenance that may occur during periods where they wouldn't be operated for economic reasons. A unit under this scenario would be "penalized", as it wouldn't be "available" while on the outage. (This assumes "available" means physically capable of operating"). A facility with a "capacity utilization rate" of 15% would have that percentage increased to approximately 18% if you deducted two months of the year as being "not available" during to an outage, even though the unit actually operated the same amount of time as it would have without the outage.

The worst possible scenario would be a facility voluntarily accepting an operational limit so it can not exceed a 15% capacity factor (see definition of capacity factor below). It seems one could argue the unit is "not available" 85% of the time. If you subtract the hours the facility is not available (based on the EPA definition), you end up with a capacity utilization rate of 100%!

To simplify matters and not penalize certain facilities, FPL proposes that "capacity factor" as defined by the Energy Information Agency (under the Department of Energy - www.eia.doe.gov/cneaf/solar.renewables/rea_issues/glossary.html.) be for used in lieu of “capacity utilization rate”.

That definition of capacity factor is, as follows,

“Capacity Factor - The ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full-power operation during the same period.”

This definition gives you the same percentage you’d achieve if you eliminate the “available” portion of the capacity utilization rate” definition and eliminates the need to define “available” and track “available” hours.

EPA Response

This is a helpful and insightful comment. The Agency agrees that the term “available” was not appropriate for the case of the capacity utilization rate threshold. As such, the Agency has struck the term from the final rule definition of capacity utilization rate. However, the Agency cannot accept the definition verbatim as recommended by the commenter for the fact that it does not define the time period over which to measure the rate. The Energy Information Administration definition of capacity factor, as stated by the commenter, "gives you the same percentage you would achieve [with EPA's NODA definition] if you eliminate the "available" portion of the capacity utilization rate." Therefore, the Agency has ensured that the final rule definition is compatible with the suggested definition and that the term "available" is not included.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Daniel J. Orr

On Behalf Of:

Xcel Energy

Author ID Number:

316bEFR.316

Comment ID 316bEFR.316.001

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy commented on the NOPR and still feels that a site-specific approach for determining the existence of and selecting best technology available for minimizing adverse environmental impacts at cooling water intake structures is more effective than nationwide performance standards. Several comments submitted on the NOPR outlined site-specific permitting procedures that could be developed into an effective nationwide NPDES permitting system.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.316.002

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

According to the NODA it appears that EPA is analyzing two alternatives for § 316(b) regulations. Xcel Energy would support EPA's preferred option based on water body type and intake structure capacity over the less flexible and more costly waterbody/capacity-based option. EPA's own analysis for the NOPR revealed that the waterbody/capacity-based option would result in substantial net costs to society based on the required installation of recirculating cooling towers at numerous facilities. The results of the NODA analysis of that option estimated even more significant net social costs. The preferred option at least provides facilities some flexibility in meeting the performance standards and incorporates cost-cost and cost-benefits analyses to avoid excessive economic burdens for many facilities.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

EPA elected to not adopt any of the alternative technology-based options discussed in the proposed rule (67 FR 17154-17159) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Please refer to the response to comment 316bEFR.005.020 for a discussion of the application of the cost-benefit test to assessing the value of alternative approaches.

Comment ID 316bEFR.316.003

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA requests comments on the use of "significantly greater than" as the trigger for the proposed "cost-cost" and "benefit-cost" test option for site specific review. EPA admits that their new methodology, in the NODA analysis, of applying the best performing technology in their technology cost modules rather than the traditional least cost technology results in greater cost conservatism than is typical of regulatory analyses. Given that the EPA's cost estimates are already overly conservative it is not appropriate to require that individual facility costs be "significantly greater than" EPA estimated costs to allow site-specific permitting. If facility costs are any greater than those estimated (or at most 10% higher than estimated) then site-specific permitting should be an option.

EPA Response

See responses to 316bEFR.337.021. See the preamble to the final rule for a discussion of the site-specific requirements of the final rule.

Comment ID 316bEFR.316.004

Subject Matter Code 7.04

Streamlined Technology Option

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy welcomes EPA's recognition that streamlining the permitting process is a benefit to both the regulated community and the regulating agencies in terms of costs and workloads. We encourage EPA to provide options for choosing from a suite of technologies that are presumed to meet the performance standards. Both of EPA's streamlining options should be incorporated allowing use of pre-approved technologies or use of innovative technologies that have been demonstrated effective at similar facilities. In no way should these streamlining options preclude a facility from using existing technology, operational measures, restoration, or combinations of the aforementioned to meet performance standards.

EPA Response

EPA appreciates Xcel Energy's support of EPA's Approved Design and Construction Technology option. Please refer to preamble section VIII.C.4., Approved Design and Construction, for EPA's position on using existing technology, operational measures, and/ or restoration measures combined with the Approved Design and Construction Technology (commonly referred to as the "streamlined technology" option) to meet performance standards.

Comment ID 316bEFR.316.005

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Daniel J. Orr

Organization Xcel Energy

Xcel Energy questions how implementation of the § 316(b) regulations will occur and how compliance will be determined. In light of the lengthy pre-permitting study requirements, engineering analysis, and permit renewal submission requirements delaying the effective date of the new rule for at least two years after approval seems reasonable. We also support the use of compliance schedules in NPDES permits as a means of meeting the rule requirements.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. See the preamble to the final rule for a discussion of compliance issues.

Comment ID 316bEFR.316.006

Subject Matter Code 21.04

Determination of compliance

Author Name Daniel J. Orr

Organization Xcel Energy

Compliance with the performance standards should be based on following all of the appropriate permitting procedures, installing the approved technology, and following approved O&M procedures not necessarily on meeting specific numeric impingement/entrainment reductions. If the properly installed and operated technologies fail to meet the standards it should not be considered a permit violation but rather require additional review and possible modifications still based on the appropriate cost-cost and cost-benefit analyses.

EPA Response

In today's final rule, EPA has included the Technology Installation and Operation Plan, as discussed in the final rule preamble. Facilities that prefer to comply using the Technology Installation and Operation Plan will not need to meet the numeric performance requirements. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Please see response to comment 316bEFR.019.014 for a discussion of site-specific study costs and considerations.

Comment ID 316bEFR.316.007

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 9.0

Costs

Xcel Energy still has significant concerns with EPA's analysis of the cost of compliance with the proposed regulation and notes that for the NODA the revised cost estimates are significantly higher than originally estimated.

EPA Response

The comment is unclear. It is not apparent whether the commenter believes costs are too high or low, or simply is concerned with the fact that the Agency revised its estimates between proposal and NODA. As such, the Agency cannot act upon the comment and differs to its substantial and detailed analysis of the compliance costs of the final rule, as outlined in the Technical Development Document and EBA for the final rule.

Comment ID 316bEFR.316.008

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 9.06

Burden to facilities (general)

Also it is unclear from the economic analysis whether EPA has analyzed what the impacts on costs will be of requiring all of these studies and technical construction work in a limited time period from an equally limited workforce.

EPA Response

The comment is unclear. The Agency notes that it integrated the projected compliance dates into its detailed economic market analysis and has provided for great flexibility in scheduling of rule compliance. For more information on ways of demonstrating compliance with this rule, see the preamble. For more information on the Agency's analysis of compliance years see Chapter B1 of the EBA for the final rule.

Comment ID 316bEFR.316.009

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

In addition there is no discussion of the cumulative cost impacts, on the utility industry, of the proposed § 316(b) regulations in conjunction with other Agency regulatory initiatives including air, water, and waste programs.

EPA Response

EPA disagrees with this assertion. The IPM base case includes current federal and state air quality requirements, including future implementation of SO2 and NOx requirements of Title IV of the CAA and the NOx SIP call as implemented through a cap and trade program. It does not include programs that are still under consideration, such as the Clear Skies Initiative. EPA does not know – and cannot reasonably predict – the outcome of initiatives still under consideration; therefore, any cost estimates EPA might try to develop would be highly speculative and unhelpful. This practice of only including promulgated regulations is typical for energy market models and the Agency's analyses of Clean Water Act rules.

Comment ID 316bEFR.316.010

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Xcel Energy would prefer a site-specific § 316(b) permitting process.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.316.011

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 7.01
RFC: Three-option framework for determining BTA

EPA's preferred alternative may provide a workable solution provided there is flexibility for the regulated community to meet the requirements.

EPA Response

Please refer to the preamble for a discussion of the framework of today's rule.

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose.

Comment ID 316bEFR.316.012

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

The rule also must include costs and benefits analyses to prevent unrealistic economic burdens to facilities and avoid requirements that impose an unjustified net cost to society.

EPA Response

EPA agrees that the analysis of the rule must include costs and benefits assessments, in accordance with EO 12866. The Agency prepared benefit cost analysis of the final Section 316(b) Phase II rule based on the principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003, DCN #6-1931). For detail, see the final Phase II Regional Studies Document (DCN #6-0003) and the final Phase II EBA document (DCN #6-0002).

Comment ID 316bEFR.316.013

Author Name Daniel J. Orr
Organization Xcel Energy

Subject Matter Code 17.0
Other technology-based opt. under consideration

Xcel Energy adamantly opposes implementation of a nationwide one-technology fits all approach and also opposes any regulatory program that stipulates specific technology fixes without offering a range of technology options, modified operating procedures, and restoration alternatives to meet the performance standards.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.316.014

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

The costs to the regulated community, and to society as a whole, of the rulemaking are significant.

EPA Response

EPA disagrees with this comment. EPA selected the least costly and most cost-effective option of the various alternative considered at proposal and for the NODA.

Comment ID 316bEFR.316.015

Author Name Daniel J. Orr

Organization Xcel Energy

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

The Agency must allow facility owners as much flexibility as possible for meeting the requirements of the proposed regulation while maintaining the economic viability of their business. Promoting the development of creative and innovative solutions to impingement and entrainment issues will benefit all parties involved.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Basil G. Constantelos

On Behalf Of:

Midwest Generation EME, LLC

Author ID Number:

316bEFR.317

Comment ID 316bEFR.317.001

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Of paramount importance is the need to retain the States' flexibility to implement the 316(b) Rule for specific waterbodies. The Clean Water Act and its implementing regulations include repeated expressions of Congressional intent to delegate broad discretion to the States to implement programs that protect the quality of our waters. The 316(b) Rule is among those provisions where Congress intended to provide the States with flexibility to address site-specific concerns while achieving the Clean Water Act's goal of protecting aquatic life in those waterbodies. As competitive suppliers of electricity to a deregulated marketplace, Midwest Generation supports the development of sound environmental regulatory programs that provide flexibility to enable affected facilities to meet the overall intent of the 316(b) rule through cost-effective, environmentally beneficial solutions that are based on site-specific circumstances. The 316(b) Rule for existing facilities can establish necessary standards to protect the environment, while still allowing each State to develop and implement its own policies and procedures to apply the 316(b) standards to specific waterbodies. The 316(b) Rule can and should address the States' need for flexibility in how the rule is applied in site-specific situations. In support of that goal, we offer the following additional comments.

EPA Response

EPA agrees that State programs should be able to address 316(b) issues. In today's final rule, State programs are eligible for approval based on meeting the requirements in 125.90(c). See response to 316bEFR.023.001 for additional discussion on State programs.

Comment ID 316bEFR.317.002

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 3.01

Definition: Existing Facility

Facilities Affected:

The EPA states in the NODA that all Phase II facilities are subject to the requirements of the Phase II regulation, even if they do not currently generate electricity. This proposed broad scope of applicability of the 316(b) Rule will affect any facility which is currently in an extended shutdown. There are several merchant power plant units in the Midwest that have recently halted operations, due to the currently soft power market and rising costs of production. The intention is to return these units to service when and if the marketplace improves. As such, the units retain their NPDES-permit status and the ability to operate again in the future if needed. However, these units are physically laid up, to prevent corrosion and other fouling from occurring, and are not actively taking in water from, or discharging effluent to, a receiving stream. They are not having any environmental impact on the receiving stream, and certainly none that requires regulation under 316(b). Therefore, the 316(b) Phase II rule should not apply to these “shuttered” units until such time, if ever, the decision is made to bring these units back into service. To require such units to install impingement and entrainment controls when such controls may never be needed does not make good economic sense. It also does nothing to protect the environment. In addition, if a unit or facility is not currently in operation, it would be impossible to determine what its calculational baseline is, an essential determination for identifying the impingement and entrainment controls that the EPA is proposing to apply to these plants. The EPA’s comments in the NODA do not acknowledge this significant obstacle to compliance. It is another reason why the 316(b) Phase II Rule should not apply to non-operating plants or units.

EPA Response

"Shutdown" facilities may not meet the requirements of 125.91(a)(2), which requires that an existing facility uses or proposes to use cooling water intake structures with a total design intake flow of 50 MGD or more to withdraw cooling water from waters of the United States. Any such determination must be made on a case-by-case basis. An existing facility that does not meet 125.91(a)(2) is not subject to this rule.

Comment ID 316bEFR.317.003

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Cost of Compliance Estimates

Midwest Generation appreciates the EPA's favorable response to the many comments submitted regarding how the Agency had underestimated the overall costs of installing and operating control technologies to respond to 316(b) requirements. Any retrofit to an existing facility is substantially more expensive than designing identical control equipment for installation at a new facility. There are very significant design and process changes required for existing facilities in many cases. These changes result not only in additional costs and downtime, but also have the potential to negatively impact the operational efficiency of the plant. For merchant plants in particular, the combined costs of procurement, installation and operation/maintenance of a control technology designed to meet the 316(b) performance standards cannot be passed on to the customers. Therefore, it is extremely critical that the Rule 316(b) compliance cost estimates accurately reflect the real-world situation and are not based on theoretical estimates for "model" facilities which do not bear any resemblance to the reality of a particular power plant's situation.

EPA Response

The commenter is mistaken when they assert that "theoretical estimates for 'model' facilities…do not bear any resemblance to the reality of a particular power plant's situation." The "model" facility costing is based on site-specific information obtained for particular power plants, and therefore it integrates real-world situations into the costing approach. The Agency believes that cost estimates for "model" facilities are reasonable when the costs estimates and technology decisions are based on the available site-specific engineering data for the existing facilities upon which the models are based. The Agency notes that the commenter has provided no contradictory evidence or comparative analysis of the Agency's "model" facility cost estimates and only provides generic, non-specific criticism that is unsubstantiated.

Comment ID 316bEFR.317.004

Subject Matter Code 9.0

Costs

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

While EPA has acknowledged that the original estimated cost of compliance was low, and has adjusted capital and O&M cost estimates upwards by 66% and 48%, respectively, we find that the revised cost estimates still do not capture the entire magnitude of the costs for the full implementation of the proposed 316(b) performance standards. The Agency has inappropriately relied upon case studies and information from only a small sampling of non-generic electrical generating plants. The EPA needs to broaden the representative nature and number of electrical generating plants on which it is relying in order to determine with a reasonable degree of reliability the estimated capital and O&M costs that will result from compliance with the proposed 316(b) performance standards.

EPA Response

The commenter possibly confuses the development of the performance standards or possibly the benefits assessment with that of the technology cost development by asserting that the costs development relied on "case studies and information from only a small sampling of non-generic electrical generating plants."

The Agency notes that it developed technology costs for the final rule based on implementation of 13 separate cooling water intake retrofit technologies. This is hardly a "small sampling" of technology case studies. The Agency relied upon the expertise of the manufacturers and installers of each particular technology in order to develop the costs for the variety of technologies considered for the final rule. The Agency obtained costs for generic electrical generating plants, but has not restricted the costs to only apply to just electrical generating plant intakes. The Agency father tailored the costs with site-specific variables and implemented the variety of technologies in such a way that utilized as much site-specific data as was available to the Agency. See response to comment 316b.EFR.317.008 for more discussion of the correlation between costs and performance standards.

Comment ID 316bEFR.317.005

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Actual Cost and Timing Estimates for Required Controls

Midwest Generation encourages the Agency to carefully consider the recent submittals made by the Department of Energy (DOE) in October, 2002 and January, 2003 providing costs estimates for the retrofitting of wet cooling tower systems. In each case, the costs estimated by the Agency were found to be much lower than actual costs incurred by the subject facilities. In addition, the DOE estimated that three out of four facilities would likely require plume abatement technologies that could double the capital costs of the cooling tower portion of a retrofit project.

In the Midwest, where open cycle cooling is dominant, the prospect of having to install wet, closed cycle cooling, especially near large urban areas, is fraught with technological complexities and local regulatory obstacles. Consideration of site-specific factors, including plant location and configuration, available land, piping requirements, plume abatement needs and plant outage repercussions must be factored into the analysis of the feasibility of a complete retrofit to closed cycle cooling. All of these factors, by their very nature, will affect the feasibility and estimated time of completion of such a retrofit, should it be deemed necessary. (The same considerations would also be relevant for any other type of impingement/entrainment control technology that has the potential to significantly impact plant operations, such as installation of a new intake or fish return system, because they would require a period of extended shutdown of a plant).

Because the Agency does not have the available data to review the complete record for all such potential retrofit projects to determine the economic impacts, the 316(b) Rule should allow a facility to prepare and submit a project plan for its retrofit work to the State permitting authority for review and approval. Upon approval, the project plan would form the basis of a compliance schedule to be incorporated into the facility's NPDES permit as part of the permit renewal process. Realistically, the facility would also need an adequate amount of time (two to three years) to allow it to collect the required baseline data necessary for identifying the required control technology to achieve the performance standards adopted under 316(b). This information is critical to developing the project plan for retrofitting the existing system.

EPA Response

EPA first notes that the commenter misunderstands or misrepresents the nature of the cooling tower retrofit cost studies conducted (and shared with the Agency) by the U.S. Department of Energy. Contrary to what the commenter asserts, the cost studies do not reflect "actual costs incurred" for retrofit projects, but rather, prospective and predicted costs based on a hypothetical analysis. The Agency is aware of four actual cooling tower retrofit projects that have occurred. The Agency was able to obtain costs for two of these four retrofit projects. The costs of these projects are included in the record of the proposal rule at DCN 4-2526. Nonetheless, the Agency has reviewed the study presented by the U.S. Department of Energy relating to hypothetical potential retrofit projects. The Agency has reviewed the study (An Investigation Site-Specific Factors for Retrofitting Recirculating

Cooling Towers at Existing Power Plants, January 22, 2003)prepared on behalf of the Department of Energy and finds the principles and concepts behind the analysis to be sound.

EPA agrees that site-specific technological complexities and local regulatory obstacles of retrofitting open-cycle cooling to recirculating wet cooling could cause increases in costs of the technology beyond those estimated by EPA. This would serve to reinforce the Agency's decision to not base the final rule on cooling tower retrofit technologies.

For discussion of the Agency’s consideration of potential plant shutdowns for retrofit installation of new intakes or fish return systems, see the Technical Development Document.

The Agency has considered the schedule and time necessary to complete the baseline data for identifying the required control technology (which is analogous and/or similar to the Agency’s comprehensive demonstration study). For a discussion of timeframes, see the preamble to the final rule.

Comment ID 316bEFR.317.006

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Site-Specific Cost-Cost/Cost-Benefit Test Evaluation

In the current proposal, EPA provides an opportunity for a regulated entity to show that its site-specific costs of compliance are "significantly greater" than the Agency's estimates. However, the Agency does not provide any objective standard for determining whether or not the "significantly greater" requirement has been satisfied. This determination should be delegated to the individual State regulatory agencies to decide, based on their wealth of knowledge regarding state waterways and their unique biological characteristics, the facilities which utilize them for cooling and the State's own priorities regarding protection of their most important aquatic resources. For nearly thirty years, the States have applied sound science and judgment to site-specific data and conditions in order to implement section 316(b) standards. The States have shown that they have the ability and judgment to retain this role in the final 316(b) rule for existing facilities.

EPA Response

See responses to 316bEFR.006.003 and 018.009. EPA notes that in states authorized to implement the NPDES programs, the state Director will implement these requirements.

Comment ID 316bEFR.317.007

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

The same analysis and rationale applies for the calculation of environmental benefits to be gained by installation of a chosen technology. EPA makes gross assumptions that all impinged or entrained organisms have a comparable monetary or recreational “value”, which is extrapolated based on the broad assumptions used in calculating the number of organisms that are inadvertently removed from the system by power plant operations. Most of the data used in the Agency’s analysis is from coastal states or areas with known recreational or commercial potential. It is interesting to note, however, that the Agency admits that greater than 99% of all fish impinged have no recreational value. This being the case, it is unreasonable to attribute derived costs based instead on commercial or recreational species to all impingement/entrainment losses. This approach grossly overstates the alleged losses, as does the Agency’s attempt to assign “non-use” value to these species.

There is little impingement/entrainment and associated cost information for other waterbodies (especially fresh-water, by the Agency’s own admission) largely because the aquatic resources they contain are not necessarily directly equated with State revenue or personal/aesthetic enjoyment. As more fully discussed below, the State of Illinois is currently looking at methods to remove aquatic invasive species from its waterways in order to protect the unique ecosystem of the Great Lakes. The determination of what constitutes environmental “losses” and their valuation should properly be left to the States to determine, in conjunction with their natural resources agencies. This delegation of authority will allow the local permitting authority to rely on pre-existing data and other relevant and appropriate information to determine where best to invest the resources necessary to protect the most valued or sensitive aquatic populations in the State. Combined with accurate cost estimates for approved control technologies, this approach will allow a true comparison of compliance costs versus environmental benefits on a case-by-case basis.

EPA Response

The comment states that “EPA makes gross assumptions that all impinged or entrained organisms have a comparable monetary or recreational ‘value’.” This is correct with the exception that not all species may have 'comparable' value – EPA examined options for assigning values to all lost organisms. But, in the final rule, monetized benefits are based primarily on recreational and commercial caught fish. The comment also notes that “greater than 99% of all fish impinged have no recreational value.” From this, the comment concludes that EPA’s estimate of losses must be overstated. EPA does not agree that because organisms lost are not commercially or recreationally valuable they therefore have no value whatsoever. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values in estimates of national benefits due to uncertainty in monetizing non-use values for this rule. The Agency, however, has explored several methods that indicate the potential for significant non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The comment states that losses and their value should be determined by States, not by the EPA. EPA agrees that there is a role for States in ascertaining benefits in their waters and, therefore has authorized State directors to make site-specific determinations of BTA based on a consideration of costs and benefits.

For EPA's response to comments about using habitat values to estimate values for fish, please see the response to comment #316bEFR.307.061.

For EPA's response regarding comparisons of population demographics between the study region and policy region, please see the response to comment #316bEFR.304.004.

For EPA's response regarding the non-use meta-analysis, please see the response to comments #316bEFR.338.046 and #316bEFR.338.046.

Comment ID 316bEFR.317.008

Subject Matter Code 9.07
Cost Modules

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

Recommended Control Technologies

The revised cost estimates derived by EPA for all of the proposed control technologies are still too low, especially in relation to the worst-case, theoretical estimates of the environmental and economic benefits to be derived from application of these technologies to reduce impingement and entrainment to the required performance levels. EPA's desire to provide state regulatory agencies with a listing of standard, approved impingement and entrainment control technologies is commendable, but the usefulness of this "comprehensive" list, even when categorized by general waterbody type and facility design, is still very limited. There is no compelling evidence in the NODA documents showing that any treatment technology chosen will work equally well in all applications at all generating stations and result in attainment of the required performance standards. There are simply too many variables that must be taken into consideration. Site-specific conditions will dictate the efficiency of any chosen control technology. Significant variables, such as natural seasonal variability in receiving water flow regime, aquatic species cycling and variable facility operating modes, will drive the technological efficiencies of treatment options for each plant. No additional amount of data or studies will be able to establish that a particular technology can be applied uniformly, nationwide in a "one-size-fits-all" approach. Variability is a key biological characteristic and must be accounted for in any regulation that seeks to apply quantitative control criteria. Site-specific application of such control mechanisms, when warranted, is the only reasonable means by which the goals of the regulation will be realized without imposing substantial and avoidable adverse effects on the industry.

EPA Response

The Agency notes that it did not apply any of the 13 technologies forming the basis of the final rule in a "one-size-fits-all" approach, as the commenter asserts. The Agency agrees that no individual technology of the 13 forming the basis of the rule will work for all facilities complying with the final rule. However, due to the fact that the Agency examined and utilized a baker's dozen distinct technologies tailored to model site characteristics, the Agency has accounted for site-specific conditions that dictate technology efficacy. The Agency agrees that site-specific application of control mechanisms is the most reasonable means for realizing the performance targets of the final regulation. To ensure that the cost estimates developed by the Agency correlate well with the real-world application of the performance standards, the Agency has included a cost-cost test in the final rule. Therefore, if facilities can demonstrate to the satisfaction of the Director that they would incur significantly higher compliance expenditures than considered by the Agency for similar facilities to meet the requirements of the rule, then they would be eligible for to less stringent requirements. Therefore, the Agency, despite its model site-tailored costing approach, recognizes that its broad analysis of the vast number of plants within scope of the rule cannot predict seasonal variability and aquatic species cycling for all of the complying facilities. Should this dramatically affect costs for certain complying facilities, then the cost-cost test will provide a second chance for the facility and permit writer to rectify this site-specific condition. The Agency also points out that its approach to developing technology decisions for the NODA and final rule deviated from a more standard "least cost” approach, as might be found in an effluent guideline development. Instead, the Agency adopted a hybrid approach that incorporated the “best performing” technology in cases where significant uncertainty in site conditions existed in its data set. Therefore, the Agency, by default is approaching the costing effort with a degree of conservatism that inherently accounts for the variability described by the commenter.

Comment ID 316bEFR.317.009

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

Subject Matter Code 7.04
Streamlined Technology Option

Streamlined Option

EPA has proposed a streamlined option whereby the Agency would certify that certain technologies, under certain conditions, meet the performance standards. The permittee could then simply choose one of the EPA-approved technologies appropriate for the conditions at the site and install it. Monitoring would be required to verify that required reductions in impingement and entrainment are achieved. While on the surface it appears that the Agency is accommodating the many requests made in the previous comment period to minimize the burdensome and costly monitoring required to determine which control technology may work best for each site, having a list of "pre-approved" technologies to choose from, without site-specific information is not a scientifically or economically sound approach for the industry. The chosen technology may or may not result in compliance with the performance standard, something that would not be realized until a facility already had expended a considerable amount of time and money on installation. Should subsequent performance monitoring indicate that the chosen technology does not meet the required reductions, the facility would be back to square one and required to install additional or substitute treatment technologies at significant costs to see if the performance limits can be met. Without an up-front agreement that installation of the Agency-certified technology is equivalent to compliance, regardless of actual performance, a facility would have little incentive to go with this approach. This option would instead only serve to minimize the Agency's regulatory burdens under 316(b) by eliminating the need for it to review baseline data or compliance plans. It does not address the already over-burdened workload of State regulatory agencies. Similarly, it also places a potentially significant burden on the regulated facility where the installed technology does not achieve the required performance limits. Instead of the proposed streamlined approach, Midwest Generation urges the Agency to adopt the suggestions herein for providing the necessary flexibility to the States to address the site-specific needs of many electrical plants. This alternative approach will achieve the same performance goals but at far less risk of expending unnecessary and duplicative compliance costs.

EPA Response

EPA acknowledges that not every facility will opt for the Approved Design and Construction Technology Option(s) for a variety of reasons. EPA believes based upon the data it has reviewed, that the Preapproved Technology Option should meet the performance standards in most cases for those facilities that qualify for that option. The facilities that do choose the Preapproved Technology Option will benefit by having greatly reduced permit application requirements; therefore, EPA disagrees that there is no incentive to go with that approach. EPA has designed the final rule so that facilities have numerous options by which they may comply with the final rule, including site-specific determinations of best technology available. In addition, EPA has provided permittees with the Technology Installation and Operation Plan, which allows any facility, with the approval of the Director, to demonstrate compliance with today's requirements based on showing that it has installed and is properly operating and maintaining protective technologies. Finally, EPA believes that it is the burden of the facility to achieve compliance. If the permitting Director determines at any point that additional technologies or operational measures are necessary in order for a facility to meet the performance standards, it will be the facility's responsibility to accommodate the requirements. The facility may also seek a site-specific determination of best technology available based on cost-cost or cost-benefit considerations.

Comment ID 316bEFR.317.010

Subject Matter Code 4.01

Source data used by EPA

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Inadequate Representation of Midwestern Plants in the NODA Information

Midwest Generation commends EPA on the time and effort expended to obtain additional technical, biological and economic data to test the original assumptions made in the proposed rule. A broad perspective is essential in order to capture the magnitude of variability of facility operations and impacts. Since the 316(b) issue is in essence a site-specific one, in that it is impossible to assume that all plants affect all source water bodies in the same exact manner, we are encouraged that more site-specific information has been included in the NODA.

That being said, we are greatly concerned by the fact that the majority of the site-specific cases, studies and technical information comes from steam-electric generating facilities located on either the East or West coasts. There is very little representation of the Midwestern or Southern States in any of the NODA materials. While it is true that the coastal regions are those that have largely already dealt with 316(b) issues in the past, on a State-specific level, and therefore have the information on technological control methods, applications and monitoring, it is also true that these facilities are adjacent to much more sensitive waterbodies that may require the additional protections afforded by 316(b) controls. Both coasts have considerable recreational and commercial fisheries, which necessitate that power plants provide adequate technology-based solutions to minimize negative, population-level impacts to important aquatic species. Estuaries, in particular, are extremely vulnerable and should be afforded adequate protection to prevent population-level impacts. In this respect, 316(b) requirements have already successfully been implemented in the coastal States , based on the original 1977 guidance document. Applying this regulation uniformly across the country is not a practical or prudent approach, for reasons illustrated in the sections below.

EPA Response

EPA reviewed as many site-specific studies as possible; studies from the East and West coasts simply happened to be available in greater quantity to EPA. It is possible that permitting authorities on the coasts were more active in requiring and collecting studies from their permittees than those in the Midwest. Nevertheless, EPA reviewed studies and literature from all over the U.S., and believes that the standards set by today's rule are both appropriate and achievable nation-wide. Furthermore, the commenter did not provide any additional studies for EPA to review. Finally, EPA did consider waterbody type when designing the rule, and has established more protective requirements (reduction in both impingement and entrainment) in waterbodies it considers most sensitive, including estuaries.

Comment ID 316bEFR.317.011

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 4.01

Source data used by EPA

Midwestern Experience with 316(b) Issues

In contrast to many of the facilities located in coastal States, there is very little current impingement or entrainment data available for most existing facilities in the Midwestern States, particularly Illinois. The limited number of baseline studies available (that were done up to twenty to thirty years ago at some sites) have shown that station operations were not the cause of significant adverse impacts on the aquatic communities in the adjacent waterways. Monitoring data subsequently collected by State natural resource agencies mirrored this conclusion to a large extent. Where impacts were noted or expected, control technologies have already been employed as part of overall plant operations. The remaining facilities have either been deemed to be in compliance with the 316(b) regulations or final judgment was deferred by the regulating agency in deference to more pressing environmental issues. In some cases, as is true with several of Midwest Generation's facilities located on heavily industrialized waterways, no 316(b) demonstration was ever required by the Agency. The water quality and aquatic life of almost all of Illinois' waterways on which Midwest Generation plants are located have greatly improved in recent years. All of this progress has been made with the continued operation of Midwest Generation's open cycle power plants. The State has recognized these improvements and, in general, is in agreement that intake impacts of the open-cycle steam-electric generating facilities in Illinois are not considered to be significant in the context of population-level aquatic communities.

EPA Response

EPA disagrees that facilities with cooling water intake structures are not responsible for adverse environmental impacts. For EPA's position on adverse environmental impact associated with cooling water intake structures, please refer to the preamble section IV, Environmental Impacts Associated With Cooling Water Intake Structures.

Comment ID 316bEFR.317.012

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 6.08

Non-aquatic impacts

Aquatic Invasive Species Control

There has been a continuing joint effort by the International Joint Commission, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Illinois Department of Natural Resources and other aligned groups to create a barrier zone in the Chicago Sanitary and Ship Canal which would be made devoid of, and impassible to, all aquatic life (through chemical, physical or other means). The purpose of this barrier is to prevent the migration of aquatic invasive species into or out of the adjacent waterway systems, which include Lake Michigan. The current exotic invaders, the Asian Carp (silver, black and bighead), have the ability to decimate the aquatic ecosystem of Lake Michigan and the rest of the Great Lakes. Infiltration of these species also would destroy the popular sport fishing industry that has taken the States so long to build in these waterbodies. Other invasives, which have been inadvertently introduced into the Great Lakes via ballast water and/or accidental or deliberate releases, travel the course of the Chicago waterway system down to the Mississippi River basin, where they out-compete sensitive, threatened and/or endangered native species for available food and habitat. The City of Chicago recently held an Aquatic Invasive Species Summit to gather worldwide experts to permanently address this problem. One of the potential solutions coming out of the summit was to utilize power plant intakes and discharges, combined with other methods, to effect some control over the migration of aquatic nuisance species though the waterway leading to and from Lake Michigan. Midwest Generation has several open cycle power plants strategically located on this particular waterway (the Chicago Sanitary and Ship Canal and adjoining Chicago River and Lower Des Plaines Rivers) that could potentially assist in the invasive species control efforts. However, all of these facilities are subject to the proposed 316(b) rule, which would require the protection of the very species that the State and federal natural resources agencies seek to destroy. Imposing protections which may actually bolster the populations of these aquatic invasive species in the waterway could serve to further jeopardize the existence of more sensitive, ecologically-valued species in both the Great Lakes and the Mississippi River systems.

Under the proposed regulations, it makes no sense for these particular Midwest Generation power plants to be required to install control technology to minimize impingement and entrainment down to the proposed performance standards when State and federal agencies are simultaneously taking steps to create a “dead zone” in this waterway to eliminate invasive species and, regrettably, the limited number of non-invasive species that travel through this same waterway. The cost of adding any new control technology under such circumstances is clearly unnecessary and actually works against the nuisance species control efforts. In the absence of a “valued” aquatic community that is intended to be protected under section 316(b), the proposed 316(b) rule imposes additional regulatory and financial burdens without realizing any additional environmental protection whatsoever.

The above example is yet another justification of the need for site-specific applicability considerations to be included in the 316(b) regulations for them to have any true environmental benefit on a State or regional basis. Exemptions must exist to cover such unique circumstances. These exemptions should be left to the State regulatory agencies to dispense, with adequate justification.

EPA Response

Please see response to comment 316bEFR.015.005.

Comment ID 316bEFR.317.013

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 6.03

Impacts of CWIS on impaired waterbodies

Waterbody-Specific Protection is Warranted

Equal protection is not required for every waterbody in Illinois, as evidenced by the fact that a significant portion of the waterways located in the Chicago area are designated as Secondary Contact and Indigenous Aquatic Life waters, due to their inability to meet the fishable / swimmable" standards required by the Clean Water Act. These waterways have been either created or significantly altered by human disturbances for more than one hundred years, and function largely as conveyances for treated effluents and barge transport, while still supporting a fair assemblage of aquatic organisms which are suited to this particular environment. The types of species expected to be entrained and/or impinged by power plants on these waterways are largely rough, low quality fish such as common carp, buffalo and gizzard shad, in addition to the invasive species noted above. These species are not "valued" (within the meaning of EPA's economic analysis) and do not warrant the same kind of protection as more desirable or ecologically important species, such as game fish, threatened or endangered species or other species important to the support of the food chain and/or recreational industry in any particular waterway. State natural resources management agencies have long been allowed to give greater protection to those waterbodies which can support the greatest diversity of quality aquatic species. This is another important example of why flexibility is required to allow the States to direct their limited resources to the protection of the most ecologically important waterways. The proposed 316(b) rule, as presently written, will result in the broad application of uniform controls for waterbodies without the necessary consideration of whether a comparable environmental benefit is attainable.

EPA Response

In order for species to coexist in a given area and utilize the same resources, they must occupy a separate and distinct niche. EPA believes all species native to a given waterbody warrant the same level of protection. Although the author may consider common carp, buffalo and gizzard shad to be "rough, low quality fish", their presence in the waterbody indicates they do occupy a distinct niche and contribute to the food chain in the ecosystem. That said, EPA believes today's final rule allows ample flexibility for the States to set their own priorities.

Comment ID 316bEFR.317.014

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival

Recent data has been submitted to EPA regarding entrainment survival. This data shows that entrainment survival is a site-specific, and sometimes species-specific occurrence. Because the Agency contends that this data is highly variable and unpredictable, it refuses to use it in its estimates of national benefits to be derived under the 316(b) Rule. While we are encouraged that EPA is going to initiate a formal peer review of its analysis of this data, we are disturbed by the fact that the Agency does not view this data as being relevant and important in the context of site-specific situations. In reality, the variable and unpredictable nature of entrainment survival is the primary indicator that entrainment (as well as impingement) is a truly site-specific phenomenon. The variability should not be discounted as not being sufficiently uniform to use in a national application. Indeed, the Agency should recognize that the data variability is a persuasive reason to maintain site-specific flexibility in demonstrating whether entrainment and/or impingement impacts are negatively affecting the aquatic communities in the receiving stream.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.317.015

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Further, species-specific survival data from other power plants in the same region should be allowed to be referenced by other sites to gain entrainment “credits” to be applied to the baseline assessment, while still allowing a facility to do its own survivability studies to gain additional credits. This would allow facilities in the same ecoregion to rely on existing data to supplement any site-specific studies needed.

EPA Response

Please see response to comment 316bEFR.034.027 regarding the role of trading in today's final rule.

Comment ID 316bEFR.317.016

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

The data presented to the Agency in the NODA is important because it shows that site-specific factors are critical in assessing entrainment losses. EPA should not impose a global approach on what should be a regional process. Sites with data to show entrainment survival (or with resource information for similar waterbodies within the same region) should be given credits towards meeting the performance standards. Similarly, if it can be shown that entrained (or impinged) organisms belong to a group identified as nuisance or invasive species by the State, credits should be given to the facility to offset selected control technology or performance standard requirements. These matters can appropriately be addressed between the regulated entity and the State permitting/natural resources authority as part of a compliance plan incorporated into the regulated entity's NPDES permit.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.317.017

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Impingement Age Class

Based on comments received, EPA has revised its impingement loss estimates to include other fish age classes beyond the age 1 class assumed in the original analysis. While the Agency's effort to improve the estimation methodology is appreciated, the shift in the predominant assumed impingement age class is in the wrong direction. The Agency has suggested that it revise its impingement costs based on a more natural age distribution, with heavier emphasis on the inclusion of older age groups, to provide a normal distribution of life stages impacted by impingement. However, the reality is that most impinged species are young-of-year (YOY), age 0 fish, and not older individuals beyond the age 1 class. Impingement studies done at several power plants in the Midwest have all shown that a majority of all impinged fish are age 0. YOY fish are those most likely to be impinged since their smaller size and limited ability to swim away from a current can result in increased impingement numbers. YOY fish, in general, have a mortality rate of close to 95%, even if they are not impinged. This is likely the reason why impingement (and entrainment) is not a problem affecting overall fish populations in the Midwest. The fish being impinged or entrained would be taken out of the system in any case, due to either predation or mortality from other causes. Larger fish, while sometimes found on traveling screens, likely represent dead or dying (moribund) specimens that have been affected by other stressors and can no longer effectively avoid the intake current. Including higher age class fish in the Agency's impingement analysis will greatly bias the economics in favor of tighter controls due to the assumed taking of more harvestable (and hence, more "valued") fish. It is hoped that the Agency will take this information under advisement when reviewing impingement estimates and develop more realistic population-level impacts that more accurately account for the ages of impinged fish and the resultant decrease in the potential economic and environmental effects.

EPA Response

The commenter expresses concern about EPA's assumptions about the age distributions of impinged fish. EPA has revised its assumptions in a manner that acknowledges that YOY may be predominant among impinged fishes, as described in the EPA response to Comment 316bEFR.029.105.

Comment ID 316bEFR.317.018

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.04

Determination of compliance

Moribund Fish

As the Agency has suggested in the NODA, moribund fish should not be included in compliance accounting. This is essential, because a great proportion of impinged fish (especially those other than YOY) are already stressed or distressed before they become impinged. They would have died whether or not they became impinged. This factor must be considered in any valid evaluation of the effects of impingement on the overall fish community, as well as in any economic evaluations.

EPA Response

Please refer to EPA's response to comment 316bEFR.306.116 for a discussion of EPA's approach to the exclusion of naturally moribund or dead organisms from determining compliance.

Comment ID 316bEFR.317.019

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

Subject Matter Code 6.04
Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Population-Based Approach

To emphasize a point made throughout our comments, EPA needs to consider impacts on a species-specific fish population, and not individual organisms, to determine whether impingement or entrainment is having a negative effect on the aquatic community. EPA also wrongly continues to assess the 316(b) economic benefits and losses on a "per-fish" basis, regardless of the species. This is clearly not appropriate. It only serves to enhance the purported ecological benefits of imposing 316(b) requirements on all power plant discharges. The ecological "value" is in the population of a given fish species, not in individual organisms. Natural compensation exists within any given biological population, which ensures species survival, even at the expense of losing considerable numbers of individual organisms to predation, natural mortality, or other causes. The loss of individual organisms should not be considered adverse unless it can be directly tied to a population-level effect. If no adverse impacts from impingement/entrainment are noted in a State-valued fish population at a given facility, then there should be no need to effect costly control mechanisms which would result in no significant environmental benefit.

EPA Response

Please see response to comment 316bEFR.207.015 for the discussion regarding impacts of cooling water intake structures at the individual versus population level. Please see the response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation.

Comment ID 316bEFR.317.020

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Restoration Projects

EPA is requiring more quantitative criteria to determine the overall success of any mitigation project undertaken in whole or partial fulfillment of the 316(b) requirements. We understand this is an effort to ensure that the project, as designed, will result in the desired outcome. However, the project should be viewed as a best-effort on the part of the regulated entity. The regulated entity should not be penalized if a well-designed project does not perform as intended, due to circumstances beyond the immediate control of the permittee. Midwest Generation generally supports the restoration project concept, which by its very nature is a site-specific/State-specific issue. We would be very willing to work with the appropriate State agencies to develop a workable plan. However, one issue of concern is what the required baseline objectives of any mitigation plan would be and how likely it is that these objectives could be achieved in a particular, site-specific situation. Should the requirements for a “successful mitigation project” be too difficult to achieve (or difficult to measure), the benefits of this option to meet the 316(b) objectives would be effectively negated.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.312.006.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

For a discussion of the need for quantitative analysis in the restoration measure context, see EPA's response to comment 316bEFR.202.035.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.317.021

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.04

Determination of compliance

As-Built Approach

While Midwest Generation is largely in favor of minimizing the burdens associated with baseline monitoring and the subsequent analysis of appropriate control measures, where required, we have some reservations regarding what is termed by the Agency as the "as-built" approach. This approach would save monitoring time and money up-front, but may leave the facility with an already-installed technology that does not meet the required performance criteria. This does not appear to be the best course of action for any facility, as site-specific factors should rightly dictate the choice of control technology, not vice-versa. This approach also would not be applicable to impingement, because there is no way to estimate the percentage or species composition of organisms impinged without doing pre-control technology counts.

Pre-control technology installation entrainment monitoring is expensive, but it would be the option of choice for Midwest Generation. This is true for all of our affected sites, since we do not have any recent data to determine what the current entrainment or impingement rates are. We need this information to determine what type of control or operational technologies would be the most cost-effective to achieve the performance standards, (contingent upon agreement with the State that controls are required). It is likely that several seasons of data would be needed to determine representative impingement and entrainment estimates. Depending on the results of these studies, it should be up to the State regulatory agency to propose appropriate reduction goals (if deemed necessary, dependent on waterbody and species involved) and work with the permittee to incorporate the installation and subsequent monitoring of the required control technology(is) into the NPDES permit in a compliance schedule.

EPA Response

EPA agrees that the "As-Built" approach is an acceptable method for establishing the calculation baseline. Therefore, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline (see EPA's definition of calculation baseline at § 125.93). EPA acknowledges that the studies in the Comprehensive Demonstration Study may be lengthy in some cases. Please see EPA's response to comments 316bEFR.034.066 and 316bEFR.002.021 and the preamble to the final rule for a discussion of timing.

Comment ID 316bEFR.317.022

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.04

Determination of compliance

Representative Species Approach

This option would require the permittee to identify representative important/indicator species (RIS), instead of considering all species present at the cooling water intake structure. The list may be developed with the input of the local permitting authority and State natural resources agencies. Midwest Generation is clearly in favor of the Representative Important Species (RIS) approach in determining compliance with the performance standards. As stated throughout our comments, we believe it is critical for 316(b) to be applied on a site-specific basis, with greater protection given to those waterbodies and species which are the most sensitive and/or the most important commercially or recreationally to the State. This perspective absolutely requires that compliance be dictated by assessment of impacts on specific species found to be important to the State/local regulatory authority.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.317.023

Subject Matter Code 21.04
Determination of compliance

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

Compliance Determination

The assessment of compliance with impingement / entrainment reduction requirements should be determined through the identification and enumeration of individual RIS species. While it may not be possible to attain a uniform reduction for each individual RIS, compliance should be assessed based on achieving the required reduction on an average basis for all RIS species based on a reasonable period (e.g. a two to three years) for evaluation.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.317.024

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Schedules

EPA is appropriately considering extending the compliance deadline for the 316(b) Rule beyond the effective date of the Rule. Given the extensive scope and magnitude of the compliance requirements imposed by the 316(b) Rule, a regulated entity will need sufficient time to review and evaluate the site specific situation of each of its affected facilities, determine the scope of required monitoring to gather pertinent information for selecting an effective control technology, completing the necessary engineering and economic studies to support that selection, and to work with State regulatory agencies to determine the appropriate and necessary compliance schedule under the final 316(b) Rule.

We understand that the Agency is considering (1) allowing an applicant whose permit must be renewed in the first year following promulgation to submit application materials one year after the current permit expires and (2) allowing a two-year extension in the deadline for submitting application materials. However, neither of these options allows sufficient time for the collection of the data necessary to determine the control technologies to comply with the established performance criteria. A minimum of two to three years of seasonal data are recommended for impingement and entrainment in order to determine what the calculational baseline is with a reasonable degree of assurance that the baseline is representative of actual conditions. Midwest Generation does not have current data for any of our facilities, since most were never required to perform any 316(b) related evaluations in the past. From the above guidance regarding the compilation of biological data, we would require at least two to three years for data collection and analysis at each of our facilities before we would have sufficient data on which to prepare the application materials to be submitted to the State. In light of the site-specific issues related to several of our plants in the Chicago Area Waterways (as discussed in Section 4c above), we do not believe that it is prudent to embark on a sampling program before the final rule is issued. It is our hope that a mutually agreed-upon compliance solution for these facilities will be developed, based on State natural resources agency priorities.

In addition, all of Midwest Generation's affected facilities will be in the midst of their 5-year permit renewal cycle when the 316(b) Phase II rules become final. It will be impossible to collect data, analyze compliance options and propose effective control technologies prior to the renewal deadline. It is also reasonable for the Agency to provide adequate time to allow Midwest Generation, and other dischargers in a similar situation, to seek guidance on the compliance implications of Rule 316(b) for each of its facilities with the Illinois EPA prior to initiating any biological, engineering or economic studies. This will allow Midwest Generation to ensure that the studies it performs will generate the data necessary to achieve compliance with the 316(b) Rule, as deemed appropriate by the State. In addition, the workload imposed by the proposed calculational baseline monitoring is not currently being adequately responded to by local biological contractor personnel, who are already overburdened with existing work. The 316(b) rule monitoring requirements, if imposed in a unilateral manner, will result in the increased need for biological consultants and contractors whom have not had a large presence, especially in the Midwestern states, for many years. Therefore, the only workable solution is to include a reasonable compliance schedule into the reissued NPDES permit that will allow for the timely completion of each step of the 316(b) determination process, as defined by the State regulatory agency. This will ensure that compliance controls are implemented, where warranted, within the following 5 to 10 years (depending on final control technology chosen) for each affected site. Considering that the Agency has only recently taken steps to finalize the 316(b) rules, which have existed as guidance since 1977, the comparatively minimal additional time needed to implement the proposed compliance schedule should be acceptable to the EPA, State regulators and the regulated community, as well as environmental interest groups.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

See also response to comment 316bEFR.034.005 for a discussion of the many streamlining efficiencies added to reduce burden in today's final rule.

Comment ID 316bEFR.317.025

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Midwestern States' 316(b) Experience:

Based on the most recent DOE EIA 767 data (2001), the State of Wisconsin has 28 plants with open-cycle cooling out of 32 fossil-fueled steam-electric generating units (87.5%). In Illinois, 32 out of 47 fossil-fueled steam electric generating units are operated with open-cycle cooling (68%). In these instances, the States have determined the appropriate controls on those facilities located on sensitive waterbodies in response to actual or anticipated adverse impacts. In developing the proposed 316(b) rule for existing facilities, Midwest Generation encourages EPA to build on the solid foundation created by years of State experience with site-specific decision-making under section 316(b) of the Clean Water Act. For nearly thirty years, the States have been allowed to apply sound science and judgment to site-specific data and conditions in order to implement section 316(b) standards. The current Illinois methodology reflects a holistic approach to assessing how to ensure the environmental protection required by the 316(b) rule in site-specific situations. It is not prudent to ignore an established and reliable performance record showing that no adverse environmental impact exists when considering how to protect the environment in the future.

The States are already empowered to take a comprehensive look at adverse environmental impacts. When the States consider the impact of a discharge on individual organisms, they also evaluate that impact in relationship to the overall health of the affected population in, and the water quality of, the waterbody. This holistic approach enables a State to improve its assessment of what is happening in the waters where cooling water intakes are located. Cross-media environmental impacts generally also have been considered by the States when making the appropriate technology choices for minimizing the entrainment and impingement of fish. Consequently, the States have been able to achieve the primary intent of section 316(b) without compromising other environmental priorities. Many States have a well-established approach to evaluating technology choices that consider cost-effective alternatives for achieving positive environmental outcomes. This is especially important because of the huge cost differential between certain technologies and correspondingly different levels of environmental benefits. The States' goal has been, and continues to be, to ensure the protection of the environment based on the application of sound science and engineering, while avoiding the imposition of unwarranted financial burdens on regulated facilities. Because both water and fisheries quality are site-specific factors, and the design, location, and circumstances of each power plant are unique, a site specific decision framework is the best approach to achieving the most cost-effective and environmentally beneficial outcome.

EPA Response

EPA agrees that States may be best positioned to address site-specific concerns at facilities within the State and has included a provision to approve existing State programs in today's final rule at 125.90(c). See also 125.94(e). Please see response to comment 316bEFR.025.017 for additional discussion.

Comment ID 316bEFR.317.026

Author Name Basil G. Constantelos
Organization Midwest Generation EME, LLC

Subject Matter Code 7.01.03
Option 3--Site-specific determination

This is another important example of why flexibility is required to allow the States to direct their limited resources to the protection of the most ecologically important waterways. The proposed 316(b) rule, as presently written, will result in the broad application of uniform controls for waterbodies without the necessary consideration of whether a comparable environmental benefit is attainable.

States should be allowed to determine the overall quality of a particular waterbody, based on current 305(b) report data, and to rely on this determination to support the imposition of 316(b) requirements that are necessary to improve the indigenous fish community. If factors other than power plant operations are influencing the overall quality and biological potential of the system, then States should be empowered to make the determination that 316(b) requirements would not result in any overall improvement to the physical, chemical or biological quality of the receiving water. This determination should be accepted by U.S. EPA and documented in a given facility's NPDES permit in lieu of the imposition of unwarranted 316(b) BTA controls and/or study requirements. The State's determination would remain in effect until significant changes occur either in the waterbody or in the facilities' operations which warrant a re-evaluation of the 316(b) determination for the facility.

EPA Response

A facility may choose to seek a site-specific determination of BTA using the cost-benefit test. Please see the preamble to the final rule for further discussion.

Comment ID 316bEFR.317.027

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Midwest Generation believes that the ultimate decisions made by the EPA in this rulemaking have the potential to adversely affect energy costs and supply in our region of the country while not achieving a commensurate environmental benefit. These potential adverse effects are significant and may not be justified or necessary for each regulated facility and/or the associated waterbody. Accordingly, Midwest Generation urges the EPA to devise a workable, site-specific approach that gives to the States the necessary flexibility to make sound choices that reflect and account for the complexities of the issues involved.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees that the final rule will have adverse effects on the energy supply and cost, and also disagrees that the rule will result in minimal environmental benefit. Please refer to sections XI and XII of the preamble to the final rule, as well as the Economic and Benefits Analysis (DCN 6-0002) and the Regional Studies document (DCN 6-0003) in the docket for the final rule.

Comment ID 316bEFR.317.028

Author Name Basil G. Constantelos

Organization Midwest Generation EME, LLC

Subject Matter Code 10.03.07

Great Lakes

Therefore, EPA's reliance on the operational or technological control data from the coastal States to determine potential Rule 316(b) impacts to the Midwest Region is inappropriate. The waterways within the Midwest itself are extremely variable in both natural biotic integrity as well as their recreational/commercial potential. The Great Lakes are our most valuable aquatic resource and provide opportunities for recreational fishing and some commercial harvesting. However, they are not truly representative of the remainder of the waterways in this region, which vary from ephemeral streams to urban canals designed and built to convey treated effluents and commercial navigation. Thus, EPA's proposal to use the 1995 Michigan Recreational Anglers survey as the basis for the economic model for Midwestern States is not appropriate for anything but the Great Lakes themselves, and even then, this data should be viewed with caution as it primarily targets recreationally important species, rather than the entire aquatic community (some of which are undesirable or nuisance species).

EPA Response

EPA agrees with the commenter that the Great Lakes are "our most valuable aquatic resource" and that they are not representative of other waterbodies in the Midwest Region. EPA did not use the 1995 Michigan Recreational Anglers survey as the basis for the economic model for Midwestern States. For the final Section 316(b) rule, these data were used for estimating recreational fishing benefits for the Great Lakes region only. See Chapter G 4 of the Regional Analysis Document for the Phase 2 rule (DCN #6-0003). Other waterbodies within the Midwest were included in the Inland Region in the regional case study analysis.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Patrick C. Lynch

On Behalf Of:

State of Rhode Island Office of
Attorney General

Author ID Number:

316bEFR.318

Comment ID 316bEFR.318.001

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 2.04.04

Use cost-benefit tests

In the Federal Register notice, EPA proposed the following objectionable provisions: first, EPA proposes a new, and wholly unauthorized, cost-based approach that would be used by EPA and industry in determining allowable technologies for Phase II facilities with regard to cooling water intake structures.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.318.002

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 2.04.06

Restoration measures in place of technologies

Second EPA proposes that Phase II existing facilities may suggest to implement restoration measures "in lieu of' design and construction or operational methods to meet the performance standards in § 125.94(b) a proposal, which provides zero "minimization of adverse environmental impact" as is required by §316(b)-or site specific requirements imposed under §125.94(c), which would be an extremely resource intensive and unduly burdensome approach for the states.

EPA Response

EPA recognizes that restoration projects do not directly address impingement and entrainment of individual aquatic organisms by cooling water intake structures. Successful restoration measures, however, do help to minimize the impacts that derive from the impingement and entrainment of individual aquatic organisms by cooling water intake structures, thereby accomplishing the specific purpose of section 316(b).

Comment ID 316bEFR.318.003

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

EPA's proposed rule also reaffirms the states' rights to set more stringent standards as they pertain to effluent limitations and other water quality limitations than those set by the federal government. The State of Rhode Island supports EPA's position with respect to this reaffirmation.

EPA Response

No response required.

Comment ID 316bEFR.318.004

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 2.04.04

Use cost-benefit tests

EPA DOES NOT HAVE THE AUTHORITY TO CONSIDER COSTS UNDER SECTION 316(b) OF THE FEDERAL CLEAN WATER ACT.

The federal Clean Water Act (hereinafter “CWA”), §316(b) specifically requires that: “any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall require that the location, design, capacity, of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact” (emphasis added). Id at §316(b), 33 U.S.C. §1326.

In the recent case, Whitman v. American Trucking Association. Inc.. et al., 531 U.S. 457, 121 S.Ct. 903 (2001), the United States Supreme Court considered the question of whether the Administrator of the Environmental Protection Agency may consider the costs of implementation in setting the national ambient air quality standards (NAAQS) under Section 109(b)(1) of the Clean Air Act (CAA). In considering this issue, the United States Supreme Court ruled: “the Clean Air Act (CAA) bars the Environmental Protection Agency (EPA) from considering implementation costs in the process of setting national ambient air quality standards (NAAQS)” (emphasis added). Id at 471, 121 S.Ct. 903, 911. The Unites States Supreme Court was unequivocal in its language, “to prevail in their present challenge, respondents must show a textual commitment of authority to the EPA to consider costs in setting NAAQS under §109(b)(1).... Congress — it does not hide elephants in mouseholes.” Id at 466, 121 S.Ct. 903, 908, quoting MCI Telecommunications Corp.. v. American Telephone & Telegraph Co.. 512 U.S. 218, 231, 114 S.Ct. 2223, 129 L.Ed.2d 182 (1994).

For the sake of guidance to EPA in any finalization of a proposed “cost-based” approach under CWA §316(b), it is important to note that the United States Supreme Court acknowledged in American Trucking that while there may have been other standards within the federal Clean Air Act that authorized the consideration of costs, the authorizing language must be section specific, stating with respect to the federal Clean Air Act: “the Act contains no explicit permission for Agency to consider costs as to those standards. Clean Air Act, § 108(a)(2), 109(b)(1), as amended, 42 U.S.C.A. § 7408(a)(2), 7409(b)(1)” (emphasis added). American Trucking, supra at 466; See also “Other provisions explicitly permitted or required economic costs to be taken into account in implementing the air quality standards. Section 111(b)(1)(B), for example, commanded the Administrator to set “standards of performance” for certain new sources of emissions that as specified in § 111(a)(1) were to “reflec[t] the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction) the Administrator determines has been adequately demonstrated.” Id at 467, 121 S.Ct. 903, 909. See also General Motors Corp. v. United States, 496 U.S. 530, 538, 541, 110 S.Ct. 2528, 110 L.Ed.2d 480(1990)(refusing to infer in certain provisions of the CAA deadlines and enforcement limitations that had been expressly imposed elsewhere).

While it is true, therefore, that specific sections of the CWA authorize EPA to consider costs as they pertain to unique technology-based standards, CWA §316(b) does not make any mention, let alone establish “explicit permission” for EPA to consider costs. Further, even if EPA could successfully assert that the reference in CWA §316(b) to “any standard established pursuant to section 1311 of this title or section 1316 of this title...” grants to it the authority to consider costs when determining “the best technology available for minimizing adverse environmental impacts,” such an authorization would not justify the cost-based approach adopted by EPA as section 1311 sets forth a technology standard that is quite unique from the standard established under CWA §316(b) and as section 1316 applies only to new sources. See CWA § 301(b)(1)(A) (requiring the application of best practicable control technology currently available; see also CWA §304(b)(2)(B) (requiring cost of achieving effluent reduction to be taken into account in determining best measures and practices available to comply with subsection (b)(2) of section 1311....); see also CWA §306(b)(1)(B) (requiring that for new sources the Administrator take into consideration the cost of achieving such effluent reduction....).

Finally, with respect to EPA’s proposed adoption of a cost-based approach under 316(b), any distinction that can be drawn between technology-based standards and health-based standards is entirely irrelevant to a statutory construction argument. In American Trucking, the United States Supreme Court did not make a distinction between health based standards and technology based standards, but rather found that where the statute did not explicitly authorize EPA to consider costs, EPA was barred from doing so regardless of the type of standard they were considering. Id at 466. The court further held that: “That factor [of cost] is both so indirectly related to public health and so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly give.” Id at 468. Likewise, the factor of cost is so indirectly related to “minimizing adverse environmental impact” that surely it would have been expressly given in CWA §316(b).

For the above-referenced reasons EPA’s proposed rule allows for the consideration of costs in direct contradiction of the United States Supreme Court’s recent decision and outside the scope of its delegated legislative authority.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.318.005

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 2.04.06

Restoration measures in place of technologies

EPA DOES NOT HAVE THE AUTHORITY TO ACCEPT PROPOSALS OF RESTORATION IN LIEU OF DESIGN MEASURES TO MEET PERFORMANCE STANDARDS OR SITE-SPECIFIC REOUIREMENTS.

Allowing restoration “in lieu of" design measures to meet performance standards is not contemplated by CWA §316(b). The goal of CWA §316(b) is to use the best technology available to “minimize adverse environmental impacts” (emphasis added).

Logic and the historical practices of EPA involving the enforcement of other environmental programs requires that the above-quoted language be interpreted in a way that would require facilities to use technology to avoid impacts in the first instance, and minimize impacts in the final instance. Mitigation, in the form of restoration, would seem to be a last resort not contemplated by the language of CWA §316(b) and imposed only in conjunction with technologies designed to prevent impacts in the first instance. Moreover, the language of CWA §316(b) suggests that the technology related to the “location, design, capacity, and construction of cooling water intake structures” will be the method by which adverse environmental impacts are minimized. The language does not include “restoration projects.”

Secondly, allowing a facility to propose site-specific requirements to meet performance standards would be unduly burdensome to the state.

Even assuming that authorized restoration projects are allowable within the meaning of CWA §316(b), and would, in fact, minimize adverse environmental impact, the determination of appropriate restoration projects populations requires a comprehensive, and resource intensive assessment of complicated biological interactions in the relevant water body. Furthermore, the proposed rule does not provide any standards to guide permit writers in this assessment, and EPA has acknowledged the difficulty of determining the effects of restoration measures on waterbodies. 66 FR at 65,314. In practice, state, permitting authorities will be required to consider proposed site-specific requirements, which will unduly burden the resources of the states.

EPA Response

For a discussion of EPA’s authority to include restoration measures as an aspect of cooling water intake structure design technology in today’s rule, see the preamble to the final rule.

Comment ID 316bEFR.318.006

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

THE RIGHTS OF THE STATES TO IMPOSE MORE STRINGENT LIMITATIONS THAN THE FEDERAL GOVERNMENT HAS BEEN EXPRESSLY RESERVED IN THE LANGUAGE OF THE CLEAN WATER ACT.

The State of Rhode Island supports EPA in its reaffirmation of the states' rights to impose more stringent limitations than the federal government for the purpose of protecting state water quality. See 40 C.F.R. § 125.84(e).

The language of 40 C.F.R. § 125.84(e) is supported by provisions relating to state law and authority in the federal Clean Water Act. Specifically, CWA §401(d), 33 U.S.C. § 1341(d) provides in part that: "Any certification provided under this section shall. . .assure that any applicant for a Federal license or permit will comply with.. .any other appropriate requirement of State law set forth in such certification, and shall become of condition on any Federal license or permit subject to the provisions of this section." Id. Further, CWA §510 states in relevant part: ". . .nothing in this chapter shall (1) preclude or deny the right of any State or political subdivision thereof or interstate agency to adopt or enforce .. .(B) any requirement respecting the control or abatement of pollution, . . .or other limitation, ... or (2) be construed as impairing or in any manner affecting any right or jurisdiction of the States with the respect to the waters ... of such States." (emphasis added) Id.

The aforementioned provisions of the CWA are consistent with the goals of the CWA as identified in CWA §101, and make clear that states' authority to impose more stringent water quality limitations was preserved by Congress.

The State of Rhode Island would encourage EPA to maintain § 125.84(e) as written.

EPA Response

EPA has included provision 125.90(d) and 125.94(e) to preserve a State's right to develop more stringent standards.

Comment ID 316bEFR.318.007

Author Name Patrick C. Lynch

Organization State of Rhode Island Office of Attorney General

Subject Matter Code 21.04

Determination of compliance

For the reasons stated within, the State of Rhode Island encourages EPA to review its authority with respect to the proposed cost-based approach and proposed restoration and site-specific analysis alternatives and revise the proposed provisions accordingly. The State also fully supports EPA in the language of 40 C.F.R. § 125.84(e) recognizing and reaffirming the state's expressly preserved sovereign right to impose more stringent water quality limitations on Phase II facilities

EPA Response

Please see the final rule preamble sections III and VII for discussions of EPA's authority over those issues. EPA appreciates Rhode Island's support.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mercatus Center at George Mason University

On Behalf Of:

Mercatus Center at George Mason University

Author ID Number:

316bEFR.319

Comment ID 316bEFR.319.001

Subject Matter Code 10.02.04.01

Peconic-based approach

Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

EPA's Estimation of Nonuse Values of Impinged and Entrained Fish

In the proposed rule published on April 9, 2002, EPA used a "50 percent rule" to estimate the nonuse value of fish impinged or entrained by cooling intakes (the 50 percent rule estimates the nonuse value as 50 percent of the use value). However, in response to comments, EPA presents new values for nonuse benefits in this NODA based on a "benefits transfer" approach.<FN 5> As noted above, benefits transfer is "the practice of transferring existing estimates of non-market values from the context of study to a new context."<FN 6> In this case, the existing study EPA used is a contingent valuation (CV) survey conducted of the value of eelgrass and wetlands in the Peconic Estuary on the East End of Long Island.

This comment focuses on the nonuse value estimates provided in the NODA. The NODA also provides estimates of the benefits to commercial fishing and recreational fishing attributable to the proposed rule. While recreational fishing values are not as readily measured as commercial fishing values, which rely on direct market prices, they are more reliably estimated from indirect methods than nonuse values. We do not address EPA's estimates of recreational benefits here.

A Lack of Understanding of the Role of Prices

The first problem in the NODA does not recognize the role of prices. For example, in calculating the value of fish lost to impingement and entrainment, EPA uses a measure it describes as "total yield" and "production foregone." "Total yield" is an estimate of "direct losses of harvested species as well as the yield of harvested species that is lost due to losses of forage species.<FN 7> "Production forgone" is estimated by using "trophic structure and trophic transfer efficiency to estimate the harvested species that is lost because of the loss of forage species to impingement and entrainment."<FN 8> While it is not clear how EPA uses "total yield," and "production foregone" in the calculations, it is clear that assigning prices to these metrics is problematic.

Prices are not static values that reflect only the value of the good in question. Rather, they are dynamic values that change as people's perceptions change about the value of the inputs to the good, the scarcity of the good, and the value of substitutes to that good. By assigning a price to either "total yield" or "production foregone," EPA conflates the value of the good (the fish), with the value of the inputs to the good (the forage fish). While this alone would not invalidate the study, these types of problems are compounded throughout the analysis, resulting in a nonuse value for fish that has no basis in the real world.

Footnotes

5 68 Fed. Reg. at 13,544.

6 Office of Management and Budget, Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations, 68 Fed. Reg. 5,491, at 5,520 (Feb. 3, 2003).

7 68 Fed. Reg. at 13,554.

8 68 Fed. Reg. at 13,546.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

EPA agrees that prices can depend on perceptions about inputs, scarcity, and substitutes. This is true for all goods, not only fish. For fish, inputs include habitat and other organisms (including but not limited to forage fish); scarcity depends on the status of the stock; and substitutes are other fish. EPA assigns values to the total estimated number of fish lost due to I&E, based on commercial and recreational values for those fish. These fish include recreationally and commercially valuable species as well as forage fish that are inputs to these species through the food web. Through their value for recreational and commercial species, people indicate their value for the inputs to those species, just as the price of a loaf of bread includes the value of all of the inputs used to make the bread. EPA uses standard methods of fisheries valuation found in any resource economics textbook.

Comment ID 316bEFR.319.002

Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Benefit Transfer Approach

Any benefits transfer approach rests on a number of assumptions and estimates, and EPA's study is no different. The first assumption is that the values from the Peconic Estuary survey of preservation/restoration of eelgrass and wetlands can be transferred to provide useful information about the valuation of fish.<FN 9> This assumption alone is questionable.

The Peconic study was a contingent choice survey conducted "to estimate the relative preferences of residents and second homeowners" on the East End of Long Island.<FN 10> The study asked respondents to choose between bundles of "goods" comprising "physical, environmental, aesthetic, and/or monetary dimensions."<FN 11> One problem with transferring the results from this study is that the contingent choice survey estimated a value for habitat. In the NODA, EPA used the estimating of the values of habitat as a way of valuing how much people value fish. However, if there is a nonuse value for the fish impinged and entrained in cooling intakes, that value is for the fish themselves, not for the habitat the fish live in. EPA's study is a study of nonuse benefits about fish that get entrained and impinged. The relevant value is the nonuse value of the fish, not the habitat.

The EPA's approach estimates the amount of wetland that could hypothetically produce the habitat services necessary for the fish hypothetically impinged or entrained, and then uses information from people's hypothetical willingness to pay for the fish production services of that habitat. Each hypothetical estimate further detaches the final estimate from any mooring connected with actual values. Each estimate, assumption, and hypothetical weakens the explanatory power of the final valuation.

In the NODA, EPA "solicits comments on whether [this] benefits transfer approach provides a more comprehensive value that address all impingement and entrainment losses."<FN 12> Due to the number of assumptions and hypotheticals involved in this approach, there is little reason to believe that the approach provides more or less of a comprehensive value of impingement and entrainment losses than the arbitrary 50 percent method. The real question is if the benefit transfer approach as applied here provides any information at all.

Footnotes

9 68 Fed. Reg. at 13,568.

10 Lynne Tudor, et. la, Memo to the 316(b) Record, Estimating the Total and Nonuse Value of Fish, Based on Habitat Values for Coastal Wetlands at 7 (Mar. 12, 2003).

11 Id.

12 68 Fed. Reg. At 13568

EPA Response

The comment states that EPA's benefit transfer approach to non-use values does not provide useful information regarding the potential magnitude of non-use benefits. EPA disagrees.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Peconic-based approach

Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

The Peconic Study

To develop willingness-to-pay (WTP) nonuse values, the NODA relies on “Measuring Public Values and Priorities for Natural Resources: An Application to the Peconic Estuary System,” a dissertation paper by Marisa J. Mazzotta. This paper is not available online in the EPA’s docket, and we were unable to find it online at all. Since we do not have a copy of the study<FN 13> we assume it is not peer reviewed.

Many questions are raised by the study. The first and most obvious is that the study was conducted in the area surrounding Peconic Estuary: Southhold, Riverhead, Southampton, Easthampton, and Shelter Island.<FN 14> These areas are in Suffolk County, New York. Median household income in Suffolk County $65,288, while the median household income in the rest of New York is $43,393.<FN 15> Not only is the Peconic Estuary more wealthy, “the study found that the survey sample population was better educated and had higher incomes that the population of the area.”<FN 16> This forced the study’s author to adjust the values “to be representative of the general population of the East End in terms of education and income.”< FN 17> It is not known how the study’s author would know and understand the relative preferences of the survey respondents compared to the general population. Also the study’s author had to estimate and adjust for people who lived in the area year-round, compared to seasonal residents.<FN 18> It is also not known how the study’s author could know and understand the relative preferences between year-round residents and seasonal residents to produce.

Another problem with the Peconic study is that, from the information we have, the survey did not ask how much respondents were willing to pay, but rather if each household on the East End of Long Island should pay either $0 for habitat or $50. There are several problems with this for EPA’s purposes. First, it is not a measure of stated WTP, but rather a response to a binary question regarding what others should pay. Second, respondents have no expectation that they will actually be asked to pay the $50 as a result of their response. Third, though the EPA claims the Peconic study provides marginal cost information, individuals were not asked about the marginal cost of habitat, but rather whether they thought that each household should pay a certain amount for a certain amount of wetland.<FN 19> Inferences of people’s marginal preferences may be possible in economics text books, but it is far more difficult, and maybe impossible to derive a valid demand function from people’s responses to a survey of this design.

To use the information from the Peconic study, EPA adjusted the values estimated for wetlands because the wetlands values “reflect all ecological services provided by the wetlands, not just fish and shellfish habitat.”<FN 20> To do this, EPA used another stated preference study to estimate the value people assign to the ecological services for fish and shellfish habitat provided by wetlands.<FN 21> Put in other way, EPA had to conduct benefits transfer within another benefits transfer to arrive at values for its study.

In the NODA, EPA requests comment on its methodology of assigning a share of WTP to “fish production services” for each habitat type.<FN 22> As noted above, there are so many estimates, including estimates within estimates within estimates, it is questionable that any useful value could be derived from this analysis. The real question is, “Is there a connection between these hypothetical values and any values in the real world?” There is no reason to believe that there is a connection. In fact, as will be shown in the next section, because the values in EPA’s analysis are so detached from people’s actual preference, they provide no useful information.

Footnotes

13 As of May 29, 2003, EPA has not responded to an email request for the paper.

14 Lynne Tudor, et. la, Memo to the 316(b) Record, Estimating the Total and Nonuse Value of Fish, Based on Habitat Values for Coastal Wetlands at 7 (Mar. 12, 2003).

15 U.S. Census Bureau, Suffolk County, New York, at http://quickfacts.census.gov/qfd/states/36/36103.html (last visited May 28, 2003).

16 Memo to the 316(b) Record, at 8.

17 Id.

18 Id.

19 See id. at 9.

20 Id. at 10.

21 Id.

22 68 Fed. Reg. at 13,750.

EPA Response

EPA disagrees that a dissertation paper by Marisa Mazzotta is not included in the docket (see DCN #5-1284) and that it is not peer-reviewed. First, the dissertation paper was reviewed by the dissertation committee, whose members include researchers with exemplary reputations and records. Second, a number of peer-reviewed publications were based on this study. For example:

(1) Johnston, R.J., J.J. Opaluch, T.A. Grigalunas, and M.J. Mazzotta. 2001. Estimating Amenity Benefits of Coastal Farmland. Growth and Change. 32(summer): 305-325. (DCN #5-1276)

(2)Johnston, R.J., T.A. Grigalunas, J.J. Opaluch, J. Diamantedes, and M. Mazzotta. 2002. Valuing Estuarine Resource Services Using Economic and Ecological Models: The Peconic Estuary System Study. Coastal Management 30(1): 47-66. (DCN #5-1275)

For EPA’s response regarding demographic differences between the Peconic study area and the policy area, and how adjustments were made for differences in demographics between the survey population and general population, please see response to comment #316bEFR.304.004.

Regarding the Peconic survey itself, the comment reflects an incorrect understanding of the survey and of the contingent choice survey method. The survey did not ask if each household should pay $0 or $50 for habitat. The survey included sixty different questions with different combinations of resource changes and prices, with five questions in each of twelve survey booklet versions. Prices included in the survey ranged from $0 for the “no new action” option to $500, and prices of $50, $100, $200, $300 and $500 were included in the different questions and versions. The questions were developed using a standard fractional factorial plan to allow for statistical estimation of values per acre of the resources included in the survey.

In terms of the connection between hypothetical values and real-world values, non-use (referred to as “passive use”) values are accepted as part of damages caused by oil and chemical spills and Superfund sites, under the Oil Pollution Act and CERCLA. NOAA convened a blue-ribbon panel of economists and survey researchers, including several Nobel laureates, to debate the merits of measuring and including non-use values in NRDA. The panel concluded that these values exist, can be measured, and should be included in damage assessments. As the only generally accepted way to estimate these values is by the use of hypothetical (contingent valuation) surveys, legal precedent has confirmed that there is, in fact, a connection between hypothetical values and values in the real world. In addition, a number empirical studies have compared hypothetical payments to real money payments and shown a correlation between these values.

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Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA's Estimates are Implausible

After numerous estimates, assumptions, and extrapolations, EPA concludes that in the North Atlantic region, the annual nonuse value of fish lost from impingement and entrainment is between $76 million and $140 million a year.<FN 23> This is in stark contrast to commercial fishing's estimated losses of a mere $282,339 per year.<FN 24> In other words the annual value lost nonuse benefits from impingement and entrainment in the North Atlantic is 270 to 500 times greater than the lost benefits to commercial users.<FN 25> To evaluate the validity of these estimates, these numbers need some context.

One way to compare the validity of these estimates is to evaluate them on a per pound basis. According to table X-6, X-7, X-8, and X-9, the total yield per year in the North Atlantic region lost to impingement and entrainment is 1.24 million pounds of fish. This translates to a nonuse value of between $61 and $113 per pound. In comparison, the estimated commercial losses are only $1.12 per pound. This means that EPA estimates the nonuse value of fish to be 54 to 100 times greater than their commercial value. The implication of this is that fish are worth 54 to 100 times more to people if they are left in the water than if a commercial fisherman catches them for human consumption.

This gigantic discrepancy between the estimated nonuse value of the fish and the commercial (or consumption) value begs the question, "why do we still have commercial fishing?" If Americans really value knowing that fish are swimming free so much more than they value eating fish, why do we pay commercial fishermen to catch them for our consumption? If the values EPA produced are truly people's "willingness to pay" for the nonuse value they place on the fish, then why don't people organize, raise money, and buy out the fishermen? Obviously there are some organizing costs to such an endeavor, but the possible societal benefits are enormous. In fact, the societal benefits are so enormous that EPA's estimate of nonuse value could be overstated by an entire order of magnitude, and nonuse values would still dwarf use values. If nonuse values were anywhere near the estimate the EPA provides, we have to assume that environmental groups would organize to collect money and buy out commercial fishing.

To further put the EPA's estimate in perspective, according to the National Marine Fisheries service, in 2001, commercial fishermen landed 9.5 billion pounds of fish. The value of these fish is $3.3 billion. Applying the same benefits transfer approach EPA used here to all fish taken by commercial fisherman, the nonuse value of the 9.5 billion pounds of fish landed may be worth between $580 billion and $1 trillion. Therefore, according to the EPA's logic and estimates, commercial fishing costs the nation between $500 billion and $1 trillion a year – almost 5 to 10 percent of GDP!

Footnotes

23 68 Fed. Reg. At 13,577. EPA estimates that a portion of these losses would be avoided with the proposed rule, resulting in benefits of between $14 million and $27 million per year.

24 68 Fed. Reg. At 13,558

25 See 68 Fed. Reg. At 13,577, table X-44

EPA Response

The comment's first point is that lost nonuse benefits in the North Atlantic are 270-500 times greater than lost benefits to commercial users. This does not take into account a number of factors, one of which is the number of people who benefit from commercial fishing (the commercial anglers) is much smaller than the number of people who receive non-use values. Additionally, fisheries are renewable, open-access resources, which makes comparison of benefits to commercial anglers to benefits to the general public much more complicated than implied by the comment. This is discussed in more detail below.

The comment goes on to compare values per pound for non-use values and for fish commercially caught. Again, the comment misses the complexity of the issue. By definition, non-use values are not connected to use of a resource. They are expressions of peoples' values for the resource in its undisturbed natural state. It is unlikely that people think in terms of values per pound when evaluating their non-use values for wild creatures. Instead, they think of the creatures themselves, or the ecosystem. Therefore it does not make sense to evaluate the validity of non-use values in terms of value per pound. A single whale would likely have a very small value per pound in terms of nonuse value, possibly lower than the price per pound for whale products in countries where it is legal to trade in whale products. Yet, there is a ban on killing whales in the U.S., based on the fact that people hold non-use values for these creatures. If we simply compared the market value of whale products to nonuse value per pound, it would probably make sense to kill off and sell whales. At the other extreme, a well-known and often-referenced study estimated the nonuse value of the striped shiner, a very small fish with no commercial or recreational value. The values per pound for striped shiners are likely larger than the value per pound for whales, and are infinitely larger than the commercial value, which is zero, illustrating the irrelevance of thinking of nonuse values in terms of value per pound. There is absolutely no theoretical connection between non-use values of fish or other wild creatures and commercial market prices of fish or other wild creatures.

The commenter wonders, if non-use values of fish are greater than commercial values, "why do we still have commercial fishing?" The comment neglects to consider certain key points that are standard to fisheries economics and management. First, fish are an open-access resource, often resulting in overfishing in unregulated fisheries, as fishers extract all of the resource rents from the fishery. In the United States, fisheries have been regulated under the Magnuson Act since 1976. The National Marine Fisheries Service receives over $600 million per year to manage marine fisheries in the United States, with the expressly stated goal of achieving the maximum sustainable yield for each managed fishery. The maximum sustainable yield is the maximum allowable catch that allows the stock size to remain constant over time. Therefore, because fish are a renewable resource, fish can be caught in quantities up to the maximum sustainable yield without affecting the total stock, thus allowing fish to continue swimming free in the sea, and allowing for other values, including non-use values. Therefore, it is absolutely possible for Americans to both value fish swimming free, and at the same time to value eating and catching fish. It is irrelevant to argue how much commercial fishing costs the nation without evaluating the sustainable yield status of all fisheries first. If fisheries are managed optimally, then commercial fishing provides additional benefits to the nation, above and beyond non-use and recreational use values. If fisheries are not managed in a sustainable manner, it is entirely possible that commercial fishing costs the nation large amounts in lost values of our shared natural capital. However, the figures presented in the comment are not relevant, as they do not consider the degree to which fisheries are managed in a sustainable manner in the U.S.

Perhaps a market-based analogy will clarify this point. A person may have a certain amount of savings, or financial capital, invested in interest-bearing accounts, stocks or elsewhere. This financial capital earns a return on investment that can be spent without affecting the capital stock. If the capital stock is managed properly, the individual can live off of the returns, thus enjoying both the returns to capital, analogous to fish caught recreationally and commercially in a well-managed fishery, and the capital stock itself, analogous to the fish stock. However, if management produces insufficient returns, the individual may deplete his or her capital stock. Similarly, I&E effects of power plants may deplete fishery stocks, thus reducing the public's overall natural capital, and reducing total benefits available to the public from the fish.

The comment goes on to ask why people do not organize, raise money, and buy out the fishermen. In fact, the American people do this, through the National Marine Fisheries Service, which has boat buyout programs in some fisheries and regions. If people did not believe this program is worthwhile, they would lobby for its elimination. Environmental groups such as the Conservation Law Foundation support these and other programs. In May, 2000 CLF, on behalf of its members, sued NMFS to press for more stringent fisheries regulation.

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Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Nonuse Values, Contingent Valuation, and Benefits Transfer

This section attempts to address how EPA could derive such implausible results from its analysis. It examines the nature of nonuse values, and the use of contingent valuation methods to measure them. It also briefly addresses the appropriate use of benefit transfer methods.

The nature of nonuse values

"Nonuse" values are alleged to derive from the mere existence of something; in this case, common species of fish. Some economists view nonuse values as a form of externality that must be addressed by government action, while others question their existence.<FN 26> There are several conceptual problems inherent in nonuse values.<FN 27> First, it can be difficult to distinguish true nonuse values from values that do involve the use or potential use of a resource, particularly unique resources, such as the Grand Canyon or Alaskan wilderness, which are often used to illustrate the concept of nonuse values. Though you may not currently visit the Grand Canyon, you may place a value on its continued existence in pristine condition so that your children or grandchildren can enjoy it ("bequest value"), so you could visit it if you chose to ("option value") or so you can see photographs and nature videos of it ("indirect use value").<FN 28> These are all values that derive from potential or indirect use, and are not true nonuse values.

Weikard,<FN 29> for example, distinguishes real nonuse values from these other values based on potential use and altruism, and attempts a theoretical proof to show that individuals would not be willing to sacrifice use values to receive nonuse values. He argues that the concept of nonuse or existence value is inconsistent with generally accepted economic principles.

Boudreaux, Meiners & Zywicki raise related concerns, though they do not deny the existence of nonuse values.

"Although everyone experiences subjective utility gains and losses that do not correspond to market money values, the fact that subjective utility exists in humans does not justify government policy geared to that dimension. Of course, government policy and the law, if they are to serve useful social functions, must be geared to measures of human welfare. But because subjective utility is unmeasurable, government cannot be charged with the task of maximizing utility." (p. 793)

This recognition that nonuse values reflect subjective utility gains and are therefore not measurable or comparable across individuals is important. Though generally discussed in the context of environmental amenities, nonuse values exist for innumerable things. Some individuals may gain nonuse values from the knowledge that the Alaskan wilderness is untouched by oil drilling, while others may gain nonuse values from the knowledge that oil wells exist to provide jobs for Alaskan workers and national security. Some individuals may assign nonuse values to knowing people attend church regularly, while others may gain nonuse values from knowing others engage in hedonistic behavior. The question then becomes, if nonuse values are to be included in government decisions, on whose values should government reallocation of resources be based?

Footnotes

26 University of Southern California's "National Ocean Economics Project" provides information and links to research on non-market values of environmental amenities. http://ahf331b.usc.edu/nonmarket.html. Last accessed 4/4/03.

27 Hans-Peter Weikard, "The Existence Value Does Not Exist and Nonuse Values are Useless." Paper prepared for the annual meeting of the European Public Choice Society, 2002. http://polis.unipmn.it/epcs/papers/weikard.pdf. Last accessed 4/4/03.

28 This classification of option and bequest values as use values is consistent with other authors, including the U.K. Department for Transport, Local Government and the Regions Economic Valuation with Stated Preference Techniques: Summary Guide. Http://www.dtlr.gov.uk/about/economics/05.htm. Last accessed 4/4/03.

29 Weikard, op cit.

EPA Response

EPA concurs that the estimation of nonuse values is an extremely challenging, complex, and controversial matter. See response to comment 316bEFR.306.105 for further discussion of the feasibility of doing original state preference analysis.

Please also note that for the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN # XX). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis.

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Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02.06.01

Stated preference (Contingent Valuation)

Contingent Valuation

Since there is no market in incremental changes in subjective individual utility, proponents of including nonuse values in government decision calculus turn to stated preference or “contingent valuation” (CV) surveys. Recent draft guidelines for regulatory analysis prepared by the Office of Management and Budget raise concerns about CV surveys, noting “the reliance of these methods on stated preferences regarding hypothetical scenarios and the complexities of the goods being valued by this technique raise issues about its accuracy in estimating willingness to pay compared to methods based on (indirect) revealed preferences.”<FN 30>

Despite concerns about its accuracy, the draft guidelines conclude that CV may be the only method available to estimate “nonuse” values, and do not dismiss CV as a tool. Instead, they state that “value estimates derived from contingent-valuation studies require greater analytical care than studies based on observable behavior,” and proceed to enumerate “best practices” for conducting CV. The best practices for conducting CV surveys address sampling, survey instrument design, transparency and replicability of results.

However, Boudreaux et al show that the practical problems of CV cannot be resolved with better surveys because the technique itself is conceptually flawed.

The questionable results [recognized by OMB and others] are merely the manifestation of greater underlying and incurable problems that render contingent valuation studies generally—and attempts to discern existence value particularly—useless and unreliable. The problem confronting designers of contingent valuation studies is at the conceptual and theoretical level, not at the merely practical level of implementation. Contingent valuation studies are inconsistent with the fundamental Contingent valuation studies are inconsistent with the fundamental principles of economic choice under conditions of scarcity and budget constraints and rest on a superficial understanding of the role played by dollar prices in a dynamic economy. (p. 776)

Values emerge, not as conscious, intentional decisions, but as the unintended and undesigned results of decentralized market activity. People do not have a single value for an environmental amenity, but rather schedules of different dollar figures dependent upon a nearly infinite variety of variables. As a result, Boudreaux et al conclude that stated market values are not acceptable surrogates for market prices.

Kahneman, Ritov, and Schkade have also examined CV methods and results to understand what stated preferences actually express.<FN 31> They find that willingness to pay estimates derived from CV studies, though denominated in dollars, “are better viewed as expressions of attitudes than as indications of economic preferences,” and that “the anomalies of CV are inevitable manifestations of known characteristics of attitudes and attitude expressions.” (p. 204) They find that stated preferences derived from CV studies are analogous to juries' punitive damage awards, and are not consistent with economists' rational models.

Both jury awards and CV results seem to reveal a prescriptive notion of what should be, divorced from actual behavior or revealed preferences. But how much weight should these prescriptive notions carry in designing government policy?

Boudreaux et. al. point out,

In market transactions, we can assume that all individual trades increase individual utility, because the occurrence of the trade itself suggests that the individual values the good received more highly than the good surrendered. Thus, it is only through the process of actual exchange of one good for another that we can know for sure that an individual values one option over another… Divorced from the discipline of making actual choices, the hypothetical choices presented by contingent valuation have little value. (p. 785)

Kahneman et al and Boudreaux et al, through very different paths, reach the conclusion that stated preferences divorced from any expectation of actually having to pay the stated values, are not accurate proxies for revealed economic preferences. The similarities Kahneman et al find between jurors and CV respondents suggests that, like jurors determining civil damage awards, CV respondents view the values they assign as imposing costs on someone other than themselves. They know they will never have to pay the values they profess to place on different amenities. Thus, these responses do not comply with the key concept of opportunity cost articulated in the guidelines – they do not "measure what individuals are willing to forgo to enjoy a particular benefit." Indeed, it strikes us as unrealistic to think that individuals would give up more than a small amount of income or other use value in exchange for a nonuse value. Indeed, as discussed above, the implications of the NODA—that nonuse values of the common fish saved from harm by the proposal dwarf the commercial or recreational value of the fish— is completely implausible. It is equally unrealistic to assume that it is in society's interests to pursue government policies that would divert society's scarce resources based on these subjective, stated preferences.

Footnotes

30 Office of Management and Budget, Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations, 68 Fed. Reg. at 5,491 (Feb. 3, 2003).

31 Daniel Kahneman, Ilana Ritov, and David Schkade, "Economic Preferences or Attitude Expressions?: An Analysis of Dollar Responses to Public Issues," in Journal of Risk and Uncertainty, 19:1-3; 203-235 (1999).

EPA Response

EPA acknowledges that there are many debates within the economics and related professions regarding the best way to design and implement a stated preference (SP) survey instrument, and that there is also some debate on how reliable the findings would be from such an effort. Overall, however, well conceived and designed SP research has provided useful and credible results in many areas. The SP approach is widely recognized and accepted, if the application is done well. Please see response to comment 316bEFR.306.105 for additional information and discussion.

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Peconic-based approach

Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Benefits transfer

In its draft guidelines, OMB recognizes that it is not always possible to conduct an original study to estimate non-market benefits attributable to regulatory activity. It notes that although "benefit transfer," a method that applies existing estimates to a new context, "offers a quick, low cost approach for establishing values for goods and attributes of goods, you should consider it as a last resort option. Several studies have documented difficulties in applying benefit transfer methods."<FN 32> The draft guidelines go on to list the conditions under which benefit transfer is appropriate and when it is not.

We have endorsed the draft guidelines on this point.<FN 33> However, as discussed above, EPA's use of the benefit transfer method in this case, relying on a survey of willingness to pay for wetlands habitat to measure the value of fish in open waters, appears to defy most if not all of the conditions set forth in the draft guidelines.

Footnotes

32 68 Fed. Reg. at 5,520.

33 See Mercatus Center Public Interest Comment on OMB's Draft Guidelines for Regulatory Analysis, May 2003. Available at http://www.mercatus.org/article.php/314.html.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Conclusions and Recommendations

EPA's efforts to place values on the nonuse benefits attributable to reducing fish losses due to entrainment and impingement at power facility cooling water intakes illustrates the problems with attempting to capture subjective utility measures in policy decisions. EPA estimates that the commercial value (or value to American consumers) of the proposed regulations is $80,000 per year. It estimates the recreational fishing value at another $880,000 per year. In contrast, it values the nonuse benefits of the proposed regulations at between $14,170,000 and 26,870,000. On a per-pound basis, the nonuse values of the common fish examined in the NODA are 54 to 100 times greater than actual use values. This is implausible.

EPA's results suggest that every fish consumed actually costs Americans much more in nonuse values than it provides in consumption value. As noted above, the implication of this result is that Americans could experience benefits of between $500 billion and $1 trillion per year, simply by not eating fish. Preferences revealed by the fact that Americans do eat fish shows the impossibility of the benefit estimates presented in the NODA.

Relying on stated preferences regarding hypothetical scenarios is widely recognized to be less reliable than relying on methods based on revealed preferences. In this NODA, EPA compounds the problems inherent in stated preference surveys by attempting to transfer the results of a CV study designed to value wetland habitat to estimate the benefits of common fish species. EPA appears to have gotten caught up in the complicated exercise of adjusting, extrapolating, and transferring, and not stopped to conduct a reality check on the plausibility of the results.

EPA should reconsider its approach to estimating benefits for this rule. The values attributable to commercial fishing (and corresponding consumption) are observable through market transactions and should be included. The values associated with recreational fishing are less easy to estimate, because they involve assumptions about the relationship between number of fish and recreational enjoyment, however, with care they should also be included. The nonuse values of the fish, however, involve subjective utility changes and are not measurable or comparable across individuals. While individuals may experience subjective utility gains from knowing that fish are not entrained or impinged, this does not justify regulation that imposes real opportunity costs. If forced to actually pay for the costs of regulation, it is simply implausible that people would be willing to give up a significant amount of private economic goods in exchange for pure nonuse value of fish.<FN 34>

Footnotes

34 Boudreaux et al defer to Adam Smith, who illustrated the concept two centuries ago with a hypothetical earthquake in China that killed millions. While a European would express sincere regrets about the plight of the dead, his concern would pale in comparison to a comparatively trivial misfortune of his own. Adam Smith, The Theory of Moral Sentiments, referenced in Boudreaux et al. (p. 774).

EPA Response

The comment states that attempting to measure non-use values is problematic because they represent subjective utility. EPA does not agree. Please see EPA's response to comment #316bEFR.319.005 regarding subjective utility.

The comment states that it is implausible for non-use values to exceed commercial values by a large amount. EPA does not agree. There is no theoretical connection between total commercial values and total non-use values. See EPA's response to comment #316bEFR.319.004 regarding comparing commercial and recreation values to non-use values. As elaborated in the reply to #316bEFR.319.004, the fact that Americans eat fish does not mean that non-use benefits from fish are implausible.

For details regarding EPA's benefit transfer approach, presented in the Notice of Data Availability (see 67 FR 38752), please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services.

The comment states that it is "implausible that people would be willing to give up a significant amount of private economic goods in exchange for pure nonuse value of fish." However, the comment does not refer to any empirical evidence for this statement, but is simply expressing an opinion. Numerous studies and evidence show that people are, in fact, willing to give up private economic goods in exchange for non-use values of fish and many other natural resources. See Freeman (2003) as one source of references to studies that have found positive and significant non-use values.

It is not unreasonable to expect that aggregate non-use values for the resources affected by the 316b regulation are much greater than aggregate use values because the number of individuals who directly use the resources (i.e., commercial and recreational fisherman) is much smaller than those who do not.

For example, assume that there are 10,000 people living near a CWIS, and 100 of these people are fisherman. Also assume that these 100 people have a use value of $10 per year from fishing and a non-use value of $5. Non-use value consists of existence and bequest values. Existence value is the value that individuals may hold for simply knowing that a particular good exists regardless of their present or expected use. Bequest value exists when someone gains utility through the knowledge that an amenity will be available for others (family or future generations) in the future.

The nonusers in the community, the other 9,900 people, by definition have zero use value. They may still have a nonuse value. Assume again that these people have a lower nonuse value than people using the resource, or $2.50 per year. This means that the total use value is equal to $1,000 ($10 x 100). The nonuse value for users equals $500 ($5 x 100), and the nonuse value for nonusers is $24,750 ($2.50 x 9,900).

The ratio of nonuse to use for users is 0.5 (there is no ratio for nonusers as you cannot divide by zero). The ratio of aggregate non-use value to aggregate use value is, however, much greater ($25,750 /$1,000) because the number of people who hold non-use values is much greater than the number of people who directly use the affected resources. In fact, for some resources such as endangered species this ratio is infinite, because use value for such species is zero.

Comment ID 316bEFR.319.009

Author Name Mercatus Center at George Mason University

Organization Mercatus Center at George Mason University

Subject Matter Code 10.02

Benefit Estimation Methodology

Appendix I. RSP Checklist
[see hard copy for table]

EPA Response

The comment states that the benefits analysis presented in the NODA is seriously flawed and does not have a sound scientific and technical basis. The commenter assigns Grade "F" to the Agency's approach. EPA does not agree with this assessment.

The comment states that it is implausible for non-use values to exceed commercial values by a large amount. EPA does not agree. There is no theoretical connection between total commercial values and total non-use values. See EPA's response to comment #316bEFR.319.004 regarding comparing commercial and recreation values to non-use values. As elaborated in the reply to #316bEFR.319.004, the fact that Americans eat fish does not mean that non-use benefits from fish are implausible.

For details regarding EPA's benefit transfer approach, presented in the Notice of Data Availability (see 67 FR 38752), please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services.

See also EPA's response to comment #316bEFR.319.008.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

John A. Arway

On Behalf Of:

Pennsylvania Fish and Boat Commission (PFBC)

Author ID Number:

316bEFR.320

Comment ID 316bEFR.320.001

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code SUP

General statement of support

The PFBC staff has reviewed the Notice of Proposed Regulations to Establish Requirements for Cooling Water Intake Structures for Phase II Existing Facilities. We understand that EPA is reopening the comment period on all aspects of the April 9, 2002 proposal. Our comments are organized according to the April 9, 2002 proposal and the March 10, 2003 Notice of Data Availability (NODA). In general, the staff supports this initiative as we believe the proposed regulations will serve to significantly reduce fish losses related to impingement and entrainment at cooling water intakes in Pennsylvania.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.320.002

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

Page 17137 – The document states that EPA is concerned with ecosystem-level impacts of impingement and entrainment. The PFBC shares these concerns, but is also concerned with the loss of individual organisms caused by impingement and entrainment. Fish protection measures should take both ecosystem level and individual fish losses into account. We believe that total prevention of impingement and entrainment should be pursued. However, often this is impractical or infeasible. In such cases, restoration measures should be based on restoring the fishery by taking into consideration the replacement costs of individual fish as well as ecosystem level considerations (e.g. production foregone), and the restoration of recreational values that have been lost. This is similar to the approach used in Natural Resource Damage Assessments under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Oil Pollution Act (OPA). We note that the proposed rule does address these issues, which we believe is a major improvement in how Section 316(b) will be implemented in the future. Every effort should be made to make the public trust resources whole when dealing with fish mortality from impingement and entrainment. This has not been the case historically, at least in Pennsylvania.

EPA Response

EPA agrees with this commenter and believes that the provisions in today's final rule will reduce the loss of the large number of organisms killed as a result of impingement and entrainment by cooling water intake structures. Please see the response to comment 316bEFR.025.018. As suggested by the author of this comment, EPA agrees that permitting authorities should take into account not only the individual replacement costs of a fish but also ecosystem level considerations such as production foregone and lost recreational values, into account when determining whether restoration projects will result in comparable performance with the requirements of today's final rule. Please see the preamble of the final rule for the discussion on restoration.

Comment ID 316bEFR.320.003

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Page 17141 – EPA is proposing that facilities that operate at less than 15 percent capacity would be required to implement impingement control technology only (with no entrainment control technology). Regardless of the form of the final rule, we believe that mitigation should be required for all entrainment or impingement losses.

EPA Response

The Agency disagrees with the comment. See response to comment 316b.EFR.330.032 for more discussion of EPA's decision to include a capacity utilization rate threshold in the final rule. See also the preamble to the final rule.

Comment ID 316bEFR.320.004

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 7.01.02

Option 2--Implement performance requirements

Page 17143 – EPA solicits comment on whether the proposed regulation should specify that proper design, installation, operation, and maintenance should satisfy the terms of the NPDES permit, until the permit is reissued pursuant to a revised Design and Construction Technology Plan. We believe this should be the case only if restoration measures are determined on a basis that is retroactive to the time of the original permit.

EPA Response

EPA has included in today's final rule several alternatives for achieving compliance, including demonstrating compliance with a Technology Installation and Operation Plan in place of achieving the numeric performance requirements. Please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.320.005

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Page 17146 – What is the basis for determining whether compliance costs are "significantly greater" for Phase II facilities? Restoration costs should be based on restoration to a no-impact baseline, regardless of the basis for compliance costs.

EPA Response

See responses to 316bEFR.308.004 and 006.003. The director will apply the significantly greater standard on a case-by-case basis.

Comment ID 316bEFR.320.006

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Page 17146; What is the role of restoration? – Every effort should be made in the proposed rule to allow the greatest possible flexibility in designing and implementing restoration programs. We recommend inclusion of an alternatives analysis requirement for restoration, with the highest priority given to restoration actions on-site, but also including other options, which may be directed at the watershed level, with the lowest priority given to off-site mitigation. Similarly, highest priority should be directed at restoring the same species or group of species impacted, but flexibility should be provided to direct restoration to other species or even broader ecosystem level benefits. Such an approach will permit creative solutions to these resource impacts, which for the most part are not currently being addressed, at least in Pennsylvania.

EPA Response

EPA believes the requirements for restoration measures in the final rule provide permitting authorities and permit applicants with a significant amount of flexibility. For a discussion of the permitting authority's role in determining suitable restoration measures, see EPA's response to comment 316bEFR.212.001.

For a discussion of the appropriate scale on which to conduct restoration, see EPA's response to comment 316bEFR.212.011. EPA does not want to preclude use of restoration measures that can accomplish the environmental objectives of the final rule through an alternatives analysis. However, the alternatives analysis suggested by the commenter could be useful for assessing restoration measure alternatives.

For a discussion of the use of out-of-kind restoration in the final rule, see EPA's response to comment 316bEFR.206.055.

Comment ID 316bEFR.320.007

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.04

RFC: Consultation with wildlife agencies

Page 17146 – The PFBC is the "state fish management agency" in the Commonwealth of Pennsylvania. The PFBC is authorized to protect, conserve and enhance fish and other aquatic life in Pennsylvania and encourage, promote, and develop recreational fishing and boating interests. As the agency responsible for managing the resources that are most significantly impacted by impingement and entrainment, we believe that we should play a very significant role in consultation related to restoration measures designed to influence these resources. The state and federal fish and wildlife agencies should be included in the rule as agencies that must be consulted in the development of restoration measures. The agencies should be given the authority to veto measures ruled inconsistent with the proper management of the resources they are mandated to protect.

EPA Response

Permit applicants must consult with Federal, State, and Tribal fish and wildlife management agencies with responsibility for fisheries and wildlife potentially affected by a permit applicant's cooling water intake structure in order to determine the species of concern to be addressed in the Restoration Plan. Permit applicant's must also submit a summary of any past or ongoing consultation with appropriate Federal, State, and Tribal fish and wildlife agencies on the use of restoration measures, including a copy of any written comments received as a result of such consultations. The requirements for these interactions are described in the final rule.

The responsibility to authorize restoration measures in the context of the final rule belongs to the permitting authority. For a discussion of the roles and responsibilities of the permitting authority, see EPA's response to comment 316bEFR.060.026. The permitting authority should take into serious consideration, however, the views and advice of other Federal, State, and Tribal fish and wildlife management agencies because of their expertise and responsibilities in fish and wildlife management. Moreover, this final rule does not modify any other state or federal law or requirement that can be applied independent of this final rule.

Comment ID 316bEFR.320.008

Subject Matter Code 11.05

RFC: Info. to include in a restoration plan

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Page 17147 – We believe that the information proposed to be required from an applicant for restoration measures is appropriate. In addition to the five items proposed, we believe that the restoration measures should include a list of alternatives, not just one measure or suite of measures preferred by the applicant.

EPA Response

For a discussion of the consideration of design and construction technologies and operational measures before choosing restoration measures, see EPA's responses to comments 316bEFR.033.005 and 316bEFR.202.029.

For a discussion of the role of the permitting authority, see EPA's responses to comments 316bEFR.212.001 and 316bEFR.060.026.

Comment ID 316bEFR.320.009

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.07

RFC: Restoration above BTA level

Page 17147 – We agree strongly with the proposal to require an over-design of restoration measures as a built-in margin of safety. This is a common practice related to wetland restoration activities associated with Section 404 of the Clean Water Act and it makes sense here as well, given the many uncertainties associated with restoration measures. The “margin of safety” could perhaps be tailored to the sensitivity of the affected resource, especially if the measures to be implemented are relatively inexpensive in relation to the benefits to the applicant of not implementing more costly control technologies.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to satisfy the requirements of the final rule, see EPA's responses to comments 316bEFR.060.026 and 316bEFR.212.001.

Comment ID 316bEFR.320.010

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.08

RFC: Habitat conservation as part of restoration

Page 17148 – We believe that habitat conservation might be an appropriate component of a facility's restoration efforts, but this would have to be evaluated on a case-by-case basis, perhaps as part of an alternatives analysis of possible restoration measures.

EPA Response

Any restoration measure must meet all of the requirements described in the final rule.

For a discussion of the roles and responsibilities of the permitting authority in determining the appropriate level of performance to meet the requirements of the final, see EPA's response to comment 316bEFR.060.026.

Comment ID 316bEFR.320.011

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 12.02

RFC: Monitoring frequencies

Page 17149; minimum frequencies for impingement and entrainment monitoring – Monitoring frequencies should be established to address the inherent variability (as determined by a pilot test or previous study at the site) in the rates of impingement and entrainment rates at a particular facility. Standard statistical procedures can be followed to establish sample sizes needed to establish appropriate levels of precision in the estimates (e.g., 95% confidence intervals within 15-25 % of the mean). Sampling frequency should likewise be determined so that the accuracy of the estimates will be reasonable. Because impingement and entrainment rates can vary greatly with season of the year, monitoring should be of sufficient frequency to allow precise estimates within each season, month or biweekly period, as appropriate for the specific fish community that is being impacted.

EPA Response

Please see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.320.012

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

Page 17151 – We believe that the withdrawal threshold of 5% of the mean flow measured during the spawning season for entrainment controls is appropriate only if the remaining losses are addressed through restoration measures. If this threshold is utilized, it should be based on cumulative impact analysis for all facilities in the watershed.

EPA Response

Please see response to comment 316bEFR.077.034.

Comment ID 316bEFR.320.013

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 15.02

RFC: States to demonstrate comparable env. perf.?

Page 17152 – We do not believe that states should be given the latitude to provide less protection than would be achieved under Sec. 125.94. Of course, it should be up to the states to decide if they want to provide more control.

EPA Response

Today's final rule allows States and Tribes to demonstrate alternative regulatory requirements (§ 125.90(c)) that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment in the performance standards. Additionally, § 125.90(d) states that nothing in today's rule precludes a State or interstate Agency from adopting or enforcing any requirement that is not less stringent than those required by Federal law. However, providing less protection is not an option with regard to alternative regulatory requirements.

Comment ID 316bEFR.320.014

Subject Matter Code 17.05

Option: I&E reduction without regard to WB type

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Page 17158 – We believe that there is considerable merit in the "Impingement and Entrainment Controls Everywhere" option that is being considered. This is much simpler from a regulatory standpoint than the other options and would require significant entrainment and impingement controls across the board.

EPA Response

EPA believes that today's final rule represents the best option for minimizing adverse environmental impacts brought by cooling water intake structures (see final rule preamble section VI. Basis for the Final Regulation for more details). For EPA's rationale behind rejecting the waterbody/capacity based option, please refer to the final rule preamble section entitled, Impingement Mortality and Entrainment Controls Everywhere.

Comment ID 316bEFR.320.015

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

Page 17163 – We believe "adverse environmental impact" should include an evaluation of losses of individual fish and not rely solely on evaluation of population or even higher organizational levels of impact analysis.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.320.016

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.01.01

UWAG definition of "adverse environmental impact"

We disagree strongly with the definition of an adverse impact proposed by UWAG. The UWAG definition is very subjective, and we believe designed to result in unnecessary ambiguity in dealing with what is in our opinion a fairly straightforward issue, i.e., if fish are killed, and technology measures to prevent these mortalities are for some reason infeasible, then the resource and the users of that resource should be made whole by way of appropriate levels of mitigation.

EPA Response

EPA agrees with this commenter. Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Comment ID 316bEFR.320.017

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.01.03

RFC: EPA 1977 definition of "AEI"?

Adverse impact should be defined, as in the 1977 Draft Guidance, as "any entrainment and impingement damage caused by a cooling water intake structure."

EPA Response

While today's final rule does not define the term "adverse environmental impact", EPA believes that the performance standards that reduce impingement mortality and entrainment by cooling water intake structure will result in a minimization of any entrainment and impingement damage caused by a cooling water intake structure.

Comment ID 316bEFR.320.018

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Page 17165 – We believe that the final rule should permit the use of a previous 316(b) demonstration only in the case when there has been no change to the biota of the water in question or to the facility. This is very unlikely to be the case in Pennsylvania, where most 316(b) demonstrations were conducted over 20-25 years ago. Perhaps the best way to address this is to only permit previous demonstrations to be adequate if they were done within the last five-year period and there has been no documented change in the fishery or the operation or design of the facility.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.320.019

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Page 17166 – We are not opposed with the concept of the use of voluntary restoration and enhancement measures to be taken into account when considering compliance with Section 316(b). A demonstration of the effectiveness of these measures, similar to that proposed for new restoration measures, should be required before such voluntary measures can be credited. The state fish and wildlife agencies should be consulted in the determination of the appropriateness of voluntary restoration and enhancement measures.

EPA Response

For a discussion of the use of existing restoration measures, see EPA's response to comment 316bEFR.032.011.

Comment ID 316bEFR.320.020

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.04

RFC: Role for fish & wildlife agencies for site-specific

Page 17166 – If a site-specific option is implemented, consultation with state and federal fish and wildlife agencies should be required, as it should be on other aspects of the proposed rule (see previous comments, above).

EPA Response

For information about consultation with fish and wildlife agencies, please refer to § 125.95 and section IX of the preamble to the final rule.

Comment ID 316bEFR.320.021

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.11

RFC: Mandatory restoration approach

Page 17170 – We agree strongly with the "Mandatory Restoration Approach," which would require that Phase II facilities include restoration measures as an element of all 316(b) demonstrations. Restoration should be required to compensate for organisms that were not protected following facility installation of impingement and entrainment control technologies.

EPA Response

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Facilities are not required to install design and construction technologies, operational measures, and/or restoration measures beyond a level necessary to meet the performance requirements in the final rule. For a discussion of the creation of the performance requirements given in the final rule, see EPA's response to comment 316bEFR.056.003.

Comment ID 316bEFR.320.022

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 20.01

RFC: Should EPA include impingement trading?

Page 17170 - 17171 – "Restoration banking" and "entrainment trading" may have merit in some specific circumstances. These could be included as part of an alternatives analyses of potential restoration activities.

EPA Response

Please see response to comment 316bEFR.018.029 regarding trading restoration.

Comment ID 316bEFR.320.023

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 20.03

Spatial scale for entrainment trading

The basis for entrainment trading, if it would be employed, should be limited to the specific water body.

EPA Response

Please see response to comment 316bEFR.077.051 for the discussion on the appropriate spatial scale for trading.

Comment ID 316bEFR.320.024

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 20.04

RFC: Potential trading units/ credits

We recommend that it be based on the replacement costs of the entrained fish, not on some overall biomass or population estimates of all fish, regardless of species composition.

EPA Response

Please see response to comment 316bEFR.077.052 for the discussion regarding the appropriate unit for trading.

Comment ID 316bEFR.320.025

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Page 17178, Verification Monitoring Plan – We strongly support this aspect of the proposed rule.

EPA Response

EPA appreciates the support of the Pennsylvania Fish and Boat Commission.

Comment ID 316bEFR.320.026

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 22.03

Other regulatory requirements

Page 17180, G – Add the Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq. to the list of federal laws applicable to federally issued NPDES permits.

EPA Response

The list of Federal laws that may apply to the issuance of permits referred to by the commenter is in 40 CFR 122.49, which is not within the scope of today's rule. EPA notes, however, that the list of Federal laws in 122.49 is not all inclusive.

Comment ID 316bEFR.320.027

Subject Matter Code 7.04
Streamlined Technology Option

Author Name John A. Arway
Organization Pennsylvania Fish and Boat Commission (PFBC)

Page 13540 – This page discusses a proposed "streamlined technology option" that is defined as "use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity of 0.5 feet per second or less." There is no mention of mesh size in this section. This should be addressed. It is conceivable that such facilities would have minimal entrainment/impingement, but restoration measures should be provided to address any losses above some de minimus threshold.

EPA Response

Please refer to EPA's response to comment 316bEFR.306.003 for an explanation of how EPA has addressed the issue of mesh size in the Approved Design and Construction Technology option.

Comment ID 316bEFR.320.028

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Page 13541 – We believe EPA should remove ambiguity and adopt a quantitative definition of "significantly greater" in the comparison of costs to benefits. Regardless, restoration measures should be required to address impacts that result when costs of control measures do exceed benefits by some threshold defined in the rule.

EPA Response

See responses to 316bEFR.006.003 and 018.009. The final rule provides for compliance alternatives that include but are not limited to a site-specific determination of BTA restoration.

Comment ID 316bEFR.320.029

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 12.03.02

Entrainment survival chapter

Page 13541 – We agree with the EPA default assumption of zero percent survival for entrained organisms.

EPA Response

EPA thanks the commenter for this submission.

Comment ID 316bEFR.320.030

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Page 13542 – We believe that "adaptive management" should be a part of the rule as it pertains to restoration measures. Permittees should be required to create and implement an adaptive management plan as part of their proposed restoration projects.

EPA Response

EPA acknowledges the commenter's support for the use of adaptive management. Requirements for adaptive management are included in the final rule.

Comment ID 316bEFR.320.031

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Page 13542, Independent Peer Review Team – The use of an Independent Peer Review team is prudent for restoration planning as an optional part of the rule. Such a team would be most useful when possible restoration alternatives are not obvious or where the magnitude of activities necessary to meet the restoration goals is unclear. If this becomes a part of the rule, we believe it should be an optional component, and that the team should be selected in consultation with the federal, state and tribal fish and wildlife management agencies. We can foresee instances where this is not necessary however, and the agencies with authority for managing the public trust resources being impacted by impingement and entrainment should have a major role in selecting and approving restoration measures.

EPA Response

EPA acknowledges the commenter's support of the use of peer review for some restoration measures. As described in the final rule, the permitting authority has the flexibility to determine the necessity of independent peer review.

Comment ID 316bEFR.320.032

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

Page 13581 – We believe the most straightforward and reasonable method for estimating entrainment baseline is by actual sampling, most likely directly in front of the new technology. Use of historic entrainment data that had been collected before new technology was installed would be highly dependent on the quality and timing of the historical studies. In Pennsylvania, where most entrainment studies are 20-25 years old, use of historical data would almost never be appropriate in our view.

EPA Response

As discussed in the preamble, EPA is allowing the "as-built" approach in the calculation baseline to measure current levels of impingement mortality and entrainment.

Comment ID 316bEFR.320.033

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.04

Determination of compliance

Page 13581 – The "as built" approach to establishment of a baseline for impingement mortality appears reasonable to us.

EPA Response

EPA appreciates the support of the Pennsylvania Fish and Boat Commission.

Comment ID 316bEFR.320.034

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.04

Determination of compliance

Page 13581 – We do not believe the calculation baseline should be determined using data from other facilities.

EPA Response

Please see EPA's response to comment 316bEFR.343.011 for EPA's position on using data from other facilities.

Comment ID 316bEFR.320.035

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.04

Determination of compliance

Page 13582 – We believe the “all species approach” or perhaps a hybrid of the “all species approach” and the “representative species approach” to determine compliance with impingement and entrainment performance standards would be appropriate. The hybrid approach we would recommend is that the compliance be measured for all species in total but also include certain highly important species as determined by the federal, state, and tribal fish and wildlife management agencies. In other words, this approach would require X% reduction in mortality for all species combined with the option for X% reduction in mortality for certain individual species as determined by the agencies. The number of species selected should be at the discretion of the agencies. Regardless of the option used, however, restoration should be provided to address any remaining losses. We recommend that compliance monitoring be based on numbers of organisms and not biomass.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.320.036

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.04

Determination of compliance

Page 13583 – We believe that the permittees should not be responsible for moribund organisms that are impinged. To reduce ambiguity, we recommend that this be limited to organisms that are already dead at the time of impingement, and not to organisms "previously injured," as this necessitates the need to determine the extent of the injury, the definition of this condition, etc. Also, it is often very difficult to collect individuals in baseline studies without injuring or even killing them. Removing only fish that have obviously been dead (e.g., those discolored or in some degree of decay) is the most reasonable way to deal with this issue, especially since previous comments accompanying this proposed rule suggest that in many occasions, entrainment is underestimated.

EPA Response

Please see EPA's response to comment 316bEFR.306.116 for EPA's position on accounting for naturally dead or moribund organisms.

Comment ID 316bEFR.320.037

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.04

Determination of compliance

Page 13584 – We believe a reasonable time for determining compliance with performance standards is two to three years with the calculation based on the same sampling strategy that was used to establish the baseline. Standard statistical tests can be used to determine if the differences noted in comparison to the baseline are significant within some established level of accuracy and precision.

EPA Response

Please see EPA's response to comments 316bEFR.034.066 and 316bEFR.002.021 for a discussion of the timing associated with determining compliance.

Comment ID 316bEFR.320.038

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.09

Permit applications/implementation schedule

Page 13585 – We believe that a two to three year period after the time the new rule is final is reasonable for permittees to comply with its conditions.

EPA Response

Based on the information presented in this and other comments, EPA agrees that a number of facilities will need several years to prepare the required studies. Therefore, EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.320.039

Author Name John A. Arway

Organization Pennsylvania Fish and Boat Commission (PFBC)

Subject Matter Code 21.09

Permit applications/implementation schedule

Page 13585 – We recommend that detailed re-assessments be required every 5 years, with the option to extend this to a longer period (e.g., 10 years) if agreeable to the Director, in consultation with the federal, state, and tribal fish and wildlife agencies, based on information that conditions have remained substantially unchanged at the facility since the initial evaluation. We believe that the proposed language under Sec. 125.95(a) is generally acceptable. However, this should include additional language that specifies specifically how a determination will be made that conditions have remained unchanged, i.e., the language should stipulate that a null hypothesis of “there has been no change in X condition at this facility,” be developed and the appropriate statistical tests and specific criteria for testing this hypothesis be established as part of the initial permit.

EPA Response

EPA agrees that permits should be re-evaluated every five years and has included a provision in today’s final rule whereby the facility may receive reduced information collection requirements if conditions (such as biological, chemical, or physical) at the cooling water intake structure and waterbody remain substantially unchanged since the last permit issuance (see 125.95(a)(3)). See response to comment 316bEFR.034.005 for a discussion.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Robert H. Reider

On Behalf Of:

The Detroit Edison Company

Author ID Number:

316bEFR.321

Comment ID 316bEFR.321.001

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.02.07

Regional Benefits Approach

EPA identifies its regional approach to developing benefits estimates and then presents its estimates for only two of the eight regions. When will EPA present its methodology and use benefits for the other regions? Will interested parties be given an opportunity to comment on these benefit analyses?

EPA Response

EPA's methods for the other regions were the same as those presented in the NODA for two regions. Please see responses to Comment 316bEFR.041.041 and Comment 316bEFR041.037. Results are presented in EPA's final analysis for the section 316b Phase II rule (DCN #6-0003).

Comment ID 316bEFR.321.002

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.02.07

Regional Benefits Approach

The EPA should have provided a list of facilities in each of the regions since the groupings are different from what was presented in the proposal.

EPA Response

EPA's Regional Study Document for the final Phase II rule (DCN #6-0003) presents the names of facilities used to develop regional I&E estimates, and the studies used are available in the docket.

Comment ID 316bEFR.321.003

Subject Matter Code 10.02.07

Regional Benefits Approach

Author Name Robert H. Reider

Organization The Detroit Edison Company

EPA is proposing combining similar species into family groups or groups used by NMFS for landings data (page 13545). Species should be combined according to their taxonomic classification and not by their common names. Ex: two widespread species whose distributions overlap, the trout-perch (Percopis omiscomaycus) is in the Order Percopsiformes which is unrelated to the Order Perciformes to which belongs the logperch (Percina caprodes). (These two species were erroneously combined in at least one of the case studies.)

EPA Response

EPA agrees with the commenter, and made every effort to ensure that species groupings were biologically appropriate. EPA also carefully reviewed the species groupings proposed in the NODA (Federal Register: 68 FR 13522-13587) and revised them as needed to more accurately reflect biologically meaningful associations.

Comment ID 316bEFR.321.004

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA states that data collected at the Salem and Millstone facilities indicate that individuals older than age 1 were collected and that EPA's assumption that all impinged fish were age 1 resulted in an underestimate (page 13546). While this may be true for these two facilities, it is certainly not true for all facilities. As stated in the comments on the Monroe case study, for several of the major species the majority of the impinged fish were less than one year old.

EPA Response

Please see response to Comment 316bEFR.029.105 concerning EPA's assumptions about the age distribution of impinged fish for its final analysis for the Phase 2 rule.

Comment ID 316bEFR.321.005

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.02.01

Recreational Fishing Benefits

EPA states "for the final rule analysis, the Agency intends to expand the Tampa Bay case study used in the proposed rule analysis to include the whole Gulf of Mexico region and to develop an original travel coast [sic] model for the Great Lakes Region" (page 13546). When will these evaluations be completed and will they be made available for review?

EPA Response

For the final Phase II 316b analysis, EPA has estimated RUM models for four coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. See Chapters A11, Estimating Benefits with a Random Utility Model (RUM), and Chapter 4, RUM Analysis, in Parts B through G of the final Phase II Regional Studies Document (DCN #6-0003).

Comment ID 316bEFR.321.006

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA provided no explanation as to how it arrived at the 99.92 percent value for "unvalued" fish in the Great Lake case study indicated in the footnote on page 13567.

EPA Response

The percentage of impinged and entrained fish that are unvalued is calculated as the total number of age 1 equivalent fish lost to the commercial or recreational harvest divided by the total number of age 1 fish lost to I&E. Updated estimates of the percentage of unvalued fish in each region are provided in the EBA for the final Section 316(b) Phase II rule (DCN #6-0002).

Comment ID 316bEFR.321.007

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA's literature review of nonuse and use values references appears to consist primarily of surface water valuation studies rather than fish studies.

EPA Response

EPA agrees that the available primary studies included in the NODA do not (in general) value fish directly. The selected studies estimate willingness-to-pay for improvements to aquatic habitat that directly benefit fish populations. The policy context, however, calls for willingness-to-pay to prevent the loss of fish directly. The two are strongly correlated, but not identical. This divergence is imposed by the available meta-data. For EPA's response to comments on applicability of the surface water valuation studies to the analysis of non-use benefits of the 316(b) regulation, please see comment #316bEFR.338.046.

Comment ID 316bEFR.321.008

Author Name Robert H. Reider

Organization The Detroit Edison Company

Subject Matter Code 21.04

Determination of compliance

The “As Built” approach described on page 13581 may require two or more years of monitoring pre- and post-installation of technology to account for annual variability in abundance. The number of years required would depend on the documented efficacy of the technology. (If the efficacy is well established it should not be necessary to conduct any post-installation studies.)

EPA Response

Please see EPA’s response to comments 316bEFR.034.066 and 316bEFR.002.021 for a discussion of the timing associated with determining compliance.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mike Wilder or Nancy Gilbreath

On Behalf Of:

Georgia Power Company

Author ID Number:

316bEFR.322

Comment ID 316bEFR.322.001

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Net Installation Downtime for Compliance Technologies Other Than Recirculating Cooling Towers.

In the analysis supporting the proposed rule, EPA assumed that compliance technologies other than cooling towers would not require facility downtime for installation. 68 Fed. Reg. 13,525. In the NODA, EPA reversed this assumption. EPA now expects downtimes of between two and eight weeks for the installation of various non-recirculating cooling tower compliance technologies. While Georgia Power appreciates EPA's revision of this assumption and recognizes it to be a positive step, EPA must recognize that under certain circumstances, based on the characteristics of a particular facility, the downtime could exceed eight weeks.

EPA Response

The Agency has further revised the net downtime estimates for non-cooling tower technologies for the final rule. For a few situations, the Agency has estimated net downtimes approaching 11 weeks. As such, the general comment has been met, though based on much more specific and detailed research by the Agency. See the discussion of the specific technology cost modules in the Technical Development Document for the final rule.

Comment ID 316bEFR.322.002

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 9.07

Cost Modules

Technology Costs Modules.

EPA developed a new approach to determining compliance costs that include a broader range of compliance technologies than it used for calculating compliance costs for the proposed rule requirements. 68 Fed. Reg. 13, 526-27. At the time the rule was initially proposed, EPA based its cost analysis primarily on the addition of fine-mesh traveling screens with fish handling systems. EPA, through the NODA, has added explicit cost modules for a much broader array of compliance activities that EPA believes will ensure compliance with the proposed performance standards. The revised and new technology modules analyzed by EPA include the following: (1) addition of fish handling and return system to an existing traveling screen system; (2) addition of fine-mesh screens (both with and without fish handling and return system) to an existing traveling screen system; (3) addition of a new, larger intake in front of an existing intake screen system; (4) addition of passive fine-mesh screen system (cylindrical wedgewire) near shoreline; (5) addition of a fish net barrier system; (6) addition of an aquatic filter barrier system; (7) relocation of an existing intake to a submerged offshore location (with velocity cap inlet, passive fine-mesh screen inlet, or onshore traveling screens); (8) addition of a velocity cap inlet to an existing offshore intake; (9) addition of passive fine-mesh screen to an existing offshore intake; (10) addition or modification of a shoreline-based traveling screen for an offshore intake system; and (11) addition of dual-entry, single-exit traveling screens (with fine-mesh) to a shoreline intake system. Georgia Power supports the expanded list of compliance technologies. Georgia Power encourages EPA to add as many of these technologies as possible to the proposed streamlined technology option. Georgia Power is concerned, however, that the expanded list of compliance technologies may result in resistance to restoration options. EPA should make it clear that the availability of compliance technologies should not impact a permittee’s choice of proposing restoration measures.

EPA Response

EPA has added as many of the candidate best technologies available as possible to the streamlined technology option, as the commenter recommends. The Agency has also has clarified that restoration measures, though not preferable to technologies in the cases where technologies are feasible, may be used in addition to or in lieu of design and construction technologies and operation measures.

Comment ID 316bEFR.322.003

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 7.04

Streamlined Technology Option

Streamlined Technology Option for Certain Locations.

In response to comments that the proposed Comprehensive Demonstration Study requirements would impose too great a burden on permit applicants, EPA is considering two variations of a streamlined compliance option. 68 Fed. Reg. 13,539 - 41. Under the first variation, EPA would evaluate the effectiveness of specific technologies with respect to the performance standards. If EPA identifies technologies that are sufficiently protective under certain conditions, EPA would promulgate regulations that allow for their use as a means of compliance.

Under this streamlined option, the permittee would have to provide documentation that it meets the applicable conditions and that, once installed, the facility will properly operate and maintain the technology. Georgia Power supports this option; however, Georgia Power urges EPA to specify that the permittee need only "substantially meet" the applicable conditions. Because monitoring would be required, as necessary, to verify that the technology is in fact achieving an acceptable level of performance, Georgia Power does not believe it is critical that all conditions be specifically met. To the extent that monitoring reveals a deficiency, the permittee can then be required to make appropriate adjustments.

Under the second variation of the streamlined option, the Phase II regulations would establish the criteria and process for approving cooling water intake structure control technologies. Under this option, the rule would define the criteria that a control technology must meet to be approved, and the process for approval. Georgia Power also supports this option. Indeed, Georgia Power strongly encourages EPA to not only approve both streamlined options, but to also allow States to create other streamlined options consistent with their State programs.

EPA Response

EPA disagrees that the permittee should only be required to "substantially meet" the applicable conditions to qualify for the Approved Design and Construction Technology Option. It should be stated, however, that whether a facility does meet the applicable conditions will be determined by the various State permitting Directors. If a facility can prove that it meets the specifications for the option, it is likely that the Director will approve that method of compliance. With regard to allowing States to create additional streamlined options, EPA agrees. As stated in § 125.99(2)(b), "…any other interested person may submit a request to the Director that a technology be approved in accordance with the compliance alternative in § 125.94(a)(4)." This could apply to a permitting Director as well as to a facility operator, or other interested party. In addition, States have the option to demonstrate that their programs will achieve environmental results equivalent to those results that will be seen through the implementation of today's final rule. In both ways, EPA is demonstrating support for States that have made or desire to enhance efforts towards creating 316(b) programs.

Comment ID 316bEFR.322.004

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Definition of "Significantly Greater."

EPA seeks comments on whether it should adopt a quantitative definition of "significantly greater," and if so, what specific ratio would be appropriate. 68 Fed. Reg. 13541. For several reasons, we believe this term is better left defined by the States. First, because Section 316(b) has been applied and implemented in a variety of ways by the States over the last 30 years, the States are in a much better position to determine what amount over a 1:1 ratio is "significantly greater" to justify a site-specific standard. For instance, a particular State's historical approach to addressing 316(b) and the resources used in addressing the related issues may inform a State's thinking on how much additional resources are justifiable. In some cases, depending on the types of aquatic species that are at risk, a particular State may want added assurance that harm is minimized. Second, given the lack of economic justification for a "significantly greater" standard (we believe that any amount over the EPA estimates, for example, should qualify a permittee for a site-specific standard), it makes sense to allow the States to come up with their own rationale for justifying any amount over a 1:1 ratio. Third, EPA has revised the capital and operation and maintenance costs for several compliance technologies. Overall, for the preferred option, the cost updates reflect a 66% increase in the total capital costs and a 48% increase in the operation and maintenance costs. These increases reflect better information as a basis for EPA's estimates. In many cases, these increases will make it more difficult for industry to pursue, unjustifiably, a site-specific standard. However, and even more importantly, these updated and purportedly more accurate estimates will provide States with good baseline numbers to serve as guidance in evaluating how much more would constitute "significantly greater." To the extent that EPA has confidence in its estimates, EPA should trust the States to determine how much more it should cost a permittee before a site-specific standard is justified.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.322.005

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival.

Georgia Power urges EPA to allow use of entrainment survival data for purposes of establishing compliance with the entrainment performance standard. 68 Fed. Reg. 13541. There is simply no rational basis to reject the use of credible scientific evidence of entrainment survival, where available. Georgia Power believes that the details of establishing the extent of entrainment mortality at a particular facility should be worked out between the permit writer and the permittee.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards.

Comment ID 316bEFR.322.006

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Measuring the Success of Restoration.

Georgia Power commends EPA for proposing the use of restoration as a mechanism for achieving compliance with the performance standards. The restoration option provides an abundance of room for creativity and flexibility, especially with respect to focusing resources on a precise problem. Further, it enables State agencies to work closely with permittees in determining how best to effectively and efficiently address entrainment and/or impingement. It also provides new opportunities for communities to get involved in identifying projects that may provide significant benefits to communities as a whole. Georgia Power, therefore, urges EPA to not be too prescriptive in setting forth methods of determining the success of restoration projects. The appropriate metrics or methodologies for making this determination should be left up to the State agencies with the most knowledge of the affected waterbodies and the relevant aquatic communities.

EPA Response

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.322.007

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 21.04

Determination of compliance

Implementation and Other Regulatory Refinements.

Calculation Baseline. Under the proposed rule, EPA defined the "calculation baseline" as "an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls." Based on comments that the proposed definition is too vague, EPA is considering adding certain specifications to the definition and seeks comments on these refinements and other considerations. See 68 Fed. Reg. 13580. Georgia Power is very comfortable with EPA's proposed definition without additional specificity.

EPA Response

For a discussion of the definition of calculation baseline, see the preamble to the final rule.

Comment ID 316bEFR.322.008

Subject Matter Code 21.04

Determination of compliance

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Options for Evaluating Compliance with the Performance Standards.

EPA is evaluating two basic options for determining compliance with the proposed performance standards (i.e., the percent reduction): (Option 1) consideration of all fish and shellfish species that have the potential to be impinged or entrained; or, (Option 2) consideration of fish and shellfish from only a subset of species determined to be representative of all the species that have the potential to be impinged or entrained. 68 Fed. Reg. 13, 581 - 13,584. For either approach, species impinged or entrained may be measured by counting the total number of individual fish or shellfish, or by weighing the total wet or dry biomass of organisms. Georgia Power believes that the only practical way to implement Option 1, the all species approach, would be to use the total number or the total biomass of the species without regard to their taxonomic grouping. The total biomass approach would be more straightforward and workable. At the very least, EPA should preserve the options (both the all species and representative species approach) for the States to decide which methodology would be preferred based on the waterbody and other factors the States deem relevant.

With respect to the representative species approach, to the extent that EPA includes language requiring permittees to develop a list of “critical aquatic organisms” for agency review, Georgia Power urges EPA to provide a “consulting” role for the State agency rather than a “concurring” role. Also, EPA presents two options for making the compliance determination using “critical aquatic organisms.” Georgia Power urges EPA to focus on the first option which would be to determine compliance based on a “total enumeration of individuals from all of the listed critical aquatic organism species,” rather than a separate analysis for each species. See 68 Fed. Reg. 13,583 Col. 2.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.322.009

Subject Matter Code 21.04

Determination of compliance

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Averaging Period.

EPA is considering specifying an averaging period for determining compliance with the performance standards. We strongly encourage EPA to leave it up to the States to specify appropriate averaging periods. To the extent EPA feels it necessary to formalize an averaging period, we recommend that such period encompass at least one complete permit term.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.322.010

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Timeline and Schedules.

EPA requests comments on whether the final rule should allow facilities required to apply for a permit renewal shortly after promulgation of the Phase II rule additional time to complete the studies associated with submitting a permit application. 68 Fed. Reg. 13, 584 Col. 2 - 13,586 Col. 2. The bigger issue is EPA's overall approach to scheduling compliance with the final rule. EPA should make it clear that the actual performance standards themselves will not become effective when the rule is finalized. The performance standards themselves (or site-specific standard, to the extent one is sought) become effective in accordance with the appropriate NPDES permit conditions subsequent to submission of all necessary information and demonstration studies. Furthermore, Georgia Power anticipates that it will take approximately four years to complete a typical comprehensive demonstration study. This includes time to hire consultants, consult with State agencies, compile data, draft and finalize reports. Accordingly, Georgia Power respectfully requests that EPA grant all permittees whose permits will expire within the first four years after the rule is finalized a categorical four year extension to submit the initial 316(b) comprehensive demonstration study and associated information.

EPA Response

EPA agrees with this comment and has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.322.011

Author Name Mike Wilder or Nancy Gilbreath

Organization Georgia Power Company

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Georgia Power is concerned that the proposed rule could be interpreted to require both entrainment and impingement characterization even when the permittee would not be required to reduce entrainment (such as in a lake or reservoir). Georgia Power urges EPA to clarify that entrainment characterization studies are not required where the permittee is only required to reduce impingement.

EPA Response

In today's final rule, EPA has clarified which facilities will be subject to impingement mortality standards only, and which facilities will be subject to both impingement mortality and entrainment standards. Please refer to § 125.94(b)(1)-(3) (National Performance Standards) for explicit instruction on which performance standards are required for each facility type.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Richard I. McLean & J. James Dieter

On Behalf Of:

Maryland Department of Natural Resources and Maryland Department of the Environment

Author ID Number:

316bEFR.323

Comment ID 316bEFR.323.001

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 15.01

RFC: State or Tribal alts. achieve comparable perf.

We noted that the State of Maryland believes that our existing 316(b) CWIS regulations have been and continue to be protective of the environment and the State's natural resources. For this reason, we suggested that the Phase II rule include the option of a State's existing regulations being accepted as satisfying 316(b) requirements,

EPA Response

Today's final rule maintains the prerogative of a permitted State to demonstrate to the Administrator it has adopted alternative requirements that will result in reductions in impingement mortality and entrainment within a watershed comparable to those that would be achieved under § 125.94. This alternative recognizes the successful achievements of many states in regulating environmental impacts associated with cooling water intakes.

Comment ID 316bEFR.323.002

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

We strongly supported a site-specific approach for determining BTA to minimize Adverse Environmental Impacts (AEI). We also stated our belief that AEI should be considered at the species or ecosystem-effects levels and not simply on the basis of the numbers of organisms entrained and impinged.

EPA Response

Today's final rule allows for site-specific determinations of the best technology available for minimizing adverse environmental impact. It is unclear what the commenter means by species and ecosystem-effects levels. The requirements in today's rule are based on reducing the number of organisms impinged and entrained in order to protect species and eliminate ecosystem-wide effects. Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision to not define adverse environmental impact in today's final rule.

Comment ID 316bEFR.323.003

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Comprehensive Demonstration Study (VII.B: 13539)

In our August 5, 2002 letter, we commented that the plans for any comprehensive demonstration study (CDS) should be reviewed and approved by the Director prior to initiation because a State's site-specific knowledge is likely to be needed to ensure that the study will produce the information necessary for making a permitting decision. We agree that a CDS may require substantial effort on the part of a licensee and thus support the idea of providing a stream-lined alternative that applicants might follow, which would reduce the burden on both the permittee as well as the state regulatory agencies. With regard to the two stream-lining options described, they both appear to be reasonable, but we would favor the second, since it would give the State flexibility and discretion in making site-specific evaluations and decisions. It would, however, place a greater burden on the State than would the first alternative, where EPA would specify an acceptable technology and the State would merely have to confirm that the applicant was going to install that technology. Thus, from a nation-wide perspective, it may be best to include both of those streamlining options in the final rule.

We do have concerns about the ability to make precise technology efficacy determinations that would serve as a basis for establishing decision criteria that may be used by Directors. Our knowledge of the existing body of literature on technology effectiveness suggests that there is a high degree of variability in results of the many studies that have been performed, and there are no studies that have integrated all of these data and established quantitatively and conclusively all of the factors affecting performance and relative contribution of each of those factors to the variability observed. In the absence of such an assessment and with the likelihood that such an analysis may not be possible, any performance criteria that may be established would have to encompass the uncertainty documented in the literature. That is, a range of efficiency would have to be provided rather than a single value (e.g., 55% to 85% reduction in entrainment, rather than 70% reduction in entrainment). Because it will not be possible to precisely define technology efficiencies, the second streamlining option, in which Directors would have the flexibility to make reasoned decisions, may be the best streamlining option.

EPA Response

EPA agrees that it should include both of the approved design and construction ("streamlined") technology alternatives, and has done so in today's final rule at § 125.99. EPA also agrees that ranges of efficiency should be provided as opposed to a single value. In today's final rule, EPA has set ranges of performance standards for both impingement mortality and entrainment. Furthermore, EPA believes that any performance within specified ranges (80-95%; 60-90%) should count as compliance. EPA opted for performance ranges instead of specific compliance thresholds to allow both the permittee and the permitting authority a certain degree of flexibility in meeting the obligations under the final Phase II rule.

Comment ID 316bEFR.323.004

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Definition of "Significantly Greater" vs. "Wholly out of Proportion" (VII: 13541)

As we stated in our August 5, 2002 letter, Maryland concurs with EPA's decision to utilize a "significantly greater" cost test in this Phase II rule. We agree that, for existing facilities, cost of retrofit relative to the benefits gained should be a major factor to be considered in determining BTA. We also do not disagree that new facilities should be held to a cost higher standard ("wholly out of proportion") for the reasons presented in the NODA. Maryland has used a quantitative definition of "significantly greater" in its existing CWIS regulations. For mitigation of impingement losses, the additional costs to install and operate CWIS modifications over a 5-year period are not required to exceed 5 times the estimated value of impingement loss (COMAR 26.08.03.05D). Entrainment losses have no specific cost test in current regulations. However, mitigation of entrainment losses is required (by installing and operating functional modifications to the CWIS) if there is a statistically measurable effect beyond the legal mixing zone, on a spawning or nursery area of consequence for Representative Important Species (COMAR 26.08.03.05E).

Since EPA has proposed specific performance measures which do not include measurement of adverse environmental impact, it may be more difficult to craft a reasonable and precise definition of "significantly greater". We suggest that if EPA is to attempt such a definition, that considerable research may be necessary to adequately demonstrate that it is reasonable. This is not likely possible before the deadline for the new rule, and thus we believe that EPA should not provide any quantification of "significantly greater" and leave this determination to the discretion of the Director, who is likely to be most familiar with the circumstances at a specific facility within his jurisdiction.

EPA Response

Supports rule. No response necessary.

Comment ID 316bEFR.323.005

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Assumption of Entrainment Survival (IX.A: 13541)

EPA seeks comment on their assumption of 0% survival of entrained organisms and on whether entrainment mortality and survival should be accounted for in their benefits assessment. The agency also seeks input on the design and implementation of entrainment and mortality studies. Maryland has shared the concerns expressed by EPA concerning the wide range of entrainment mortality and survival values that have been documented in the literature and the uncertainty associated with such values. Because of these concerns, in our 316(b) evaluations of most power plants in Maryland in the late 1970s and early 1980s we also assumed 0% survival in assessing whether entrainment losses were having a significant effect on spawning and nursery areas of consequence. All these assessments were conducted nearly 20 years ago, such that we have not had cause to reassess our acceptance of that assumption. Given the difficulties in conducting studies that would precisely document the percentage of entrained organisms that would survive after their discharge into the receiving waters, we would be reluctant to depart from our assumption of 0% survival. However, we are aware of study technologies, such as the larval table, that have been developed to provide the most accurate assessment possible of entrainment survival and mortality. We are also aware of literature that suggests that the eggs and larvae of some species, such as striped bass, may be quite hardy and may exhibit significant survival after entrainment. For these reasons, we would suggest to EPA that the assumption of 0% survival be required, unless an applicant can provide results of very rigorous and scientifically valid studies that conclusively prove otherwise. Thus, we support EPA's suggestion of specifying data quality objectives with very high technical standards that would have to be met by any applicant who chooses to challenge the 0% survival standard. Given the site-specific nature of entrainment effects, we believe that it is appropriate to require that such an applicant conduct site-specific studies supported by literature findings.

EPA Response

EPA agrees with this commenter today's final rule requires the assumption of zero percent entrainment survival for determinations of compliance with the requirements of the rule. In the case of site-specific benefits analyses, entrainment studies may be incorporated; however, they must first be approved by the permitting authority. Please see the response to comment 316bEFR.305.001 for the discussion regarding the inclusion of entrainment survival estimates in site-specific benefit analyses. Please see the response to comment 316bEFR.305.001 regarding entrainment-based performance standards.

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Comment ID 316bEFR.323.006

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Uncertainty in Restoration Project Performance (IX.B.1-2: 13541-13542)

Maryland agrees that there can be great uncertainty in the benefits of restoration projects and that an adaptive management plan can be one way to ensure that ecosystem benefits anticipated from restoration projects implemented as mitigation are achieved and meet the objectives established for those projects. However, we are concerned that this approach can result in potentially opened-ended costs to a permittee which may be unreasonable, particularly if very comprehensive and precise restoration objectives are not established at the onset of the project. Should EPA choose to include adaptive management of restoration projects in the new rule, we suggest that the agency also include very specific guidance on how to establish quantitative, measurable restoration objectives, and include a cost factor or some sort of monetary cap on expenditures to limit exposure of a permittee to unlimited costs to comply.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of limits on the resources expended on restoration measures, see EPA's response to comment 316bEFR.312.006.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.323.007

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Peer Review of Restoration Projects (IX:B.3: 13542-13543)

Maryland believes a peer-review requirement potentially has merit. Although it may increase costs and delays in the permitting process, the benefit in a more cost-effective and efficient restoration project is likely to be outweighed by the initially higher cost and time to conduct the peer-review. However, we know from experience that a selection of peer reviewers with absolutely no biases or preferences is extremely difficult, and it is likely that an applicant as well as all stakeholders with interest in a facility would seek to have significant influence on the selection of the peer review panel. EPA should consider specifying in the rule some process for selection of unbiased reviewers, including, perhaps, the use of independent organizations such as the National Academy of Sciences to identify potential peer reviewers.

EPA Response

For a discussion of the use of peer review, see EPA's response to comment 316bEFR.312.006. As described in the final rule, peer reviewers are chosen through consultation between the permitting authority and permit applicant. Every effort should be made to select unbiased reviewers.

Comment ID 316bEFR.323.008

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

As a general matter, EPA's approach to analyzing cost impacts has emphasized conservatism, i.e., ensuring that cost impacts of compliance are not understated. ("EPA has approached the compliance costing effort with great conservatism.") (p. FR 13527). For example, the analysis selects best performing rather than the least cost measure that achieves compliance. The EPA's conservatism is appropriate and helps address concerns regarding uncertainty.

EPA Response

The Agency appreciates the commenter's understanding for the approach to conservative estimates of costs (i.e., that the costs help address concerns regarding uncertainty of technology performance, as EPA stated in 68 FR 13527).

Comment ID 316bEFR.323.009

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Installation downtime. EPA has revised its downtime assumptions for retrofit closed-cycle cooling systems to up to seven months for nuclear plants and four weeks for non-nuclear plants. (FR 13525) Such downtimes are likely to be coordinated with other scheduled outages, such as refueling outage for a nuclear plant. Hence, the analysis should ensure that only "incremental" downtime is included in the analysis.

EPA Response

The Agency points out that the downtime estimates analyzed for both the proposal, NODA, and final rule were “incremental” downtimes. The Agency referred to them as “net construction downtimes,” perhaps that is where the confusion lies with the comment. Therefore, the comment only reiterates the analysis conducted by the Agency and does not contradict its approach to downtimes.

Comment ID 316bEFR.323.010

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Installation downtime for IPM. Installation downtime could be an important cost for a nuclear plant if seven months (or at least several months) of replacement power is, in fact, required as suggested in the NODA. The problem is that it is unclear whether this is adequately captured in the IPM analysis. The IPM analysis shown in the NODA is for the year 2010, and is intended to be a representative post compliance year. The results for this year appear to exclude the downtime costs needed for installation of the compliance equipment since installation (and therefore downtime), assumed to occur prior to 2010. Thus, results for 2010 may not accurately represent all costs incurred. This is a limitation of the IPM modeling.

EPA Response

EPA agrees that the effect of downtimes is not captured in the results for 2010. However, for both the NODA and the final rule, EPA analyzed modeling results for 2008 to capture market-level impacts during the technology installation period. For the NODA, EPA analyzed the market-level impact at 2008 for two options: the NODA preferred option and the waterbody/capacity-based option. For the final rule, EPA also analyzed the market-level impact at 2008 of the final regulation. These analyses did not show significant impacts as a result of the Phase II rule during the installation period. See also DCNs 5-3002, 5-3121, and 6-0002.

Comment ID 316bEFR.323.011

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

IPM Net Income Analysis. The IPM model runs calculate the impact on (pre-tax) net income by NERC region. (For example, see Exhibits 1 and 2 of the NODA.) This presentation appears to overlook the fact that most NERC regions are dominated by generation-owning utilities subject to full cost of service regulation (the major exceptions being MAAC, ERCOT and NPCC). By definition, captive retail customers must pay the full cost of compliance, and therefore there can be no adverse pre-tax income effect for regulated plants. In fact, cost of service utilities will receive an increase in pre-tax income as customers provide utilities with a return on investment associated with the compliance retrofits. It should be noted that Exhibit 1 presents an estimate of change in wholesale price per mWh, but this may be meaningful (in terms of consumer impacts) only in "retail access" regions.

EPA Response

EPA agrees with this comment. EPA notes that for regulatory analyses conducted for the EPA, the IPM model generally uses assumptions that reflect wholesale competition occurring throughout the electric power industry.

Comment ID 316bEFR.323.012

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Capacity Utilization Measure. We agree with the suggestion in the NODA that capacity utilization (for purposes of the 15 percent threshold estimate) is better obtained from the IPM model (using only steam generation) rather than historical data. This is due in part to the substantial increase in new merchant plant capacity (mostly gas combined cycle) which tends to drive down capacity factors for existing (less efficient) gas and oil units.

EPA Response

EPA agrees with this comment.

Comment ID 316bEFR.323.013

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Non-IPM cost impacts - annualization. The NODA (FR 13534) identifies "annualized costs" of compliance of $265 million under the preferred compliance option and about $800 million for the alternative water body/capacity-based option. However, the annualization calculation method is not discussed in the NODA. The proper annualization calculation will depend on the assumed remaining life of the Phase II facility. Some of these facilities have operated for decades and in most cases do not have announced retirement dates. (nuclear plants, of course, have approved operating license dates.) Given the uncertainty over power plant remaining life, it may be appropriate for EPA to employ range of annualization factors to capture uncertainty over remaining life.

EPA Response

EPA notes that the methodology of annualization was described in Chapter B1 of the Economic and Benefits Analysis in support of the proposed rule (DCN 4-0002). Since the methodology did not change between the proposed rule and the NODA, this methodology was not re-published in the NODA.

Conceptually, EPA agrees with the statement that proper annualization will depend on the assumed remaining life of Phase II facilities. However, EPA notes that the concept of a fixed, limited remaining operating life is generally not applicable to non-nuclear facilities. Component replacement and repowering are common with the consequence of significant extension of the expected useful life of electric generating units. As a result, while individual parts of the generating system have a finite life, the overall facility and surrounding infrastructure need not be viewed in this way. While it is true that nuclear plants have approved operating license dates, this does not mean that they will cease operation at the end of their license term. In fact, given their low operating costs and efficiency, many nuclear plants are expected to renew their operating licenses beyond their current expiration date. Finally, EPA notes that for the final rule, all technology costs were annualized over a 10-year period, which is less likely to exceed the remaining life than the 30-year period for cooling towers. As a result, EPA believes that its annualization methodology used for the final rule is based on appropriate assumptions.

Comment ID 316bEFR.323.014

Subject Matter Code 9.0

Costs

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Exhibit 12 Clarification. As a matter of clarification, it appears that the word "Annual" should be inserted before "cost."

EPA Response

EPA notes that this is a point of clarification on a table title in the NODA that has no bearing on the final rule analyses.

Comment ID 316bEFR.323.015

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 9.02

Economic impacts on consumers/households

Cost of Compliance Per Household. The calculations of electric rate impacts appear reasonable subject to the simplifying assumption that all compliance costs incurred by generating facilities ultimately flow through to end use customers. This assumption probably is reasonable in most cases. However, in reporting the cost per household, it appears that the reported impact reflects only a household's utility bill. Households also will incur costs assigned to industrial and commercial electric customers who will flow such costs through to households in the prices of products they sell. That is, it is reasonable to assume that businesses will not absorb their now higher electric bills but will include those added costs in their product prices. Thus, the final per household impact shown on Exhibit 12 is probably substantially understated because the product price effects are omitted.

EPA Response

EPA performed a sensitivity analysis assuming that 100% of compliance costs are passed through to residential customers. This analysis provides a ceiling of the potential effects on residential customers. Please refer to response to comment 316bEFR.072.208 for a discussion of this analysis.

Comment ID 316bEFR.323.016

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Commercial. As discussed in the NOPR, the proper measure of commercial fisheries economic benefits from compliance is the sum of changes in producer and consumer surplus. The NODA also correctly states that consumer surplus does not change if compliance has no net impact on dockside fish prices. Presumably, the price change would occur only if compliance meaningfully affects overall market supply for a given fish species.

EPA appears to propose using a rule-of-thumb of 0 to 40 percent of the change in gross revenue to estimate producer plus consumer surplus. We understand that practical considerations may support this simplified approach, although the NODA does not make clear how the point value within this range will be selected. The NODA (FR 13548) also claims this to be conservative "because it does not account for shifts in marginal cost curves." We are puzzled by that assertion and believe that the percentage of gross revenue implicitly does, in fact, reflect improved fishing productivity (i.e., the same quantity with less effort or more quantity with the same effort), and therefore shifts in marginal cost curves.

Recreational. The NODA suggests that greater fish stocks due to compliance will improve the recreational fishing experience and therefore angler benefits, and that this qualitative improvement also may increase the number of person fishing days. While these concepts appear reasonable, we believe that their validity should be very rigorously documented in the docket, to show that this assumed behavior of recreational fishermen can be documented to occur nationwide for all fisheries. Past work by PPRP on recreational benefits has measured local or statewide economic activity benefits, e.g., local job creation and income gains from expanding the recreational fishing industry. While such employment gains may not be meaningful for a nationwide study, they can be important for localized studies.

EPA Response

For response to comments regarding commercial fishing benefits for final rule, see response to comment 316bEFR.005.029. For detail on EPA's approach to estimating recreational fishing benefits for the final 316(b) rule, see Chapters A11, Estimating Benefits with a Random Utility Model, and Chapter 4, RUM Analysis, in Parts B through H in the final Phase II Regional Studies Document (DCN #6-0003). EPA did not include a quantitative measure of secondary economic benefits (e.g., local job creation and income gains) from an increase in recreational fishing activities in the cost benefit analysis for the final Section 316(b) Phase II rule due to data limitations and because it is sometimes difficult to determine if these impacts are transfers. This omission is unlikely to have a significant effect on the final benefits estimates because the estimated percentage increase in the number of fishing days due reduced impingement and entrainment is small. The Agency, however, assessed this benefit category qualitatively. See Chapter A9, Economic Benefit Categories and Valuation Methods, in the final Phase II Regional Studies Document (DCN #6-0003).

Comment ID 316bEFR.323.017

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Discounting. We agree that discounting is appropriate if (and to the extent) there is a significant and identifiable lag between compliance and resultant increase in the fisheries stocks. The NODA does not fully explain the magnitude of this lag. The NODA asserts that "non use" benefits should not be subject to discounting but does not adequately defend that decision. EPA should further explain or document the reason for exempting non-use benefit estimates from
discounting.

EPA Response

Information on the methods EPA used to estimate the time lag between compliance and resultant increase in the fisheries stocks is provided in the Regional Study Document prepared for the analysis for the final Phase II rule. See Chapter A14 (DCN #6-0003). See also response to comment 316bEFR.005.029 for discussion about lags and discounting.

EPA does not estimate nonuse benefit in the analysis of the final rule. However, EPA has explored methods for valuing nonuse benefits and finds potential for significant nonuse benefits to exist. For a discussion of EPA's exploration of methodology for non-use benefits see Chapter A12 in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003).

Comment ID 316bEFR.323.018

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Non-Use Benefits. We also note that “non-use” benefits comprise a large proportion of the total benefits estimated by EPA. The valuation of “non-use” benefits remains a controversial topic with results that are often debatable. While we do not offer a technical assessment of the methods used by EPA to develop their “non-use” benefits, we hope that others commenting on the NODA will provide the level of detailed scrutiny that will ensure that those estimates are valid and based on widely accepted methods. It would also be valuable to have those estimates reflect the uncertainty often associated with estimates of “non-use” benefits.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.323.019

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 21.04

Determination of compliance

Definition and Methods Associated with Calculation Baseline (XI.A: 13580-13581)

Defining a calculation baseline as being the effects of a facility with a shoreline intake and no entrainment or impingement controls is problematic, since this suggests an open pipe with no screen at all, an unrealistic assumption. In such a situation, everything withdrawn from the source water body would be entrained and there would be no impingement (disregarding as a practical matter that a plant could not operate long in this mode due to intake clogging). This is why we suggested in our August 5, 2002 comments that EPA should consider specifying the mesh size that would represent the standard for distinguishing between entrainment and impingement. The third specification in the NODA on this point (traveling screens with 3/8 in. mesh) provides this definition.

However, the first two definitions of calculation baseline that EPA is considering would not apply to facilities with an intake canal. It is difficult to see how one could calculate what the hypothetical E&I impacts would be in these or other cases if they instead had a shoreline intake. Our Maryland experience has shown that intake canals and intake embayments are often attractive to fish and result in enhancement of impingement rates. We see no means of estimating what impingement would have been in the absence of such structures. It would be even more difficult to estimate these theoretical losses if the screen were angled with currents or near the water surface vs. deeper in the water column.

The fourth specification is still vague in that it is not clear if a standard traveling screen of 3/8 mesh would be considered baseline or not. Such a screen is primarily used to prevent debris from entering the intake system; it has the incidental effect of reducing entrainment but potentially increasing impingement (by definition, in the third suggested specification). Thus it is not clear how these issues would be resolved, if this suite of options were included in the design specifications in the new rule.

An "As Built" approach to estimate the calculation baseline may be appropriate, if this definition means that the facility would estimate E&I impacts based on its technology, practices and operating procedures that were employed for normal plant operation in the absence of any specific effort or requirement to reduce E&I impacts. This would avoid the difficulty of whether traveling screens reduce E&I impacts even though that was not their original purpose. However, in this instance, if the facility happens to have been constructed and operated such that the amount of impingement and/or entrainment was low at the initiation of its operation, a requirement that it be reduced by another large percentage would be very unreasonable. We also remain concerned that the compliance standard is specified without regard to the level of impact to the fish populations or community.

We don't feel it is appropriate in most cases to allow facilities to define the calculation baseline using data from other facilities, since that information is likely to be very site-specific. The only exception might be for facilities of similar design located within the same local water body and in fairly close proximity. For example, in Maryland, this exception might apply to Baltimore Harbor facilities with similar intake designs.

Clearly, it is easier to critique potential approaches to this issue that to provide concrete positive suggestions. We believe that if a baseline is to be included in the final rule, it would have to be based on a combination of all the possible approaches described, but ultimately have to be based on what has been observed at a facility over the time it has been operating, within the context of what has been observed at other similar facilities. For example, at Chalk Point, which has an intake canal, the installation of a double barrier net reduced impingement by about 90% from the level observed prior to installation of barrier nets. We believe that such a reduction would be sufficient to document that the existing CWIS at Chalk Point is in compliance with the new rule, regardless of the absolute magnitude (and composition) of the numbers of organisms currently impinged. Conversely, for a facility such as Dickerson station on the Potomac River, where impingement is extremely low, it would make no sense to require CWIS modifications to reduce already low impingement to even lower levels. These examples point out the difficulty in establishing a single baseline estimation approach, and suggest that allowing broad discretion to the Director in establishing baseline may be the most appropriate way to address this issue.

EPA Response

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013. EPA agrees that the "As-Built" approach is an acceptable method for establishing the calculation baseline. Therefore, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline (see EPA's definition of calculation baseline at § 125.93). With regard to using data from other facilities when determining the calculation baseline, please see EPA's response to comment 316bEFR.343.011.

Comment ID 316bEFR.323.020

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 21.04

Determination of compliance

Determination of Compliance with Performance Standards; Representative Species (XI.B: 13581 - 13583)

We believe it is appropriate to develop quantitative estimates of all organisms (excluding phytoplankton and zooplankton) entrained and impinged. This would be accomplished through a statistically rigorous study design sufficient to allow quantification of total impingement with good levels of precision (e.g., in circumstances where organisms have very "patchy" distributions and sample variability is high, more samples would be required than in situations where distributions are more uniform). Organisms should be identified to the lowest taxonomic level feasible, and quantitative estimates of annual entrainment and impingement estimated. For impinged fish and shellfish (e.g., crabs, shrimp), organisms should also be quantified in size classes. However, we see no particular value in documenting total biomass of entrained or impinged organisms. The species- and size-specific data is what is required to evaluate potential ecosystem effects, and biomass estimates can be derived from those data. For impingement, properly designed mortality/survival studies should be conducted, with the primary interest being the number of organisms killed by impingement, not the number impinged. Also, applicants should be allowed to exclude moribund individuals from their counts (although the numbers of moribound organisms should be reported), so long as there are very specific and definitive
criteria provided for establishing that organisms are moribund.

We don't believe that the use of Representative Important Species (RIS) is applicable for the new rule as has been proposed by EPA, since the rule assumes that the amount of organisms entrained and impinged is the impact of the CWIS. The RIS concept would only be applicable if the intent of the rule was to evaluate whether there were effects on ecosystems or communities. Because of the site-specific constraints on sampling methods, EPA should only offer guidance on sampling objectives, and not include detailed sampling requirements. For the same reasons, compliance should be measured on a facility-specific basis.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.323.021

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 21.09

Permit applications/implementation schedule

Timing of Phase II rule and NPDES permit renewals (XI.C: 13584-13585)

Maryland agrees that facilities with permits expiring soon after the effective date of the Phase II rule should be given more time to understand and implement the regulation, including the study requirements. Allowing a two-year extension from the date of the final rule for permits expiring within two years of the rule would be a reasonable approach. The regulation should also specifically allow the expiring permits to be reissued at expiration but with a reopener for permit modification for the Phase II rule deadlines.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. See also response to comment 316bEFR.320.038.

Comment ID 316bEFR.323.022

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Information to be Required at Subsequent Permit Renewals (XI.C: 13586)

In comments on proposal, Maryland stated that it may be reasonable to require a detailed 316(b) reassessment perhaps only every third permit renewal, unless there is reason to believe there is a substantial change in the affected ecosystem or that plant operations are likely to be causing some significant impact. EPA's suggested regulatory language in the NODA at 125.95(a) meets our suggestion in this regard, although we suggest further guidance on this issue perhaps in a later document.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.323.023

Author Name Richard I. McLean & J. James Dieter

Organization Maryland Department of Natural Resources and Maryland Department of the Environment

Subject Matter Code 21.09

Permit applications/implementation schedule

Information for Compliance with Phase II Rule (XI.C: 13586)

As we stated with regard to the Comprehensive Demonstration Study, it appears reasonable to establish specific time frames for demonstration of compliance, but, given the substantial uncertainties that surround environmental studies, it is also reasonable to provide substantial flexibility to Director in enforcing compliance with those time frames. EPA could provide specific guidance to the Directors so that a reasonable justification is provided for allowing varying timeframes for compliance depending on site-specific circumstances

EPA Response

See response to comment 316bEFR.025.019.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James R. Wright

On Behalf Of:

Tennesse Valley Authority

Author ID Number:

316bEFR.324

Comment ID 316bEFR.324.001

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name James R. Wright

Organization Tennesse Valley Authority

The Tennessee Valley Authority (TVA), a resource development agency and public (federal) power producer, is submitting the attached two reports into the record in support of EPA's proposal to maintain restoration as a regulatory option under rules pursuant to Section 316(b) of the Act. TVA takes pride in its multipurpose operation of the Tennessee River reservoir system and encompassing ecosystems, stewarding, them in a manner to protect or enhance water quality and aquatic life, recreation, and sustainable development, in addition to providing power production, navigation, and flood control.

The 2 reports are (1) John Sevier Aquatic Biological Program, Paddlefish Stocking and Assessment, Report for 1994; and (2) Aquatic Biological Program for John Sevier Fossil Plant, Walleye Stocking and Assessment Report, 1995. In 1995, TVA provided the Tennessee Wildlife Resources Agency (TWRA) with 5 new rearing ponds, to integrate into its fish propagation, stocking, and management programs, and in which to propagate appropriate fish species for introduction into the Cherokee Reservoir and the Holston River (on which the plant is located). TWRA has and will continue to manage the rearing facilities and stocking programs as it sees fit.

EPA Response

No response necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Kenneth S. Johnson

On Behalf Of:

Constellation Generation Group

Author ID Number:

316bEFR.325

Comment ID 316bEFR.325.001

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code SUP

General statement of support

The New Regulation Continues to Have Many Favorable Features

EPA is to be commended for the considerable effort that has been put toward this regulation. There are a number of positive elements in the rule that we endorse and hope will be part of the final requirements. Among the provisions that will improve the overall 316(b) processes are:

- Cost and benefit tests to determine technology suitability;

- The option to use voluntary environmental restoration and enhancement measures to satisfy compliance requirements;

- The use of a 'baseline' intake condition with no controls from which compliance is determined; and

- Allowances for plants with low utilization.

We appreciate that EPA has seriously considered the comments from the regulated community and recognized that the proposed rule needs further refinements. It is also good that the entire slate of issues in the proposed rule remains open for additional comments.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.325.002

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

However, despite the extensive work and many new considerations offered in the NODA, we continue to be frustrated by the vagueness and absence of clear guidance in this rulemaking. Too many important provisions are still subjective, open for interpretation or simply not addressed.

Science and the Basis for the New Regulation

The Regulation Needs a Definition of 'Adverse Environmental Impact' - It seems clear that the final rule will not attempt to define 'adverse environmental impact'. We continue to believe this is an unfortunate lapse of regulatory oversight. The statutory language is clear. To have a rule that is based on the concept, repeatedly references it, purports to reduce it yet refuses to define it will not serve the process well.

Rather than focus on reducing an absolute number of organisms, EPA should recognize the importance of population-level impacts and accept that, as a matter of basic biology, (sometimes large) losses occur naturally with little or no effect on the health of aquatic populations. In its comments on the proposed Phase II rule, UWAG recommended the following definition:

"Adverse environmental impact is a reduction in one or more representative indicator species that [1] creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial and recreational harvests, or to perform its normal ecological function and [2] is attributable to the operation of the cooling water intake structure."

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.325.003

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

The New Rule Should Encourage Site-Specific Regulation of Cooling Water Intake Systems – We strongly urge EPA to craft a rule that accepts the site-specific aspects of power plants, their cooling systems, the source water bodies, the surrounding environments and the affected populations of aquatic organisms. All of these factors intuitively argue for greater consideration of a site-specific application of this rule and less uniform, one-size-fits-all alternatives. The original 1977 guidance and regulations required site-specific considerations. There is no sound scientific or technical basis to change EPA's or Congress's 30-year record that promotes site-specific regulation of cooling water intake systems.

There are other reasons to support a site-specific approach to regulating cooling water intake structures:

Entrainment and impingement are largely determined by factors that vary from site to site. Just because the proposed rule distinguishes certain water body types, it does not mean that everything after that is the same and amenable to one type of solution. Power plants are still different, as are water bodies and their surrounding landscapes. In fact, one might suggest that no two plant sites are the same. Every locality has its distinctive environmental characteristics, independent of the facility. Aquatic populations vary and the technologies and control options that are feasible will not perform the same way in certain environments.

Prior (site-specific) determinations should be considered. Also, if there are data that already show there is so little entrainment or impingement that the community is not affected or the economic impact is exceeded by the cost of a comprehensive study, there should be no need for further evaluation.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

A goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.325.004

Subject Matter Code 7.02.03
Technology Efficacy Database

Author Name Kenneth S. Johnson
Organization Constellation Generation Group

In the NODA @ P. 13539, EPA requests comment on the documents in the “Technology Efficacy Database”, a collection of 148 references on the performance of the recommended intake control technologies. To quote from the FR notice,

“EPA requests comment on whether these data are of sufficient quantity and quality to support the determination that the proposed performance standards are best technology available and that the existing facilities can meet these standards by implementing design and construction technologies either singly or in conjunction with other design and construction technologies (including operational and restoration measures).”

At this time, we do not believe that enough of the proposed intake technologies have demonstrated experience at the operating plant level or under sufficiently representative hydrologic conditions. Until more experience is available to support BTA decisions, it may be premature to suggest that some technologies will meet the performance standards…especially if non-compliance is to be based on strict percent reduction requirements.

Also, while relevant historical and operations experience from other plants has value, we do not want to facilitate hasty decisions or encourage challenges based on a simplistic justification that would be as follows:

“This plant is on an estuary…it installed fine mesh screens and restored a wetland…you are on an estuary…you should do the same.”

Experiences elsewhere are worthwhile but technology determinations are another of the many factors that clearly argue for site-specific determinations.

EPA Response

Please see response to comment 316bEFR.074.005.

EPA notes that many of the studies reviewed during the development of this rule were not analyses of “out-of-the-box” technologies. That is, many of the installations of the various technologies were modified or adjusted to better suit the unique conditions, species, and configurations present at the facility. A key factor in the long-term success of a particular technology is the monitoring, maintenance and adjustments made during the course of its deployment.

Comment ID 316bEFR.325.005

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

EPA Should Make it Easier to Accept the Considerable Long-Term Data That Shows Many Plants Have Negligible Adverse Environmental Impact – Many states have already done extensive work to regulate the impact of cooling water intake systems. If some plants have not yet conducted studies and assessed the impact of their cooling water intake systems, EPA should not conclude this is a reason to make others revisit an issue that has been demonstrably resolved.

EPA Response

Please see EPA's response to comment 316bEFR.030.009.

Comment ID 316bEFR.325.006

Subject Matter Code 8.03

Proposed standards for Great Lakes

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

The Great Lakes and Estuaries Do Not Require More Regulation Based on Sensitivity to Cooling System Impacts – The Great Lakes are unique but that does not make them uniquely sensitive. Great Lakes fisheries are highly managed and consist largely of introduced and stocked species. The life history characteristics of the Great Lakes commercial and recreational fish of concern are not put at risk by power plant operations.

Similarly, burgeoning human development and the fishing pressures on the abundant populations of commercial and recreational species have impacted estuaries. That many estuaries continue to be productive in spite of over-fishing, pollution and habitat degradation suggests resilience more than sensitivity. It also suggests that, if the overall health or 'sensitivity' of certain, important waters are at issue, the EPA should place as much attention on more obvious threats to the sustainability of important species. Habitat losses, competition from introduced species, non-point source runoff and over-fishing all contribute [to a greater degree] to the loss of commercial and recreational species.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies and the presence of introduced and nuisance species.

EPA acknowledges that other factors such as overfishing or declining water quality may also affect fish populations. However, these factors do not diminish the increased potential for adverse environmental impact from cooling water intake structures in tidal rivers and estuaries.

Comment ID 316bEFR.325.007

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Implementation of the New Regulation

Allowing Restoration and Environmental Enhancements is Good Policy – Mitigation can be a cost-effective way to offset the impacts of cooling water intake systems and a most reasonable alternative to many technologies. Congress has consistently promoted creation and restoration of wetlands in a number of laws. EPA should not accept the Riverkeeper position that restoration measures are "wholly unrelated" to intake structure technologies and therefore cannot be BTA. The State of Maryland has included mitigation measures as part of 316(b) settlement decisions and we hope the new national guidance will continue to encourage that option. The voluntary option should remain in the final regulation.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize the adverse environmental impacts that derive from the impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.325.008

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

The NODA (@ p. 13542) requests comment on additional proposed requirements for the use of restoration measures.

- Documentation of sources and magnitude of uncertainty in expected restoration project performance;

- Creation and implementation of an adaptive management plan; and

- Use of an independent peer review to evaluate restoration proposals.

We agree with UWAG's recommendations on the requirements. All three can be useful to evaluate and endorse a proposed measure but the degree to which each requirement is applied should depend on the specific project. Based on the environment and experience, some activities certainly have less uncertainty and should need less scrutiny.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The practices mentioned by the commenter are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.325.009

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Utilities Need Clear Guidance Regarding the Effective Date and Implementation Requirements of the Rule – While we are certain this concern was a high priority comment in many of the responses to the proposed rule, the NODA seems to have done little to lessen the vagueness that detracts from the proposal in so many important places. This is a complex matter that requires the kind of guidance that EPA produced in 1977. We suggest that uniform approaches to this very site-specific activity are not possible without more comprehensive guidance.

CEG has a total of six facilities that would be regulated under this proposal. One nuclear facility has an NPDES permits that expires in December 2004. If the complete application package is due to the permitting agency 180 days before the permit expires (May, 2004), it is most unreasonable to expect to have all the elements of the Comprehensive Demonstration Study completed in time. We will have known the final regulatory requirements for only three months. EPA misses the point when they justify the 180-day requirement (68 FR 13584). This is not about the time that permit writers need to review such complex and extensive submittals. It is about the time the applicants need to prepare the package. In fact, the expanded submittal that permit renewals will become might argue for even more time to review the substantial additional material…after all, most states require the 180-day lead time already and have much less to address (by comparison).

Our concern is about the time we will need to develop the application package with all the elements that the Comprehensive Demonstration Study requires. Sufficient time must be allowed to bring together the necessary information. More important than that, the application must be prepared with the understanding that comes from the final rules. It is unreasonable and unfair to expect the commitment of resources that would be required to prepare the next round of Phase II permit renewal applications before we know what the final requirements will be. (See more under the 'Compliance' headings below)

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.325.010

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 21.04

Determination of compliance

The Rule Needs a Better Definition of 'Calculation Baseline' and Guidance on How it is Determined - We agree with UWAG's recommendations to factor full operation conditions into a fair baseline characterization. We particularly agree that the process should be consistent with the same, overly-conservative assumptions EPA uses to estimate CWIS impacts and benefits – all fish are alive and in good health when impinged and there is zero survival. To be consistent, the baseline assessment should apply the same assumptions.

We appreciate that there will be a hypothetical, rudimentary basis to which the proposed performance standards will be applied. However, there must be acknowledgement that many cooling water intake systems have always had features that are improvements on (or just different from) the 'baseline' condition. Apart from operational considerations, we still need guidance on how we are expected to factor biological phenomena and all the structural differences that most intakes have into an assessment of a condition that never existed before. EPA (and UWAG, for that matter) continues to address what the 'baseline' intake should look like and we suggest the greater uncertainty is how we determine the entrainment and impingement at such a facility.

EPA Response

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.325.011

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 21.04

Determination of compliance

Determining Compliance – CEG agrees with UWAG and strongly suggests that the final rule clearly indicates what constitutes compliance with the numerical performance standards. If we complete the demonstration study and install the technology specified in the NPDES permit, we should be considered in full 'compliance'. If monitoring shows that the measures have not actually achieved the required reductions in impingement and/or entrainment, the facility should not be in violation and be penalized. The facility should be expected to evaluate and commit to additional measures to meet the performance standards.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan. EPA disagrees that a facility that is out of compliance should not be subject to enforcement actions.

Comment ID 316bEFR.325.012

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

In the NODA @ p. 13585, there is some worrisome language that suggests perpetual reconsideration of 316(b) issues and compliance with every NPDES permit renewal. If a facility has installed and operates technologies that monitoring shows meet the new performance standards, the issue should be closed. The plant has met the BTA standard or its equivalent under the site-specific determinations. To recommend that each renewal application include information that demonstrates that conditions have not changed suggests that facilities may have to monitor constantly in order to have this information. This should not be necessary if the accepted technology has demonstrated that it meets the performance standard.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.325.013

Subject Matter Code 21.03
Monitoring requirements

Author Name Kenneth S. Johnson
Organization Constellation Generation Group

This same difficulty arises on p. 13586 with the issue of how much time a facility needs to come into compliance. If compliance is NOT just having BTA that is installed/operated/maintained but monitoring that demonstrates that it meets the percent reduction standards, we may have to monitor routinely…as we do for effluent limits. The Clean Water Act enforcement framework has fines for daily non-compliance. If we cannot show we are in compliance every day, how will we counter accusations that we are not? This is another reason why, once monitoring demonstrates that the performance standards are met, the issue should be closed.

EPA Response

Please see EPA's response to comment 316bEFR.021.007.

Comment ID 316bEFR.325.014

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Finally, EPA has some suggestions @ p. 13584 to address the considerable feedback it got regarding how applicants will be able to get the substantial permit application package together when it is due in 2004, shortly after the rule becomes final. We would agree to at least a one-year delay and two years if new biological studies would have to be conducted. We continue to believe that an easy way to cleanly resolve this question would be to make compliance start with a renewed permit that specifically requires all the elements of compliance in the new five-year term. Field studies, economic assessments, technology selection, approvals, installation and compliance monitoring can all be done with the applicants and permit writers having the advantage of knowing the final requirements [and having a guidance manual and training available].

One option we do not want is a 'Compliance Schedule' (p. 13584)…if that approach implies that the facility is not in compliance with the regulations. While EPA describes a process that is attractive and innocent enough, with the permit writer preparing a "reasonable" schedule that "will ensure the facility is brought expeditiously towards compliance", we do not want any presumption that our facilities are out of compliance now. With the understanding that considerable time will be needed to do all that is required, EPA should call the approach an "Implementation Schedule" and make it clear that the facility is not in a state of non-compliance during this intermediate stage.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.325.015

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 21.04

Determination of compliance

Impingement of Moribund Organisms Must be Factored Into the Impact Assessment – There is no doubt that certain environments can produce conditions that result in mass mortalities of aquatic organisms. Cold shocks in winter and the presence or sudden movement of low oxygen water in the summer have caused fish kills in the vicinity of the Calvert Cliffs Nuclear Power Plant on the Chesapeake Bay. Such conditions have killed or irreversibly weakened thousands of vulnerable fish, which are essentially collected by the plant's intake system. If this happens during impingement sampling, the numbers collected can be overwhelming. However, since impingement monitoring is a sub-sampling process and the numbers are extrapolated to the longer period of plant operation, these episodic events can yield huge estimates of impinged organisms. The final guidance for determining impingement impacts must factor in the obvious influence of episodic events where dead fish are drawn into the plant intakes. Guidance should allow for the development of scientific methods that document such episodes (and ultimately discount this site-specific phenomenon from the impact assessment).

EPA Response

For EPA's position on the factoring of naturally dead or moribund organisms, please see EPA's response to comment 316bEFR.306.116.

Comment ID 316bEFR.325.016

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

The Final Regulation Should Allow Entrainment Survival to Determine Compliance With the Performance Standard – As with impingement, the performance standard for entrainment should be mortality. Mortality is what constitutes the adverse impact…and it can be argued that planktonic organisms that are killed are not as lost to the food web they support, as other parts of the system would be. Also, it seems EPA is going to rather extreme lengths to criticize the body of work on entrainment survival. While many of the utility studies are dated and some methodologies may not be exquisite, one is still left to wonder why EPA does not apply the same level of scrutiny to the studies that support its initiatives.

The assumption of 100 percent mortality is too conservative and is inconsistent with the proposed impingement standard. Also, there are considerations that should be factored into any given facility's impact assessment. If we understand that entrainment mortality is a combination of three primary factors – exposure to heat, biocides and physical stresses, there are site-specific issues to consider. Biocide use is infrequent. Most entrained organisms are not exposed to the chemicals. Some plants have very efficient or substantial condensers and do not reject as much heat to the cooling water. The maximum temperature increase at the Calvert Cliffs Nuclear Power Plant is 12°F, not a significant thermal shock to many organisms. Finally, while certain groups of organisms may be vulnerable to the physical stresses of entrainment, others are not. The foregoing simply supports what many studies have demonstrated…sometimes, a significant number of entrained organisms survive. We need a regulatory framework that honestly assesses impacts and has a valid basis for evaluating the controls that may be required.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.325.017

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 7.04

Streamlined Technology Option

We Support the Streamlined Technology Option – At 68 FR 13,539, EPA suggests that the burdens of the Comprehensive Demonstration Study might be reduced if a facility in the appropriate water body agrees to install a control technology that has a confirmed history of meeting the proposed performance standards in that type of aquatic environment. Although the proposed example will not apply to any CEG facility, we support the Streamlined Technology Option and any other provisions that will (with sufficient scientific justification) lead to expeditious agreement on compliance without protracted monitoring and reporting.

EPA Response

EPA appreciates Constellation Generation Group's support of EPA's Approved Design and Construction Technology option.

Comment ID 316bEFR.325.018

Author Name Kenneth S. Johnson

Organization Constellation Generation Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

We Still Need a Better Definition of 'Significantly Greater' – The cost/benefit tests that make economic feasibility a part of BTA selection are one of the most important features of the proposed rule and CEG strongly supports their retention in the regulatory process. However, as we noted in our comments for the 2002 Phase II rule, such a subjective term is not the way to go. 'Significantly greater' is too vague, and clearly needs clarification…preferably as a measurable or quantifiable expression. Otherwise, we face different interpretations across the country and the potential for regulators to say, "the difference is not significant enough."

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Jay Hudson

On Behalf Of:

Santee Cooper (South Carolina Public Service Authority)

Author ID Number:

316bEFR.326

Comment ID 316bEFR.326.001

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

Subject Matter Code MISC

Miscellaneous comment

Santee Cooper understands the Utility Water Act Group (UWAG) is evaluating the economic aspects of intake structure technology and the database of documents on the efficiency of specific intake technologies as referenced in the NODA. As a member of the APPA, which is deferring to the UWAG to draft comments, Santee Cooper endorses and incorporates by reference the UWAG comments we understand they will be submitting to the EPA.

EPA Response

Please see EPA's responses to the Utility Water Act Group's comments. The comment database may be searched by author.

Comment ID 316bEFR.326.002

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

With a projected promulgation date of February 16, 2004, for the Phase II Existing Facilities 316(b) Rule, as EPA discusses in the Compliance Schedule section beginning at page 13525, Santee Cooper believes it would be virtually impossible for facilities to meet EPA's early compliance date indicated as 2005.

The NPDES permit renewal (or modification) application must be submitted at least 180 days before the permit expires. Since the Proposal For Information Collection requires the state Director's approval before the waterbody sampling can begin, we believe permittees will need to submit their proposal to the Director not later than one year before the permit expiration date.

Permittees seeking modifications or renewals will need to ensure enough lead time is scheduled to accomplish their sampling in time to prepare and submit the Comprehensive Demonstration Study, which must include their Impingement Mortality and Entrainment Characterization Study and the Design and Construction Technology Plan. Should the presence, absence, or abundance of representative indicator species be seasonally dependent, as EPA generally recognizes<FN 1> , the permittee's proposal may need to be sent in 15 to 18 months before the expiration date.

From a business perspective, it would not be prudent to initiate any of these activities until the final rule has been analyzed. Assuming up to 8 weeks may be required to analyze the final rule and prepare the Proposal For Information Collection, state Directors are not likely to receive a Proposal For Information Collection before April 2004. Assuming another 30 to 60 days are consumed before the Director's approval is returned, the permittee would not be able to start his impingement and entrainment characterization study earlier than May or June 2004. May or June may be too late in the year to collect data for significant migratory species, so the permittee would have to wait until the spring of 2005 to accomplish the sampling. In this case, permittees whose permits would be expiring or needing modification during 2004 or early 2005 certainly would not be able to comply.

Should some permittees receive the Director's approval in time to proceed and result in the NPDES permit being issued during 2005, additional time would be needed to implement and verify the project. Implementation would likely include obtaining state and federal construction in navigable waters permits, construction of the technology, and performance verification.

We believe a hypothetical date of February 16, 2005 (one year after the projected promulgation date for the final rule) is an optimistic date to assume an NPDES permit could be issued in the above scenario. However, using this date as the "issued date" would leave approximately 10 ½ months to obtain permits, construct, and verify the efficacy of the selected technology.

Santee Cooper estimates that it would take at least 4 to 6 months of this time to obtain the state and federal permits for construction in navigable waters and another 1 to 2 months for construction. Then, the permittee would have approximately 2 ½ to 5 months during the end of 2005 to verify the efficacy and prepare the verification study. This timeframe may not accommodate performing the study within the season for certain migratory species. Thus, we believe the EPA's projected early compliance date of 2005 is very optimistic and demonstrates the need for a compliance schedule.

Footnotes

1 At page 13582, the EPA states "An important consideration in evaluating entrainment is the element of time, i.e., the density of entrainable organisms will fluctuate"

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.326.003

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

At page 13585, the EPA requests comment whether the final rule should allow facilities required to apply for a permit renewal shortly after promulgation of the Phase II rule additional time to complete the studies associated with submitting a permit application. As Santee Cooper noted in comment number 2 above, we believe EPA should allow facilities submitting a permit application, whether for renewal or for modification, additional time to complete the studies. Thus, Santee Cooper believes any provisions that result in the final rule for facilities applying for permit renewals should also be applicable to any facility needing to apply for a permit modification.

Santee Cooper prefers the EPA's second option noted on page 13585 which allows a two-year extension in the deadline for submitting Phase II application materials. For the reasons cited in comment number 2 above, we do not believe one year of additional time, as the EPA's first option allows, is sufficient.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.326.004

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

At page 13585, the EPA is soliciting comments on the relaxation of application requirements in subsequent permit renewals for facilities that have previously implemented the Phase II regulations. In particular, the EPA notes "Determinations of unchanged conditions may rely upon demonstrations that there is no statistically significant changes in impingement and entrainment at the facility or in the densities of the organisms in the vicinity of the cooling water intake structures." EPA's proposed regulatory language, also at page 13585 and which states, "if conditions at your facility and in the waterbody remain unchanged since your previous application," incorporates this precept by providing that Directors may approve a permittees's request for reduced information to be submitted in their permit application.

Santee Cooper commends the EPA's approach to relax the subsequent permit application requirements which allows applicants to update only the key parts of the application that reflect changes. However, we believe this language could potentially create some "Catch 22" scenarios that would penalize permittees.

For example, it is Santee Cooper's view that the water quality of any waterbody is dynamic with respect to time and may be impacted by many factors<FN 2> , both natural and anthropogenic. Permittees should not be penalized for changed conditions in the waterbody except to the extent they caused the changed water quality conditions.

We also believe it is reasonable to assume that certain permanent <FN 3> facilities, which are properly operated and maintained throughout their life, are likely to continue to operate within or very near their design performance specifications. It is our opinion that impingement reductions of 80-95% and/or entrainment reductions of 60-90% which are verified during the initial compliance with the Phase II rule should result in a significant population improvement to the species within the waterbody over time.

Therefore, it is our view that requirements to perform additional studies to determine if population densities have increased, with an associated potential requirement to ratchet down the previously verified impingement and entrainment reductions, would be punitive. Such requirements would constitute penalizing the permittee for achieving a compounding of benefits that resulted due to the permittee's initial implementation of the Phase II rule.

Therefore, in fairness, Santee Cooper believes permittees that properly operate and maintain "permanent" intake structure facilities, such as those mentioned above, in accordance with the conditions that demonstrated compliance with the Phase II rule should also be deemed to meet the "determination of unchanged conditions" requirement that warrants the relaxed submittal requirements.

Santee Cooper suggests the following language at 125.94(a):

“Those applicants seeking permit renewals or modifications which have previously implemented the Phase II regulations by installing ‘permanent’ technology(ies) and which have also demonstrated compliance through verification monitoring and received the Director’s approval for BTA determination are deemed in compliance with the performance standards and need not resubmit any of the Comprehensive Demonstration Study data previously submitted. Instead, these applicants must submit a certification statement that the previously installed BTA facilities are being maintained and operated in accordance with the terms and conditions previously approved by the Director.”

We do not believe the EPA would not have to develop a list of approved “permanent” facilities, because state Directors would have knowledge of the installed technology and have sufficient data in each facility’s NPDES file to confirm the performance on that technology on a site specific basis.

Footnotes

2 Some factors that have the potential to impact the population density of organisms could include climactic factors, such as droughts, or other anthropogenic factors, such as, but not limited to, new water withdrawers, new wastewater dischargers, changed land uses adjacent to the waterbody, or environmental incidences, none of which may or may not be attributable to the permitted facility.

3 Some potential “permanent” facilities could include structural modifications such as new or modified intake screens, angled bars or louvers, or even new wirewound screens, etc. Gunderbooms or accoustic fish deterrent systems, for example, which may be subject to clogging or electronic failures, etc., probably should not be considered “permanent” facilities.

EPA Response

EPA appreciates Santee Cooper’s support of EPA’s efforts to minimize burden associated with the permit application process. EPA disagrees, however, that a facility should not have to take changes in their facility’s source waterbody into account when determining compliance, or that a facility should be allowed to maintain a technology regardless of the waterbody conditions. The facility should keep in mind, however, that “representative of current conditions” refers to conditions expected over the course of one year. Therefore, unusual peaks or declines in ambient fish densities would not be considered “representative.”

Comment ID 316bEFR.326.005

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

Subject Matter Code 21.09

Permit applications/implementation schedule

At page 15384, the EPA is soliciting comments on a compliance schedule that would allow a permittee some specific time to come into compliance with the rule. Santee Cooper recognizes the EPA's uncertainty on the appropriate averaging time for verification monitoring. The final decision on which averaging time is appropriate needs to be factored into the permittee's compliance schedule. Santee Cooper believes it would be appropriate to extend the compliance schedule commensurate with the extension in the averaging time for each year beyond one year.

Santee Cooper believes there are circumstances where it may be highly appropriate to extend the compliance schedule into the second round of permitting depending upon the compliance option proposed by the permittee. For example, if the permittee chooses a restoration option, then additional time may be required to measure the success of the restoration.

EPA Response

EPA has clarified timing requirements for the submittal of required studies. See response to comment 316bEFR.034.066 for a discussion. In today's final rule, EPA has left the determination of appropriate averaging time to the Director. The facility could outline an averaging time in its Proposal for Information Collection for review and approval by the Director. See also the preamble to the final rule for a discussion of issues relating to compliance.

Comment ID 316bEFR.326.006

Author Name Jay Hudson

Organization Santee Cooper (South Carolina Public Service Authority)

Subject Matter Code 21.02

Director's role in determining requirements

On page 15386, the EPA is soliciting comments on how Directors will determine if a facility is in compliance with the requirements of the proposed rule, as well as the time frames for permittees to come into compliance. Santee Cooper agrees with other commenters that existing facilities should not be subject to immediate enforcement actions in the first permit term for failing to meet the proposed performance ranges.

Therefore, we believe the EPA should not specify a definite compliance schedule that should be applied across the board on a national basis in the federal regulation. Santee Cooper believes the Directors should have the discretion to establish appropriate compliance schedules according each permittee's site-specific case. We believe the Director's would be more intimately familiar with the circumstances and potential site specific difficulties encountered by the permittee than EPA and would need the latitude to make such determinations.

EPA Response

For a discussion of timeframe for submitting information under this rule, please see § 125.95(a) and the accompanying preamble text. For a discussion of demonstrating compliance using a Technology Installation and Operation Plan, see § 125.94(d), § 125.95(b)(4) and accompanying preamble text.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Paul L. Zweiacker

On Behalf Of:

TXU Business Serves obo TXU Energy Company LLC

Author ID Number:

316bEFR.327

Comment ID 316bEFR.327.001

Subject Matter Code MISC
Miscellaneous comment

Author Name Paul L. Zweiacker
Organization TXU Business Serves obo TXU Energy Company LLC

TXU is an active member of the Utility Water Act Group (UWAG), the Edison Electric Institute (EEI), the Electric Power Research Institute (EPRI) and the Nuclear Energy Institute and hereby endorses the comments submitted by these groups under separate cover.

EPA Response

Please see EPA's responses to the comments from the Utility Water Act Group, Edison Electric Institute, the
Electric Power Research Institute and the Nuclear Energy Institute. The comment database may be searched by author.

Comment ID 316bEFR.327.002

Author Name Paul L. Zweiacker

Organization TXU Business Serves obo TXU Energy Company LLC

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

As fully described in the TXU comments submitted for the Phase II regulations, we believe that southern reservoirs, especially those in Texas, are much different from those chosen as examples in the proposed regulations. Probably the greatest concern for TXU is that none of the various cooling water intake structure technologies discussed or described by the agency have ever been applied successfully in typical Texas reservoirs. The Company is also of the opinion that, based on our intimate knowledge of Texas reservoirs, these same cooling water intake structure technologies are not appropriate and/or will not function effectively. The phrase “not function effectively” means that the technologies will either have a significantly negative impact on the operation of the facility or will not achieve the desired goals for impingement or other measurements.

EPA Response

Please refer to the response to comment 316bEFR.041.551 for a discussion of the biology of reservoirs.

EPA disagrees that all intake technologies are not appropriate or will not function effectively. EPA does agree that some technologies may not be effective at some facilities. However, the final rule does not specify any single technology, thereby providing each facility the flexibility to select the most effective technology for its intake structures. Please refer to section VII of the preamble for a discussion of the basis for the performance standards in the final rule.

Comment ID 316bEFR.327.003

Author Name Paul L. Zweiacker

Organization TXU Business Serves obo TXU Energy Company LLC

Subject Matter Code 21.07

Alternative site-specific requirements

If TXU is correct in its assessment of the technologies, implementation of the proposed regulation will be very difficult for both the agency and the affected sites. For that, and the other reasons discussed above, TXU believes that the greatest flexibility possible should be provided to both the agency and the permittee to adjust for the regional biological, hydrological, physical, and climatic differences. TXU endorses those concepts offered in the NODA that provide both the agency and the regulated community the ability to customize these regulations to each situation. This is especially true for those dealing with restoration, the "Calculated Baseline" (and the use of data from other facilities), the use of "Representative Species", removal of moribund organisms, and the use of compliance schedules.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

For information about the calculation baseline, please refer to § 125.93 and the preamble to the final rule.

For information about representative species, timeframes, and moribund organisms, please refer to section IX of the preamble to the final rule.

Comment ID 316bEFR.327.004

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

Author Name Paul L. Zweiacker

Organization TXU Business Serves obo TXU Energy Company LLC

TXU is also extremely concerned about the economics of these proposals. Although the NODA does correct some of the economic misconceptions found in the original proposal, the agency's improved methodologies still grossly underestimated the cost and significantly overestimated the benefits. The agency must take into consideration the tremendous cost and risk associated with the application of the cooling water intake structure technologies that are untested and unproven in different waterbodies and regions.

EPA Response

The Agency notes that the comment provides no specific examples nor any data to support the commenter's statement that the costs and benefits are overstated. Without further specific reference, the Agency cannot further act on the comment except to counter the assertion that "cost and risk associated with the application of the cooling water intake structure" have been incorporated. See the Technical Development document for the Agency's approach to cost analysis supporting the final rule. Additionally, see the efficacy discussion in the Technical Development Document for a discussion of the demonstrated cases of the cooling water intake structures in different waterbodies and regions.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Quinlan J. Shea

On Behalf Of:

Edison Electric Institute

Author ID Number:

316bEFR.328

Comment ID 316bEFR.328.001

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Quinlan J. Shea

Organization Edison Electric Institute

EEI Strongly Supports Inclusion of Site-Specific Elements in Any Final § 316(b) Rule

In our August 2, 2002 comments on EPA's April 2002 NOPR, both EEI and the Utility Water Act Group of which we are a member noted that implementation of § 316(b) of the Clean Water Act inherently involves some site-specific analysis. In determining whether an existing cooling water intake structure is having adverse environmental impact, and if so in identifying the best technology available for addressing that impact, State water quality agencies need to consider the nature of the water body, the cooling water intake structure, and the biota involved.

Therefore, we are pleased that EPA has tried to include some consideration of these types of factors in its proposed rule. We also are pleased that EPA has included provisions in the proposed rule allowing adjustments to be made in the measures required for a given facility if the costs of those measures exceed their benefits or the costs that EPA anticipated. EEI strongly encourages EPA to retain these and other site-specific elements in any final rule, and to ensure that the State agencies can implement the rule reasonably in light of the circumstances at each facility.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.328.002

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

EEI also encourages EPA to clarify that facilities whose cooling water intake structures have only minor impingement and entrainment effects do not need to undertake costly new studies or adopt costly new technology, operational, or other measures. For example, if prior or current studies of a particular intake structure show that the numbers of organisms entrained or impinged or the effects of the entrainment or impingement are small, EPA should have a de minimis exception to costly new measures that might otherwise be required.

EPA Response

Please see EPA's response to comment 316bEFR.041.007, for a discussion of what would be required of facilities that demonstrate impingement mortality and entrainment rates lower than the performance standards set by today's final rule.

Comment ID 316bEFR.328.003

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

First, based on EPA's revised cost estimates in the NODA, the cost of the water body/ capacity-based option has increased significantly, and that option would impose net social costs in excess of its benefits.

EPA Response

This comment supports EPA's decision not to promulgate a rule based on the waterbody/capacity-based option.

Comment ID 316bEFR.328.004

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Second, the approach EPA has proposed in the NOPR was a credible attempt to balance the need for administrative simplicity with the realization that site-specific factors can have a major impact on the reasonableness of the standards at any given facility. The consideration of site-specific factors is embodied in three provisions of the proposed rule.

- Performance-based standards allow facilities to choose the most cost-effective means of meeting the standards – provided there is more than one way of achieving the target reductions in impingement and entrainment.

- The "cost-cost" test allows facilities to meet less stringent performance requirements if the costs of meeting the performance standards at a particular facility are significantly greater than the costs envisioned by EPA in establishing the standards. This test recognizes that site-specific technical factors may make the installation of controls to meet the performance standards at a specific location sufficiently expensive that those controls no longer represent a reasonable regulatory approach.

- The benefit-cost test allows facility owners to meet alternative standards if the benefits of meeting the performance standards of the rule are significantly less than the costs of achieving those standards, or stated another way if the costs are significantly greater than the anticipated benefits. This test recognizes that site-specific biological factors may limit the value of potential improvements at a given site and allows a facility to take a more reasonable approach in such circumstances.

The provision of reasonable site-specific safety valves in the rule is a minimum requirement of any rule that the electric utility industry can find acceptable. Moreover, such safety valves avoid perverse regulatory outcomes and should be desired by the regulators and the public as well.

We are encouraged that EPA's proposed rule recognizes the site-specific nature of the cooling water intake structure issue, provides several compliance options based on benefit-cost analysis, and, most importantly, rejects any mandate for the retrofit of costly and potentially inefficient closed-cycle cooling towers that would affect 40 percent of the nation's total installed electric generating capacity.

Moreover, we agree with EPA that the Phase II rule should allow voluntary use of "restoration" measures as a voluntary option to technology and operational measures, so long as the restoration measures are reasonably related to the losses caused by intake structures. Voluntary restoration increases the flexibility of the rule and makes it possible to produce benefits that may last even beyond the life of the regulated facility.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.328.005

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

EPA Should Further Refine the Cost Tests

EPA should modify the "cost-cost" and "benefit-cost" tests so that any cost greater than the anticipated cost or benefits allows site-specific modifications. This would more fully maximize societal benefits and better reflect EPA's economic analyses, by not imposing greater costs than the costs EPA has considered in promulgating the proposed rule and by not imposing costs that exceed benefits

EPA Response

See the preamble for a discussion of the cost tests and site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.328.006

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 7.04
Streamlined Technology Option

EEI Supports Additional Streamlining Efforts

EEI appreciates EPA's movement toward identifying technologies that can be presumed to meet performance standards under specific sets of conditions. Specifically, EPA is proposing to allow use of wedge-wire screens as a pre-approved technology and to allow States or EPA to identify additional technology that could be used in specified circumstances. While the cost-cost and benefit-cost tests still are necessary to ensure that the costs of the proposed rule are kept within reasonable bounds, any identification of "pre-approved" technologies, if carefully done, can help reduce costs to permittees and permitting authorities alike.

In allowing use of pre-approved technology, EPA needs to take care to preserve the option for permit applicants to rely on existing technology, operational, and restoration measures, or to propose necessary additional such measures, without the pre-approved technology constraining those options. Further, EPA needs to avoid a "one size fits all" approach in allowing the use of pre-approved technology. As already stated, the 316(b) issue requires careful consideration of site-specific factors. Having an array of pre-approved options can help streamline the permitting process, but it should NOT compromise the ability of an applicant to explore alternatives that best suit its facility's circumstances.

EPA Response

EPA appreciates Edison Electric Institute's support of EPA's Approved Design and Construction Technology option. EPA agrees that existing technology, operational and restoration measures may be used by a facility to comply with today's final rule. In response to the comment that EPA needs to avoid a "one size fits all" approach in allowing the use of pre-approved technology, EPA believes that it has built tremendous flexibility into the Approved Design and Construction Technology Option, and expects that this will encourage and support innovation by industry and State Agencies (see § 125.99(2)(b)).

Comment ID 316bEFR.328.007

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 21.09

Permit applications/implementation schedule

EEI Also Supports Reasonable Transition and Compliance Provisions

EEI continues to support transition and compliance provisions for the Phase II rule's requirements. It will take time for facility owners to gather new information required by the rule, examine the options at their facilities for complying with the new rule, and implement any changes that may be necessary in technology, operations, or restoration programs already in place. Similarly, it will take time for State permit writers, in issuing National Pollutant Discharge Elimination System (NPDES) permits under § 402 of the Clean Water Act, to review permit applications submitted to comply with the new rule and to make informed decisions about the appropriate course of action. EPA needs to reflect and allow for this in any final rule.

In addition, the effectiveness of the technology, operational, and restoration measures that EPA has evaluated and States and facility owners will use to reduce impingement and entrainment mortality at cooling water intake structures is likely to vary depending on the circumstances at each facility and each site. Therefore, EPA needs to allow facilities and permit writers to make best informed judgments in issuing permits, recognizing that some permit requirements may need to be adjusted when permits come up for renewal to achieve the desired reductions in mortality. The implementation of new measures in conformance with general time frames specified in a permit should constitute compliance, even if it turns out that additional measures may be needed ultimately to achieve mortality reduction goals or other numeric standards.

EPA seems to recognize some of our concerns in this area, by proposing use of "compliance schedules" that would allow new technology, operating, and restoration measures to be implemented over some period of time. However, we are concerned that EPA has not provided enough flexibility for permit writers to provide sufficient time for the new measures to be implemented, much less for the information gathering and analysis that will precede issuance of permits. EPA needs explicitly to allow permit writers to establish reasonable time lines and milestones in NPDES permits, even spanning multiple permit time periods if necessary to allow adequate time to gather and evaluate the necessary information and to implement any new measures that may be necessary and appropriate.

In addition, we are concerned that failure to achieve the rule's performance standards will be treated as non-compliance despite the best efforts of facility owners and permit writers to achieve those standards. Provided that a facility owner and permit writer have examined whether additional measures are needed at a particular cooling water intake structure in accordance with the rule's framework, if technology, operating, or other measures required by the permit are installed and operated consistent with the permit, failure to meet the proposed rule's numerical impingement and entrainment reduction standards should not constitute a violation of the rule. Instead the permit should be reviewed at renewal to require any additional measures necessary to meet the numerical requirements – based on the full array of technology, operational, and restoration options available to any other facility and consistent with the site-specific principles of the proposed rule, including the cost-cost and benefit-cost tests.

EPA Response

See response to comment 316bEFR.025.019.

EPA has also added many efficiencies to today's final rule since the proposal and NODA to provide options for streamlining application requirements and speeding permitting. See response to comment 316bEFR.034.005 for details.

Comment ID 316bEFR.328.008

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

EEI is Still Concerned About EPA's Cost Estimates and Market Impact Analysis

The attached document "Analysis of Economic and Market Impacts of the Proposed Phase II 316(b) Regulations" looks at EPA's revised cost estimates and analysis in greater detail. EEI's reactions to the revised analysis are mixed. On the one hand, the engineering costs and national costs are more reasonably estimated. On the other hand, economic and market impact analyses remain fundamentally flawed.

EPA has made an attempt in the new analysis to address some of the issues we raised in our comments on the proposed rule. However, significant methodological issues remain that appear to skew the results of the analysis in a way that could misrepresent the actual impacts of the rule on the utility industry.

EPA's reevaluation of the costs of its proposed alternative and the water body/ capacity-based alternative has resulted in significant increases in the estimates of the cost of the proposed rule. The capital cost estimate for the proposed alternative increased by 66 percent, and the estimate of operations and maintenance costs increased by 48 percent. For the water body/ capacity-based alternative, the capital and operation and maintenance cost estimates increased by 40 percent and decreased by 13 percent respectively.

Some of these increases reflect new information collected by the agency with respect to technology cost as well as a response to other changes such as increased installation downtimes that were consistent with the comments filed by EEI and others in response to the NOPR. However, some of these cost increases reflect a change in the methodology EPA used to select applicable technologies for each facility. EPA intentionally uses a conservative methodology – estimating the costs of over compliance by selecting the most effective technology at each facility – to estimate the costs of the rule.

While EPA has not redone its nationwide benefit-cost analysis of the proposed rule in light of the new cost information, EPA has conducted two regional case studies using the new information. Those studies suggest that the cost of the proposed rule could significantly exceed its benefits. Furthermore, there are substantial questions about EPA's benefit estimates, including non-use benefits that we believe EPA has grossly and inappropriately estimated, as we will discuss in the next section of these comments.

Therefore, EPA needs to avoid adding any new requirements to the proposed rule that would increase the cost of the rule, for example by requiring greater use of cooling towers, or by forcing use of measures whose costs would exceed anticipated benefits or costs at particular facilities (i.e. by removing the site-specific benefit-cost and cost-cost tests). Furthermore, the increase in the cost estimates means that the costs of the water body/ capacity-based option even more greatly exceed its anticipated benefits than EPA estimated in the NOPR. So that option would be even less justified under the new cost estimates.

While EPA's new costing methodology may provide a general idea of national costs, we were not able to obtain the facility-specific assumptions used to generate this estimate. Therefore, we cannot comment fully on whether technology-selection assumptions are reasonable. Moreover, it would be inappropriate for EPA to share this cost information with other regulators for any purpose, in particular for use as the starting point in developing permit requirements.

In addition, the economic and market impact conclusions drawn from this national cost estimate remain fundamentally flawed. EPA continues to use the cost-to-revenue test, the average cost per household, the average electricity price impacts, and the IPM model to evaluate market impacts. EEI raised serious concerns about these methods in response to the NOPR, and EPA has done nothing to address these concerns.

Upon closer review of the IPM model, it is clear that the structure of the model is simply not conducive to evaluating the impacts of the Phase II requirements. The IPM methodology and choice of assumptions minimize the impact of § 316(b) compliance costs.

- The IPM model's estimates of market-clearing prices are based on variable costs, of which 85 percent are fuel costs that do not change under the preferred option.

- EPA's engineering cost estimates for § 316(b) compliance allocate operational and maintenance (O&M) costs as fixed rather than variable costs. But in the IPM model, changes in fixed costs do not drive changes in market-clearing prices.

- The model assumes 100 percent market competition. Yet a large number of States continue to regulate electricity prices on a cost-of-service basis, which would allow the fully amortized cost of § 316(b) to be reflected in prices.

- The model underestimates the potential for plant closures because it does not consider the recovery of embedded capital costs.

Thus, while the IPM model may have value in analyzing alternative air emission scenarios, it is ill suited to evaluating the impacts of this regulation.

In addition, before any conclusion can be made on whether or not the requirements of the rule are justified, EPA must still address one key issue regarding the impacts of the rule on the electric utility industry. EPA needs to address the cumulative impact of air and water requirements on the electric utility generating sector.

EPA's IPM analysis looks at the requirements of this rule in isolation, not accounting for the requirements of the President's Clear Skies Initiative. However, since Clear Skies is Administration policy, it should be in the baseline of any analysis run to evaluate the post-regulatory health of the industry. Failure to include the costs associated with the Clear Skies requirements gives an incomplete and potentially misleading picture of the post-regulatory world. EPA should provide this additional analysis for review prior to promulgation of a final rule.

EPA Response

The commenter makes several points:

(1) The commenter claims that EPA has grossly and inappropriately estimated non-use benefits. EPA RESPONSE: Please refer to the response to comment 316bEFR.328.010 in subject matter code 10.02.04.

(2) The commenter states that "EPA needs to avoid adding any new requirements to the proposed rule that would increase the cost of the rule, for example by requiring greater use of cooling towers, or by forcing use of measures whose costs would exceed anticipated benefits or costs at particular facilities (i.e. by removing the site-specific benefit-cost and cost-cost tests). EPA RESPONSE: EPA notes that the final rule does not require the installation of cooling towers. In addition, the final rule still contains the benefit-cost and cost-cost tests.

(3) The commenter states that "it would be inappropriate for EPA to share this cost information with other regulators for any purpose, in particular for use as the starting point in developing permit requirements. EPA RESPONSE: EPA will not share confidential business information with anybody not authorized to view such information.

(4) The commenter reiterates concerns voiced in comments on the proposed rule about EPA's economic impact methods. EPA RESPONSE: Please refer to the following comment responses:
The Cost-To-Revenue Test (CRT): 316bEFR.072.206 (subject matter code 9.01)
Average Household Impact: 316bEFR.072.207 (subject matter code 9.02)
The IPM: 316bEFR.072.209 (subject matter code 9.03)

In addition, the commenter makes several points about EPA's IPM analysis. For a response to these comments, please refer to comments 316bEFR.328.024 and 316bEFR.328.025 (subject matter code 9.03).

Finally, the commenter argues that EPA needs to address the cumulative impact of air and water requirements on the electric utility generating sector, in particular the President's Clear Skies Initiative. For a response to this comment, please refer to comment 316bEFR.316.009 in subject matter code 9.03.

Comment ID 316bEFR.328.009

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 10.01.02.04
Assumptions about I&E survival

EPA overstates the impacts of cooling water intake structures

Of greater concern are the methodologies that EPA uses to value the benefits of the rule. There are a number of technical concerns and internal inconsistencies in how EPA estimated recreational benefits in different regions of the country. We also direct you to the work submitted in conjunction with the comments filed by the Utility Water Act Group (UWAG) that raises serious concerns with the estimation of the projected losses due to entrainment and impingement. This work suggests that EPA has grossly overstated the environmental impacts of impingement and entrainment at Phase II facilities.

In addition, EPA's analysis continues to ignore the basic question of whether impingement and entrainment in cooling water intake structures, in fact, causes an "adverse environmental impact." The analysis ignores three important factors in computing the potential impact of impingement and entrainment.

- The analysis continues to assume that entrainment survival is zero. While there is no single number that can be supported to replace this assumption in all cases, the evidence shows that the assumption of zero survival is definitely false. Therefore, estimates of entrainment mortality will be overstated.

- The analysis does not place impingement and entrainment losses in their larger biological context. Experience with cooling water intake structures over the past several decades has shown that impingement and entrainment losses attributable to these structures often are relatively minor when compared with natural losses, and that fisheries typically thrive despite relatively high natural losses in all life stages. Thus, the impact of impingement and entrainment losses on the overall fishery may be relatively minor, if any.

- The analysis also ignores important compensation responses in natural systems. Many of the species entrained or impinged in cooling water intake structures have very high juvenile mortality rates and have reproduction rates that take this into account. It is not clear that the relatively low levels of additional mortality have any impact on the development or abundance of these organisms at all.

However, all of these significant concerns pale in comparison with the implications of EPA's fundamentally flawed attempt to calculate non-use values.

EPA Response

Please see the response to comment 316bEFR.306.506 for the discussion regarding EPA's assumption of 100 percent entrainment mortality in the benefits analysis for this rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule.

Please see the response to comment 316bEFR.025.015 for the discussion regarding density dependent compensation.

EPA did not use calculations of non-use value in today's final rule.

Comment ID 316bEFR.328.010

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 10.02.04
Valuing Forage Species (incl non-use and non-landed)

EPA's methodology for estimating non-use values is fundamentally flawed

While the existence of non-use values may be theoretically sound, the accurate quantification of such values is fraught with difficulty. Non-use values are the values that persons place on a particular good even if they have not used the good and do not ever intend to use the good.

The clearest examples of non-use values are those dealing with the existence value of unique or spectacular resources. For example, one may place a value on preserving the grandeur of the Grand Canyon even if one never expects to go there. Likewise, one may place a value on the preservation of an endangered species even if that species is of no benefit to that person in any other way. Such values can be real and significant – especially if large proportions of the population share the values.

However, the likelihood that non-use values are significant diminishes greatly when we begin to discuss the value of easily replaceable and non-unique resources. While a person may be willing to pay five dollars for a cup of designer coffee across the street from their office, the value they place on knowing that a virtually identical cup is available at that same moment on the West Coast is likely to be at or near zero.

Unfortunately, EPA's preamble indicates that it does not understand the nature of non-use values. EPA cites as the primary non-use values the uncalculated value of unharvested commercial and recreational fish and losses of forage fish. But in fact, these resources are use values that EPA has already considered as part of its benefit calculations:

- Trophic transfer of forage to harvested species is a key input into EPA's model of commercial and recreational losses.

- Commercial and recreational landings are a function of the total population – including non-landed fish – therefore, EPA's estimate already places a value on these non-landed fish.

In addition, things that affect current or future use, such as one's potential desire to go fishing next year, are not non-use values and have likely been accounted for in the analysis already used to estimate use value. Moreover, while non-use values can vary to some extent based on proximity, the degree of locational variation that EPA has observed suggests that the values on which EPA is relying have a significant use component.

Despite not properly defining what it is trying to measure and ensuring that it is measuring non-use benefits rather than duplicating use benefits already estimated, EPA attempts to use a stated-preference or contingent-valuation study to generate an estimate of non-use benefits. Contingent-valuation studies are done by creating surveys that ask people what they would be willing to pay for some hard-to-value good. This generates a willingness-to-pretend-to-pay estimate that is only as good as the survey used to generate it and that generally measures both use and non-use benefits without distinguishing them.

The use of stated preference methods to estimate values is controversial. Even proponents of this methodology caution that studies need to be done with great care to avoid the common biases that result from this methodology. Stated preference studies are often difficult to administer correctly and are seldom done well enough to provide a reliable answer to the actual question that is being asked in a particular study. Moreover, EPA's attempts in the context of the proposed rule to transfer values from one stated-preference study (loss of habitat) to infer values of a resource that was not specifically addressed in the original survey (loss of fish due to impingement mortality or entrainment) is highly inappropriate and stretches the credibility of the estimates beyond reasonable bounds.

A full discussion of the methodological shortcomings of EPA's benefits estimation approach is contained in comments filed by UWAG and others. These EEI comments merely draw your attention to the fact that the EPA's conclusions about the non-use benefits of fish, shellfish, and for that matter, wetlands, are grossly inconsistent with both observed behavior and reasonable economic analysis.

EPA Response

The first point made by the comment is that accurate quantification of non-use values is difficult. For this reason, for the final 316b rule analysis, EPA has not included quantitative measures of nonuse values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.328.011

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA's conclusions with respect to non-use value are inconsistent with observed behavior

EPA estimates the annual non-use values of baseline losses in the North Atlantic Region at between $76 and $482 million for a loss of 284 million pounds of biological production. This translates to a non-use value of between $0.27 and $1.70 per pound of lost fish. While these numbers may not seem high, one needs to put this in the context of the fact that the average gross value per pound of fish landed (commercially) is $0.33 per pound. This puts the non-use value significantly above the use value of the resource in all but EPA's lowest bound case – an outcome inconsistent with sound economic theory.

Likewise, wetlands restoration is valued between $6,000 and $20,000 per acre per year, to say nothing of the $46,000 per acre per year value placed on planting submerged vegetation. This is well above any reasonable cost estimate for wetlands restoration activities. Since there are no market barriers preventing individuals from pooling their resources to undertake such projects, the fact that widespread voluntary restoration is not taking place is a clear indication that EPA's estimate is not consistent with observed behavior and, therefore, is invalid.

Moreover, EPA's methodology makes no distinction between fish taken by cooling water intake structures and those lost in any other way. If the values implied by EPA's methodology apply uniformly across the country, the social loss associated with our $3 billion dollar fishing industry is between $2.5 and $16 billion. This conclusion is not credible.

EPA's conclusions do a great disservice to the public and make the benefit-cost test overly complicated to implement at best and meaningless at worst. Intuition suggests that the real non-use values for any entrainment and impingement losses are likely to be small to negligible. Little would be lost by ignoring them entirely in both the analysis supporting the rule and in any demonstration required under a benefit-cost test.

At the very least, EPA's methodology needs to undergo serious peer review to help correct the misapplication of stated preference methodologies.

EPA Response

The comment compares non-use values to commercial values for fish and states that the results are inconsistent with economic theory. EPA disagrees. There is no clear theoretical connection between commercial use values and non-use values. For EPA's detailed response to this point, please see the response to comment #316bEFR.319.004.

The comment's second point is that benefits of wetlands and eelgrass restoration are well above costs, and that "the fact that widespread voluntary restoration is not taking place" indicates that EPA's estimate is not consistent with observed behavior. In fact, voluntary restoration is common. In Rhode

Island alone, Save the Bay, a single organization, transplanted over 21,000 eelgrass plants in Narragansett Bay in 2002, using 212 volunteers. Save the Bay's spokesperson announced "… we were able to transplant sixty percent of an acre of Bay bottom with eelgrass, which was an amazing amount of work." Thus, 212 volunteers assisted in attempting to restore less than one acre of eelgrass (www.savebay.org/aboutus/2002/6_14_02.htm) (DCN #6-3259). Nationally, a group called Restore America's Estuaries, founded in 1995, is "an alliance of eleven regional, nonprofit, non-governmental organizations all working towards restoring estuarine habitats. … Collectively, the RAE organizations, working in partnership with others, have restored over 25,000 acres of estuary habitat. They are dedicated to reclaiming one million acres by the year 2010. (www.savebay.org/bayissues/rae.htm)" (DCN #6-3260).

Furthermore, as reported in the National Estuary Program Newsletter, Coastlines: "Mark Fonseca of the NOAA National Ocean Service Laboratory notes that, based on successful Federal Court cases in which he has been involved, adult-shoot planting efforts [for eelgrass] can cost $41,836 per acre (in 1996 dollars)." (http://www.epa.gov/nep/coastlines/feb01/sowingseeds.html) (DCN #6-3261).

The next comment, that "intuition suggests" negligible non-use values, is an opinion that is not backed up with empirical evidence. EPA has provided empirical evidence that non-use values for the resources of estuaries are in fact significant. For EPA's response to comments regarding evidence for non-use values for temporary losses to common species, please see the response to comment #316bEFR.306.302.

Comment ID 316bEFR.328.012

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EEI continues to support site-specific measures for implementing § 316(b) of the Clean Water Act. To the extent it includes such measures, we guardedly support EPA's proposed alternative as a means of providing a simple to administer – yet flexible when necessary – means of implementing the requirements of § 316(b). However, the key to our support remains the availability of reasonable economic and energy impact analyses, and realistic safety valves to avoid blind implementation of technological solutions that do not result in net improvements to society.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.328.013

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 7.02

Performance standards

We clearly oppose EPA mandating uniform use of cooling towers or any other particular technology, operating measures, or other measures. We also strongly prefer EPA's proposed rule over the water body/ capacity-based option discussed in the NODA. EPA's NODA resolves some of our issues with the proposed rule and its analysis, but the NODA raises a new set of issues that must be addressed.

EPA Response

Today's rule does not require any facility to retrofit its cooling system to include closed-cycle cooling (cooling towers), although EPA notes that this option remains available to any Phase II facility in order to satisfy the requirements of the regulation. If a facility were to adopt closed-cycle cooling (compliance alternative 1), they would be exempt from many of the additional elements required of facilities opting for one of the other compliance alternatives. EPA also notes, however, that today's rule preserves each State's right to adopt or enforce more stringent requirements.

Comment ID 316bEFR.328.014

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 7.02

Performance standards

EEI supports retention of flexibility in the final rule, including a performance-based standard, a reasonable phase-in, the use of voluntary restoration measures, and reasonable cost-based safety valves.

EPA Response

EPA appreciates the comment and believes today's rule sufficiently addresses the concerns of the commenter.

Comment ID 316bEFR.328.015

Subject Matter Code 23.01

EBA related comments

Author Name Quinlan J. Shea

Organization Edison Electric Institute

EPA needs to provide a realistic post-regulatory picture of the health of the electricity generating sector. This must include a combined analysis of the impacts of water and air requirements.

EPA Response

EPA notes that its IPM market modeling analyses did provide a realistic post-regulatory picture of the health of the electricity generating sector. The IPM base case includes current federal and state air quality requirements, including future implementation of SO2 and NOx requirements of Title IV of the CAA and the NOx SIP call as implemented through a cap and trade program. It does not include programs that are still under consideration. EPA does not know – and cannot reasonably predict – the outcome of initiatives still under consideration; therefore, any cost estimates EPA might try to develop would be highly speculative and unhelpful. This practice of only including promulgated regulations is typical for energy market models and the Agency's analyses of Clean Water Act rules.

Comment ID 316bEFR.328.016

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA must also discard the results of its incredible analysis of non-use benefits. We recommend that EPA not waste further effort trying to estimate the non-use benefits because they are likely to be quite small and so would not materially change the relative attractiveness of the regulatory options EPA has evaluated. If however, the agency wishes to continue to pursue quantification of these benefits, EPA must seek external peer review on any future attempts to use this type of analysis. EEI is prepared to help EPA in this effort.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values at the national level. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including peer-reviewed meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services.

For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis.

For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.328.017

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

EPA must ensure that the site-specific alternative remains a realistic safety valve that avoids inefficient uses of societal resources. The utility of a site-specific alternative depends on reasonable benefits estimation, replacement of the "significantly greater" criterion with a simple "greater than" criterion in the "cost-cost" and "cost-benefit" tests or comparable interpretation of that criterion, and a clear understanding of the baseline for comparison in the "cost-cost" test.

EPA Response

See responses to 316bEFR.006.003, 018.009, and 308.004.

Comment ID 316bEFR.328.018

Subject Matter Code MISC

Miscellaneous comment

Author Name Quinlan J. Shea

Organization Edison Electric Institute

EEI appreciates the opportunity to comment on this important rulemaking and remains committed to work with EPA throughout the public process. We hope that informed comment on this initiative will lead to programs that result in effective and efficient progress towards improving the quality of our nation's waters, albeit in a manner consistent with other national policy objectives.

EPA Response

EPA believes that today's final rule will be effective and efficient progress towards improving the quality of our nation's waters, and will be consistent with other national policy objectives.

Comment ID 316bEFR.328.019

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

Scope of Analysis

This analysis addresses the economic and market impacts of the proposed Clean Water Act § 316(b) Phase II Existing Facility Regulations (Proposed Rule) (67 Fed.Reg. 17122) based upon the information provided in EPA's March 19, 2003 Notice of Data Availability (NODA) (68 Fed. Reg. 13522). It specifically examines the methodologies and assumptions used by EPA in estimating economic impact to electricity consumers and electric power sector investors. The analysis focuses on the cost estimates for EPA's "preferred option," although the methodological issues also apply to EPA's "waterbody/capacity" based option.

National Cost Estimate Assumptions

In the NODA, EPA revised its estimate of the national cost of compliance to $416 million (net present value), an increase of 49% above the estimate at the time of proposal. The increase in the national cost estimate appears to be due to two factors:

- EPA adopted more conservative assumptions regarding the appropriate compliance measures for the 551 in-scope facilities (e.g., the adoption of "best performing technology" rather than the most cost effective technology).

- EPA performed a more rigorous analysis of facility-by-facility compliance assumptions, utilizing a set of 11 technology costing modules. The modules used in the NODA analysis incorporate revised cost assumptions regarding capital and operating and maintenance (O&M) costs and net installation downtime. For the preferred option, total capital costs increased by 66% compared to the initial analysis, and total O&M costs increased by 48%.

The analysis in this paper used the revised national cost estimates in the NODA as a given. It is expected that other commenters will address specific issues regarding the engineering cost estimates. Also, this analysis accepted the EPA assumptions regarding the application of best performing technology at individual facilities. The assumption of best performing technology has potential implications for the determination of cost effectiveness and the selection of a cost baseline for purposes of the cost-cost test. These issues are addressed elsewhere in the industry's comments.

Summary of Conclusions Regarding Economic and Market Impacts

The cost of compliance is borne by either electricity consumers (in the form of higher prices) or electric industry shareholders (in the form of lower share prices, lower dividends, or both). In the case of not-for-profit consumer-owned and governmentally-owned utilities, costs are reflected in higher electricity rates, reductions in ancillary services, or increased taxes.

The NODA presents four alternative approaches for estimating the economic and market impacts of the proposal. All four approaches show no significant adverse economic or market impact. These approaches have substantially different and, in some cases, conflicting methodologies. All four have serious underlying flaws that undermine the validity of the reported results.

- The cost-to-revenue (CTR) test is not a useful metric because it does not provide a direct measure of impacts on either consumers or producers. It should be dropped, or at least modified to measure impact on net revenue.

- The average household impact measure is misleading because of the averaging methodology and should be dropped.

- The average electricity price impact also is misleading because of the averaging methodology and should be dropped.

- The electricity market impacts (based on the IPM model analysis) are significantly underestimated because the model does not adequately capture the effects of compliance costs on market prices. The model structure and the choice of assumptions tend to minimize impacts.

TABLE 1. Summary Analysis of EPA Economic/Market Impact Analysis.
[See hardcopy]

Some of these issues are not new. They were raised in the comments provided on the proposed rule but not addressed in the NODA. A summary of the issues raised with the proposed rule that were not included (or partly addressed) in the NODA are shown in Table 2.

TABLE 2. Summary of NODA Adjustments in Response to Comments.
[See hardcopy]

EPA Response

Please refer to the following comment responses:

The Cost-To-Revenue Test (CRT): 316bEFR.072.206 (subject matter code 9.01)

Average Household Impact: 316bEFR.072.207 (subject matter code 9.02)

The IPM: 316bEFR.328.024 and 316bEFR.328.025 (subject matter code 9.03).

Comment ID 316bEFR.328.020

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 22.01

Executive Orders (except EO 13211)

Significance of Economic and Market Impact Analysis in Assessing the Value of the Proposed Rule

Under E.O. 12866, EPA is required to consider the estimated total costs and benefits of its proposal. In the NODA, as in the proposed rule, EPA used estimated national compliance costs as a measure of the total cost to society.

While the impact on electricity producers, consumers, and electric power industry investors is important, it is not the appropriate criterion for determining whether the rule will produce net positive societal benefits. The estimates of economic and market impacts are not benefit/cost analyses, but instead are measures of "affordability." EPA's presentation of analyses of affordability creates a false impression that, if the proposal appears affordable, it must be cost-beneficial. But "affordability" is not a metric for measuring benefit-cost, nor is it endorsed (or even mentioned) in either E.O. 12866 or other statutes addressing regulatory analyses, such as the Regulatory Flexibility Act or the Small Business Regulatory Enforcement Fairness Act.

The question that an affordability test seeks to answer is, "Can the nation, industry, or consumer segment afford to absorb the costs of compliance with the rule?" From a benefit-cost standpoint, this question has no value. The theoretical cost maximum that a company, nation, or consumer base can shoulder does not provide any information about whether or not they should be asked to do so. In a functioning market, almost any increase in price will result in a new equilibrium point reflecting consumer adjustments. For example, many U.S. consumers probably could "afford" a doubling of the electricity price. Demand for electricity would decrease, alternative forms of energy would gain in popularity, and consumers would adjust to the new price reality, though the price increase clearly would affect consumer pocket books, and more poorer consumers could be unable to afford to pay for basic needs. It is highly unlikely, however, that the nation would be better off as a result of a regulatory change with this result. Similarly, the ability of firms to "afford" the increase in operating costs resulting from compliance is an irrelevant metric when assessing whether or not an industry or a nation benefits or suffers as a result of the regulation.

It is precisely for this reason that E.O. 12866, the Federal guidance on cost-benefit analysis, recommends the use of net present value (NPV) whenever possible. If the NPV of a regulation is negative then it does not matter if it is "affordable" to one or more segments of the population or industry – the agency should not promulgate the rule. For these reasons, even if the CTR, average household impact, and average electricity price analyses were done correctly, they would still fail to provide a meaningful assessment of the benefit-cost wisdom of promulgating the regulation. In addition to this point, the following sections provide detailed discussions of the methodological flaws inherent in each affordability analytical method.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA’s final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Analysis of the Cost-to-Revenue Test (CTR)

The CTR compares both average and maximum annual costs per facility against the facility's (and firm's) gross revenue. EPA estimated the CTR at both the firm level and the individual facility level. The firm-level CTR for the preferred option ranged from 0.00% to 7.36%. The facility-level CTR for the preferred option ranged from 0.01% to 102.6%. A detailed breakdown of the EPA estimates is shown in Tables 3 and 4 below, taken from the March 12, 2003 memo to the record from EPA:

TABLE 3. Firm-Level Cost-to-Revenue Measure by Entity Type for the Preferred Option.
[See hardcopy]

TABLE 4. Facility-Level Cost-to-Revenue Measure for the Preferred Option.
[See hardcopy]

The CTR data reveal several anomalies:

- Surprisingly, the CTR estimates in the NODA show fewer facilities and firms with a CTR greater than 3.0%, even though the NODA analysis is based upon higher cost estimates.

- The CTR data show several facilities with very high CTR values. For example, one investor-owned oil/gas steam generating facility shows a CTR of 102.6%, (i.e., the annualized compliance costs are slightly greater than the facility's gross revenues), yet that facility is not indicated for closure in the plant closure analysis.

- The maximum CTR value for nuclear facilities is only 3.1%, yet one nuclear facility is identified for closure in the IPM modeling analysis.

- Two governmentally-owned facilities have CTRs of 22.8% and 62.9%, yet neither is identified for closure, and neither appears to have affected the market-clearing prices in the IPM analysis.

The comparison of the data, however, is a secondary issue. The principal issue is methodological – the CTR methodology is not a meaningful measure of economic viability or lack thereof. Commodity industries – including the electric power industry – are generally characterized by low profit margins earned on high volumes of transactions. This means that while gross revenues can be quite large, the net revenues are frequently a small percentage of gross revenues. In electric power, these margins are generally predicted to shrink even further in the wake of expanding deregulation. For example, as shown in Table 5, the ratio of net income to gross sales revenues for the investor-owned utility industry is about 10% and decreasing. It is possible that a facility or firm with a low estimated CTR may actually have negative net revenues after application of the requirements. This would likely result in the facility's closure. This example further demonstrates why CTR is not a valid indicator.

TABLE 5. Revenue and Expense Statistics for Major U.S. Investor-Owned Electric Utilities.

[See hardcopy]

A more appropriate measure of the economic impact of the proposed rule on firms and facilities would be to analyze the impact on each regulated entity's net revenues, with consideration of the portion if any of increased costs that can be recovered through higher revenues. EPA should evaluate the effect of the proposed rule by calculating the ratio of the discounted present value of the marginal cost of compliance to the discounted present value of expected net revenues. Similarly, the regulations for economic analysis in E.O. 12866 state that net present value is the preferred method of evaluating the costs and benefits of regulatory actions.

While estimates of net revenues are readily available for investor-owned utilities, municipally-owned utilities and electric cooperatives have different measures of net "revenue." For example, municipal utilities do not report net revenue, but instead apply a portion of their gross revenues in the form of provision of services and payments to the community, including donations to the general fund, no-cost provision of power, free communication services, funding of shared resources, and other contributions. The aggregate values of these services and payments are readily available as a matter of public record through city budgets and as recorded in their financial statements. Similar information is available on the use of net proceeds by cooperatives. The use of NPV in the analyses is important because, if the utilities cannot pass through the costs of compliance with 316(b) regulations, they will have to make reductions in their contributions of net proceeds for other purposes.

In addition to considering the impact on net revenues, EPA also should perform a more detailed analysis of the cost impacts of the proposal on different segments of the industry. EPA should therefore compare the NPV ratios of discrete groupings of facilities to assess the possibility of competitive harm. These groups should be delineated by factors such as:

- Size

- Location

- Customer Base

Only by determining the reductions in NPVs (as a result of compliance) of the facilities in each group can the agency determine the actual economic impact on firms and facilities resulting from the rule.

EPA Response

The commenter makes three points in this comment:

(1) The cost-to-revenue results of the NODA preferred analysis reveal several anomalies compared to the results at proposal.
i. "Surprisingly, the CTR estimates in the NODA show fewer facilities and firms with a CTR greater than 3.0%, even though the NODA analysis is based upon higher cost estimates." EPA response: EPA agrees that based on the NODA analysis, 5 fewer facilities have a CTR greater than 30%. It should be noted, however, that the changes in the CTR are not only a function of different cost

estimates but also of different revenue estimates. As documented in the NODA (68 FR 13528), EPA's revenue estimates at proposal omitted revenues from non-steam generators at Phase II facilities. This omission was corrected for the NODA analysis and the analysis for the final rule. For facilities with non-steam generators, accounting for all of the facility's revenues, in some cases, lead to a lower CTR despite higher compliance costs.

ii. "The CTR data show several facilities with very high CTR values. For example, one investor-owned oil/gas steam generating facility shows a CTR of 102.6%, (i.e., the annualized compliance costs are slightly greater than the facility's gross revenues), yet that facility is not indicated for closure in the plant closure analysis." EPA response: EPA notes that in the IPM, a facility's decision on whether to close or remain in operation is not based on the profitability of one year alone. The model determines the net present value (NPV) of future operations for each facility. If this value is positive, the facility remains in operation, even if there is a loss in any one year. The facility cited by the commenter is an example of this algorithm. If 2010 revenues were used instead of 2008 ones, the CTR of this facility would be less than 4%. This is the case because this facility realized capacity revenues in 2010 but not in 2008 (due to a change in excess capacity in the region).

iii. "The maximum CTR value for nuclear facilities is only 3.1%, yet one nuclear facility is identified for closure in the IPM modeling analysis." EPA response: As argued by the commenter himself, the CTR is not (and was not intended to be) a predictor for facility closures. Even if compliance costs represent a relatively small percentage of revenues, it is possible that a facility is modeled to close if, as a result of this additional cost, the facility's NPV of future operations becomes negative.

iv. "Two governmentally-owned facilities have CTRs of 22.8% and 62.9%, yet neither is identified for closure, and neither appears to have affected the market-clearing prices in the IPM analysis." EPA response: EPA notes that the two facilities referenced by the commenter have generating capacities of less than 30 MW each. As a result, their contribution to the electricity supply in their respective regions is insufficient to influence the market-clearing prices.

(2) "The cost-to-revenue test is not a meaningful measure of economic viability or lack thereof." The commenter states that "A more appropriate measure of the economic impact of the proposed rule on firms and facilities would be to analyze the impact on each regulated entity's net revenues, with consideration of the portion if any of increased costs that can be recovered through higher revenues." EPA response: Please refer to the response to comment 316bEFR.072.206 in subject matter code 9.01.

(3) EPA should perform a more detailed analysis of the cost impacts on different segments of the industry. EPA response: Please refer to the response to comment 316bEFR.072.206 in subject matter code 9.01.

Comment ID 316bEFR.328.022

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 9.02

Economic impacts on consumers/households

Estimates of Average Household Cost Impacts

As another method of assessing the economic impact of the rule, EPA estimated the average energy price increase per household resulting from compliance with the proposed regulatory requirements. The calculated annual cost per residential consumer ranges from $0.55 in NERC region ASCC to $5.69 in NERC region HI.

EPA evaluated the annual cost per household by multiplying the average annual compliance cost per MWh of sales by the average annual electricity sales per household. Both input variables were calculated by NERC region according to the following methods:

- Average Annual Compliance Cost per MWh of Sales = Total electricity sales divided by total pre-tax compliance costs. EPA compiled the total electricity sales from the 2000 Form EIA-861 data base and used utility-level sales aggregated by region.

- Average Annual Electricity Sales per Household = MWh of residential sales divided by the number of households. The raw data also came from Form EIA-861.

Presenting an average cost per household, when a significant portion of the households are unaffected by the proposal, is not a meaningful metric. This approach is warranted only in those instances where the entire population is homogenous with respect to the impact of costs – that is, in those cases where each household can reasonably be expected to see increases in costs as a result of rule. That is not the case in the context of this rulemaking.

- EPA states that only 13% of existing facilities (representing 50% of electricity generation) are in-scope facilities under the proposed rule. However, the cost of compliance for the in-scope facilities is averaged over total electricity sales from all facilities.

- The use of regional averages masks the variation of impact at the local level. For example, rural populations or those served by government-owned facilities might face a significant increase in the cost of electricity, but that effect would be masked by using the average cost over an entire NERC region.

EPA should eliminate this analysis altogether. The inclusion of unaffected households in the averaging methodology creates an erroneous impression that the cost impact is smaller than it is, while masking the true impacts on sensitive subpopulations. Both the Unfunded Mandates Reform Act and E.O. 12866 specifically require that the effects of a proposed regulation on sensitive subpopulations be considered. This is impossible when the costs are calculated only as a population-wide average.

EPA Response

Please refer to the response to comment 316bEFR.072.007 in subject matter code 9.02.

Comment ID 316bEFR.328.023

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 9.02
Economic impacts on consumers/households

Average Electricity Price Impacts Analysis

In order to assess the potential effects of the regulation on electricity prices, EPA compared the average compliance cost per KWh of sales against baseline electricity prices. EPA used the total electricity sales and the consumer prices from the Annual Energy Outlook (AEO) 2002. The analysis assumes that industry passes the full cost of compliance through to consumers. In addition, the agency assumes that all sectors -- residential, commercial, industrial, and transportation -- bear an equal share of the increase per MWh of purchased electricity.

EPA estimates that the additional costs of compliance resulting from the preferred option will raise the price of electricity:

- 0.14% for Residential

- 0.15% for Commercial

- 0.25% for Industrial

- 0.15% for Transportation

Several problems exist with this analysis. First, the estimates do not provide an accurate picture of the compliance impact because the costs of compliance are averaged against total sales, including sales from facilities that are not in-scope.

Second, by averaging across entire NERC regions, the EPA analytical approach makes it impossible to assess the impacts on cost-sensitive subpopulations. Both UMRA and E.O. 12866 specifically direct the agency to consider these vulnerable groups.

Finally, it is unrealistic to assume that cost is allocated uniformly across customer classes. In a relatively competitive power market, different types of consumers have different power requirements and vastly different elasticities of demand. This can result in some groups paying a proportionately larger share of the rate increases than others. For example, EIA projections in Table 6 show that average prices for customer classes do not change in equal amounts. There is no basis for assuming that certain action, such as 316(b) compliance, will have equal impacts among customer classes. In view of these problems, EPA should eliminate this analysis altogether.

TABLE 6. Projected End Use Prices by Customer Class.
[See hardcopy]

EPA Response

Please refer to the response to comment 316bEFR.072.008 in subject matter code 9.02.

Comment ID 316bEFR.328.024

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

Analysis of IPM Modeling Issues

The Integrated Planning Model (IPM) is a dynamic linear programming model of the electric power sector. The IPM is used by government agencies and the private sector to conduct assessments of capacity planning, environmental policy analysis and compliance planning. The IPM analysis supporting the proposed regulations utilized a modified version of the EPA Base Case 2000.

A detailed description of the model and its main assumptions can be found in various documents published by EPA. This discussion focuses on several issues with IPM that lead to a significant underestimate in the electricity market impact of the proposed 316(b) regulations. The issues stem from a combination of the methodology of the IPM model itself and the choice of assumptions – all of which seem chosen to minimize impacts. There are five general issue areas, which we will now discuss.

The IPM Structure Does Not Adequately Capture the Impacts of 316(b) Compliance Costs

IPM is designed to depict production activity in fully deregulated wholesale electricity markets, not in retail markets. Two key methodological features of IPM are its assumption of "perfect competition" and "perfect foresight." In IPM, the dispatching of electricity is based on the variable cost of generation. In the absence of any operating constraints, units with the lowest variable cost generate first. The marginal generation unit, i.e., the power plant that generates the last unit of electricity, sets the wholesale energy price.

The model also uses physical constraints in certain instances to influence the dispatch order. For example, IPM uses "turndown constraints" to prevent baseload units from cycling (i.e., switching on and off). This is especially important for nuclear and large coal-fired baseload plants, which, when operating, are run steady–state at or near full capacity.

While this methodological approach may be based on sound economic theory, it is unlikely to show any increases in market-clearing prices due to 316(b) regulations except in cases where the variable costs of compliance actions represent a significant proportion of variable costs in the model. Furthermore, the IPM model fails to recognize that the costs of complying with 316(b) will be borne by consumers and investors. Instead, the model suggests that these costs simply fade into the background because they do not affect market clearing prices. This is simply unrealistic.

The 551 in-scope facilities subject to Phase II 316(b) regulations are mostly fossil steam and nuclear facilities. These facilities typically have relatively low variable costs, and are dispatched early in the generation mix. The cost of compliance of the preferred option would not, except in a few circumstances, increase the variable cost of generation to the point where these units would become the highest cost unit and thus increase the market-clearing price. For this to occur, the increase in variable costs – due to variable O&M and fuel costs associated with any energy penalty – would have to exceed the current differential in variable costs between coal and nuclear plants and oil and natural gas steam plants and gas-fired combustion turbines, which in most cases are the highest variable cost facilities.

Moreover, since many coal and nuclear facilities are likely to be subject to “turndown constraints” in the IPM model, they would not affect the IPM calculation of market clearing price in any event.

In the NODA, EPA provides revised engineering estimates of the capital and O&M costs for various 316(b) compliance options. In developing the IPM model inputs, EPA estimated that, with two exceptions, the fixed O&M cost component would be 40-100% of total O&M costs, depending upon compliance technology. Thus variable O&M costs – which affect market-clearing prices in the IPM model – comprised 0-60% of total O&M costs for the 316(b) compliance options. A comparison of the model results between the base case and the preferred option case shows essentially no change in variable O&M costs. The analysis also shows that the effects of variable O&M costs in the model represent only 14% of total variable costs. The comparison of total variable costs is shown in Table 7 below.

TABLE 7. Comparison of National Total Variable Costs in IPM Model Run for 2010.
[See hardcopy]

The variable O&M costs resulting from 316(b) compliance are extremely small, which, in turn, drives the model output that shows no change in the market-clearing price. For example, the projected national average variable production cost in 2010 is essentially unchanged between the base case and the preferred option.

This is not to suggest that EPA’s assumptions on the relative projection of fixed and variable O&M costs are flawed. The analysis of EPA’s engineering cost estimates of O&M costs is beyond the scope of this paper. What it does indicate is that an IPM modeling analysis of EPA’s 316(b) options, assuming a 100% competitive wholesale electricity market, and assuming no energy penalty and relatively small variable O&M costs, is not the appropriate method for estimating market impacts.

A further illustration of the lack of sensitivity of IPM to 316(b) costs can be illustrated by comparing the IPM results with the CTR analysis. The CTR analysis shows 41 facilities (7.4% of the total in-scope facilities) with a CTR greater than 3%. Yet, the IPM results show no increase of market-clearing prices commensurate with this level. The model apparently assumes that these costs are absorbed within the producers’ surplus, i.e., net revenues. Yet, 17 of the 41 affected facilities are governmentally-owned, and another 3 are cooperatives. These 20 facilities (half of those with CTRs above 3%) do not have net revenues that can absorb 316(b) compliance costs.

If 316(b) compliance costs exert little effect on the IPM market-clearing prices, then what does account for changes in IPM projections of market-clearing prices? In the NODA, EPA notes that the IPM results for 2010 show that energy prices per MWh decrease in three NERC regions: MAAC, MAIN and SPP. If the model runs were reflecting only changes in 316(b) compliance, this result is anomalous. Further analysis of the model runs suggests that the changes are due to other factors such as differences in the mix of new generation additions and retrofit upgrades. Thus, the model is showing the effect of alternative investment decisions in new or upgraded capacity that are not the direct result of 316(b) compliance, but rather some form of secondary response. And these results are based on the premise of a fully deregulated wholesale electricity market functioning under perfect competition.

In reality, the cost of retrofits at Phase II facilities to meet new regulations will have significant impacts on wholesale and retail prices. A total of 25 states currently regulate retail electricity prices on a cost-of-service basis. Another 18 states plus the District of Colombia permit varying levels of retail competition. Vermont has pending restructuring legislation, California has suspended restructuring, and the remaining 5 states are taking a "wait and see" approach by actively delaying moves toward competition. Table 8 shows the state-by-state information.

TABLE 8. Status of Adoption of Retail Competition in States <FN2>
[See hardcopy]

While the extent of wholesale price regulation is much smaller, many of the existing facilities subject to the proposed 316(b) regulations are still in cost-of-service operation.

All states that allow retail competition incorporate a cost-of-service component. In even the most competitive states, retail consumers ultimately have the option to purchase cost-of-service power, which is intended to set a benchmark for all utilities in the market. The IPM model does not capture the current dynamic of a market that is partly competitive and partly cost-of-service. As a result, the modeling outcomes are seriously flawed.

In conclusion, the methodological structure of the IPM is not conducive to the type of analysis of the proposed 316(b) regulations for which it was used. The specific conclusions can be summarized as follows.

(a) The model structure does not adequately consider the types of 316(b) compliance costs. Thus, changes in 316(b) compliance costs have little or no effect on IPM calculations of market-clearing prices.

- IPM estimates of market-clearing prices are determined by the facility with the highest variable cost. The 551 in-scope facilities typically have relatively low variable costs and thus do not affect market clearing price calculations.

- The variable cost component of the IPM model consists primarily of fuel costs, which are critical to the analysis of air emissions control options, but not to 316(b) compliance options. For example, IPM model data for the preferred option show over 85% of variable costs are comprised of fuel costs. Furthermore, EPA's analysis of the preferred option assumes no change to fuel costs.

- The EPA engineering cost estimates for 316(b) compliance costs allocate total O&M costs between fixed O&M and variable O&M costs, but the allocation is weighted heavily to the fixed O&M cost component. Changes in fixed O&M costs do not drive changes in market clearing prices under the IPM analysis.

(b) Because the model is dynamic in nature, the model results reflect other investment changes that may be secondary but not the primary result of 316(b) compliance actions.

- Changes in market-clearing prices, such as cases where prices decline, appear to be due to other factors, such as different mixes of new and retrofit capacity investment rather than 316(b) compliance.

(c) The model does not address the price impacts from facilities still subject to cost-of-service regulation.

- A large number of states continue to regulate electricity prices on a cost-of-service basis, which would allow the fully amortized cost of 316(b) compliance to be reflected in changes in prices.

- The model appears to treat electricity dispatch, pricing, and financing for cooperatively-owned and governmentally-owned utilities in the same manner as for investor-owned utilities.

Because the IPM was designed as a flexible analytical tool that focuses on the analysis of air emission control scenarios, it does not appear to provide a good analytic framework for analyzing the impacts of the proposed 316(b) regulations.

Footnotes

2 Source: http://www.eia.doe.gov/cneaf/electricity/chg_str/regmap.html

EPA Response

EPA disagrees with the comment that the IPM structure does not adequately capture the impacts of 316(b) compliance costs. The commenter's argument rests on the suggestion that the IPM "is unlikely to show any increases in market-clearing prices due to 316(b) regulations except in cases where the variable costs of compliance actions represent a significant proportion of variable costs in the model. Furthermore, the IPM model fails to recognize that the costs of complying with 316(b) will be borne by consumers and investors. Instead, the model suggests that these costs simply fade into the background because they do not affect market clearing prices."

EPA disagrees fundamentally with the validity of the commenter's argument. Dispatch and market-clearing prices are a function of variable costs. As a result, only variable costs should drive unit dispatch and market-clearing prices. The argument that there is something wrong with the structure of the IPM, or that it is inappropriate for assessing the effects of the 316(b) regulation, just because the final Phase II rule does not contain significant variable costs, is invalid. If the variable cost differential between facilities subject to the final rule and other facilities is great enough as to not change the dispatch order, then the final rule should not lead to increases in prices. Furthermore, the suggestion, that just because the modeling results do not show any price increases, the compliance costs "fade into the background" is unfounded. The IPM considers all cost increases as a result of the final rule. Even if they do not affect market-clearing prices, they are taken into account in the long-term operating decisions of each affected facility. And, patently, compliance costs do not "fade into the background" in the IPM analysis. Compliance costs are explicitly recognized and accounted for in the IPM system: to a limited extent, they are passed through as increases in prices to consumers; in other, more common, circumstances, they manifest as reductions in the net income of the complying entities and are explicitly accounted for in the 316(b) impact analysis in terms of these financial impacts. They don't "fade into the background."

For a response on potential impacts on governmentally-owned facilities, please refer to comment 316bEFR.028.008 in subject matter code 22.03.

The commenter further notes that changes in market-clearing prices that are not the direct result of 316(b) compliance costs are anomalous. EPA disagrees with this assertion. The IPM is an integrated market model that takes into account the direct and indirect effects of a policy option. One of the indirect effects the IPM models is the need for new additions in response to other changes in the market. EPA disagrees with the commenter's assertion that such a comprehensive treatment of potential regulatory effects is a flaw.

With respect to the comment that the IPM analysis is flawed because it does not account for facilities still subject to cost-of-service regulation, EPA notes that in terms of industry impacts, the assumption of full competition is conservative. While some facilities might be able to pass on some of their costs, this will be less possible in many regions where competition has already taken hold. In addition, the ability to partially or fully pass on costs to consumers also means that there will be fewer impacts on the facilities themselves, including fewer closures and less loss in net income. In short, the presence of cost-of-service regulation reduces the potential financial burden on complying entities; in contrast, the assumption of full deregulation increases the likelihood of finding a material financial burden on complying entities.

Finally, EPA notes that the IPM is a peer-reviewed, OMB-approved model. The commenter themselves conducted an analysis of the proposed rule using a different model. Interestingly, despite highly conservative assumptions (including grossly overstated compliance costs), the re-analysis did not produce results that were materially different from EPA's analysis. (See response to comment 316bEFR.072.101 in subject matter code 9.03.) EPA therefore notes that any alleged flaws of the IPM, which EPA does not acknowledge, did not materially affect the results of this analysis.

Comment ID 316bEFR.328.025

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

The IPM Analysis Underestimates Potential Plant Closures

In the analysis of the preferred option, the IPM analysis projects the closure of one nuclear facility representing 434 MW of capacity. The IPM allows for the retirement of plants, as well as retrofits, repowering, and, in the case of nuclear facilities, relicensing. Each of these options is represented in IPM as "model plants," and the options available for each facility, such as retrofit or retirement, are pre-defined. However, the algorithm in the model to determine if a retirement option should be triggered due to 316(b) compliance costs has not been described in the NODA Docket. The algorithm and the choice of assumptions can significantly alter the results of the closure analysis.

There are several methodological issues that would lead to underestimates. The first issue is the IPM treatment of embedded costs. The IPM model documentation indicates that the model only considers new capital costs that may be incurred during the model run period. The model does not consider recovery of the historic embedded costs of generating facilities. Thus, it would appear that the IPM algorithm for estimating plant closures only considers whether the facility can recover new capital costs within the revenues realized at the projected market clearing price. In reality, facility owners would consider whether the facility can recover the combined total of both its embedded and future costs in deciding whether to close a facility. A consideration of the combined total would lead to more plant closures than merely considering future capital costs only.

The second issue relates to how the IPM was used to model the capital costs for 316(b) compliance. Typically, the up-front capital costs for compliance are provided as model inputs. The model then translates these costs into a series of annualized charges, using the following assumptions <FN 1>:

- Initial capital investment is converted into an annualized capital outlay stream at a capital charge of 12%.

- The book life and debt life of generating unit investments are assumed to be 30 years.

- The period used in calculating levelized annual outlays is either the book life of the investment or the years remaining in the model planning horizon, whichever is shorter.

- NPV is estimated using a discount rate of 5.34%.

However, it appears that EPA modified the standard IPM model set up. The Economic and Benefits Analysis states that the IPM used two single up-front cost values for 316(b) compliance, one for technologies with a useful life of 10 years, and another for technologies with a useful life of 30 years. For the preferred option, all compliance technologies had a useful life of 10 years. However, there is no indication that replacement capital costs were considered over the span of the IPM model run, i.e., to 2030. Since EPA used a relatively low discount rate of 5.34%, replacement costs 10 years in the future would exert some influence on net present values.

Finally, there appears to be some uncertainty as to how the IPM modeled the capital costs of 316(b) compliance. While the discussion of capital costs describes the 316(b) capital costs as input to the capital cost variable, the discussion of model outputs describes annualized capital costs as being included in the reported model results for fixed O&M costs. At a minimum, the differences in these descriptions are confusing. More importantly, however, they may reflect that the costs were treated differently in the model.

These three factors – embedded costs, useful lives and replacement costs, and assignment of costs within the model – would affect the model estimates of plant closures.

In addition, the assumption of a capital charge rate of 12% is significantly less than the current cost of capital for the electric utility. The 12% rate is based on an assumption that the compliance measures are a retrofit to existing units and are financed on the strength of the parent company's balance sheets. The 12% rate also assumes that the environmental retrofit has a 30-year book life and a 30-year debt life. These assumptions are extremely low in the current financial environment for electric generators, and they will result in much less predicted impact on annualized costs. By comparison, in comments provided on the proposed rule, OnLocation, Inc., a contractor to the Edison Electric Institute, performed an alternative modeling analysis, using the POEMS model that utilized a 20% capital charge rate. The POEMS model is an electricity market model developed by the Department of Energy, and used extensively in modeling alternative electricity policy scenarios. Adjusting the IPM results for a higher capital charge would increase the model's projection of plant closures, because the annualized costs would be higher. This was shown in the POEMS modeling results at the time of the 316(b) proposal.

Footnotes

1 Documentation of the EPA Modeling applications (V.2.1) using the Integrated Planning Model, Electricity market model analysis, Chapter B3, p. B3-3

EPA Response

The commenter argues that three factors affect the model estimates of plant closures:

(1) Embedded costs: EPA disagrees that IPM's treatment of embedded costs is inappropriate and will cause underestimation of facility closures. The decision of whether or not to incur compliance costs and continue operation of the affected facility depends on the discounted present value of future cash flows from the facility – specifically, whether the discounted net present value of the facility, before payments to capital, will remain positive. This concept of business decision-making is a fundamental and universally accepted element of financial analysis. The IPM analysis properly embodies this concept.

(2) Useful lives and replacement costs: EPA notes that replacement costs are captured in its analyses. As documented in chapter B3 of the EBA, capital costs are modeled as annual fixed O&M costs. By annualizing them over the 10-year period of the technology's useful life, the analysis explicitly considers the need for technology replacement.

(3) Assignment of costs within the model: The commenter states there is confusion over how capital costs were treated because the discussion describes 316(b) capital costs as input to the capital cost variable. EPA notes that the commenter did not carefully read the documentation. Chapter B3, as

published for the NODA, states that "Capital cost inputs into the IPM are expressed as a fixed O&M cost, in dollars per KW of capacity." (See DCN 5-3002.)

Finally, the commenter states that the capital charge rate of 12% is too low. The commenter cites a different model, POEMS, that uses a capital charge rate of 20%. Without commenting on the reasonableness of the POEMS capital charge rate, EPA notes that the IPM rate reflects a real (i.e., adjusted for inflation), after-tax weighted average cost of capital and that the IPM rate concept has been reviewed and approved by EPA and OMB in a range of regulatory studies.

EPA notes that the commenter's own re-analysis of the proposed rule, which used the POEMS model, did not produce results that were materially different from EPA's analysis. See response to comment 316bEFR.072.101 in subject matter code 9.03.

Comment ID 316bEFR.328.026

Author Name Quinlan J. Shea
Organization Edison Electric Institute

Subject Matter Code 9.03
Mkt-level impacts/Reliability/EO 13211: Energy Effects

The IPM Analysis Uses Outdated Projections of Demand Growth and Natural Gas Prices That Underestimate Compliance Costs

The IPM analysis underestimates demand growth because it relies upon the EIA reference case projection in AEO 2001, and it reduces the projected demand by the estimated electricity savings from the EPA and DOE Climate Change Action Plan (CCAP) voluntary programs to reduce greenhouse gas emissions.

The lower level of projected electricity demand underestimates 316(b) compliance cost in three ways: (1) it reduces the level of new capacity additions, which, in turn, lowers the market-clearing prices for new generation additions; (2) it enables more oil/gas steam electric facilities to operate at less than 15% capacity utilization, enabling them to quality for less stringent compliance requirements; and (3) it fails to consider the impact of the proposed "generation caps" on electricity price behavior during peak periods.

A comparison of several key assumptions is shown in Table 9 below. It shows that IPM's projected electricity sales are 5.9% below current forecasts. Furthermore, it shows that the fuel price projection used in IPM is almost 15% lower than current projections. Since the market-clearing pricing algorithm is heavily influenced by fuel prices, lower fuel price projections will result in lower market-clearing prices.

Table 9. Comparisons of IPM and Current AEO Projections.
[See hardcopy]

The sensitivity of the IPM to changes in electricity demand projections and fuel prices can be illustrated by comparing the model results from the two baseline model runs: the base case for the preferred option, which uses the EPA demand and fuel price assumptions, and the base case for the waterbody/capacity based option, which uses the higher AEO 2001 assumptions. The differences, by NERC region, are shown in Table 10.

TABLE 10. Changes in IPM Baseline Price Projection EPA Base Case 2000 vs AEO 2001.
[See hardcopy]

The comparison shows that:

- Capacity prices ($/ KW-yr) are higher in 6 of 9 NERC region with comparable data. Four regions show increases above 2%, one region (SPP) shows an increase of 8.6% and another region (WSCC) has an increase of 64.8%.

- Energy prices are higher in 9 of the 10 NERC regions. Five regions have energy price increases greater than 5%, with one region (ECAR) showing an increase of 10.1%.

Both of these cases are base cases – i.e., without the effect of 316(b) regulations. The EPA base case was used to model the EPA preferred option for 316(b) regulations, and the AEO 2001 base case was used to model the waterbody/capacity based option. The modeling results for the two 316(b) options show little or no change relative to their respective base cases. Thus, even in the waterbody/capacity based option model run, which were based upon the higher demand and fuel price assumptions, there was little market effect.

By looking at all four model runs, it becomes clear that the IPM model is sensitive to changes in electricity demand and fuel prices, but is not sensitive to 316(b) compliance costs. A possible explanation for this anomaly is that the costs for 316(b) compliance options were assigned to fixed O&M costs, rather than capital charges and variable O&M costs. Such an allocation would minimize the effects on model results. However, since this level of detail was redacted in the IPM files placed in the NODA, it is not possible to fully examine this possibility.

The NODA discusses the fact that the IPM results project that 75 facilities would have a capacity utilization rate of less than 15%. This projection is much higher than actual historical data complied by EIA. If the IPM model were run with a higher demand projection, the utilization rate for a number of these facilities would increase above 15% thereby triggering the more stringent 316(b) requirements, and the results would show fewer facilities falling below the 15% threshold.

Finally, the NODA discusses the use of a "generation cap" that would ensure that facilities that qualify for less stringent 316(b) requirements based on a low utilization rate would actually operate at less than the 15% utilization level. However, a "generation cap" was not modeled in the IPM analysis. While the concept of a threshold based on 15% utilization is a flexible and cost effective approach, establishing a hard cap on generation could have significant adverse market impacts. For example, the generation cap could be reached in instances of peak demand (such as during extended summer heat waves) or during times of major unplanned outages. Not only would prices be at a peak during these times, but also, as past events have shown, electricity prices can be bid up to levels significantly above marginal production costs. Generating facilities would need to have flexibility to respond to these types of situation. While the 15% threshold concept has merit, the market implications of adopting a hard and fast generation cap could be significant and should be analyzed further.

EPA Response

EPA notes that the analyses using the two different electricity demand assumptions did not show materially different results. EPA further notes that even a highly conservative re-analysis of the proposed rule, conducted by the commenter himself, did not produce any results that were materially different from EPA's. This re-analysis included a sensitivity analysis that assigned high per MW costs to all facilities, including those with capacity utilization rates below 15% and those that already meet the requirements of the Phase II rule. Again, even this highly overstated cost assumption did not produce results materially different from EPA's. As a result, EPA concludes that the different assumptions outlined by the commenter would not change EPA's decisions with respect to this final rule. See response to comment 316bEFR.072.101 in subject matter code 9.03.

Finally, EPA notes that the commenter's assertion that a generation cap was not modeled by IPM is incorrect.

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Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

EPA's Approach for Estimating the Costs of Installation Outages in the IPM Model Is Flawed

In the NODA, EPA acknowledged that the initial IPM analysis of installation outages was flawed. The NODA provides a new analysis based upon a different approach.

The challenges associated with modeling facility outages appear to be due to basic limitations in the IPM model, not due to any specific assumptions. The IPM is run for only a few selected years (the "model run years"). The results of the model run years are then "mapped" to other years over a multi-year period (typically 3-6 years) that spans the model run year. Typically, the costs of compliance that may occur over the "mapped years" are aggregated into the "model run year." The results are then re-allocated back over the mapped years. As described by EPA Economic and Benefits Analysis Report:

The model assumes that capital investment decisions are only implemented during run years. Each model run year is mapped to several calendar years such that changes in variable costs, available capacity, and demand for electricity in the years between the run years are partially captured in the results for each new model year.

A detailed assessment of the accuracy of this mapping process is beyond the scope of this analysis. However, as EPA stated in the NODA, the mapping process may have the effect of overestimating the price effects of installation outages because the process maps the effects of outages in the model run year to each of the mapped years. However, EPA's proposed solution to the problem is also flawed. EPA's revised IPM run averages the installation outages over the number of mapped years, and only uses the annual average value (and not the total value) in the model run year.

The market impact of installation outages is a one-time perturbation in generating capacity, that can occur in warm weather months (peak summer or "shoulder" spring and fall seasons). It is not appropriate to treat this type of event as multi-year annual average. A proper assessment of the impact requires an analysis relative to peak load periods under varying assumptions of the probability of multiple simultaneous occurrences of installation downtimes among in-scope facilities. Averaging the effect among multiple facilities over a multi-year period virtually assures that the model will not identify any market impact.

EPA Response

EPA acknowledges the fact that its analyses average the outage time over the seven months of the non-summer season. However, EPA believes that despite this assumption, the short-term effects of the final rule on energy supply, reliability, or energy prices will be minimal. EPA examined the capacity of facilities projected to have downtimes under the final rule, by compliance year and NERC region. For each NERC region, EPA then compared the maximum projected downtime capacity in the year for which the maximum downtime capacity occurs to the total capacity of the region in 2008 (the model run year that represents the compliance years). This analysis found that the highest percentage of capacity projected to experience downtime in any one year, in any one region would be 10.1 percent (4.9 GW out of 49.1 GW, in FRCC, in 2009). Three facilities account for the 4.9 GW: two of these facilities have estimated downtimes of two weeks while one has an estimated downtime of three weeks. For five other regions, the estimated maximum percentage of downtime in any one year is greater than 3.0 percent. In each case, at least three facilities account for the downtime capacity, which provides the opportunity to schedule unit outages in non-overlapping periods and thus reduce the potential capacity loss during any scheduled outage period. It can be expected that facilities would work within the outage management frameworks provided by their reliability coordinating councils to schedule their outages to minimize system reliability issues. EPA therefore believes that short-term effects of downtimes as a result of the final rule will be minimal. EPA also notes that facilities have some flexibility in when to comply and might decide to comply during an earlier year to avoid overlap of downtimes with other facilities.

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Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

Lack of Consideration of the Administration's Clear Skies Proposal, When Combined With the Phase II 316(b) Regulations, Ignores Potentially Significant Interactive Cost Impacts to In-Scope Facilities

The IPM is primarily intended for use in modeling air quality regulations. In fact, it is detailed and flexible when used for that purpose. However, the EPA Base Case 2000, which is the starting point for the 316(b) modeling scenarios, takes into account only those Federal and state air emission laws and regulations where provisions "were either in effect or enacted and clearly delineated." The modeling analysis includes the NOx SIP call, but excludes the new National Ambient Air Quality Standards (NAAQS) from ozone and fine particulates, Maximum Achievable Control Technology (MACT) standard for mercury, and revisions to SIPs to address regional haze. The Base Case does include the EPA Climate Change Action Plan, even through the plan has no statutory or regulatory basis, has not been fully funded by Congress, and has been superseded by the President's February 14, 2002 Climate Change Initiative. Most importantly, IPM does not consider the cumulative impact of the Administration's Clear Skies initiatives and Phase II 316(b) regulations.

The Clear Skies Initiative is the most aggressive action ever proposed to reduce air emissions from power plants. The proposal has been fully delineated and has already been extensively modeled by EPA using IPM.

The milestones for Clear Skies reductions begin in 2008 and extend through 2020. EPA expects the initiatives will result in significant over-compliance in the early years because sources are allowed to bank excess emissions reductions and use them later. Thus, a substantial level of activity to implement Clear Skies will occur in the same timeframe as Phase II 316(b) regulations implementation. For example, an unpublished analysis of compliance with Clear Skies, compiled by the Electric Power Research Institute (EPRI), showed that one-half to two-thirds of the fossil steam units that were analyzed for air emissions controls have cooling systems that would be subject to the Phase II 316(b) regulations. Comparable details from EPA's IPM analysis of Clear Skies and the IPM analysis of 316(b) have not been made public.

Implementation of Clear Skies will increase both the fixed and variable costs of fossil fuel generating facilities. Many facilities will have higher variable costs, raising their relative cost in the dispatch process modeled by IPM. With the additional impact of 316(b) regulations, it is likely that a number of these facilities would affect the market-clearing price. In addition, the fossil fuel generating units will have installation downtimes and energy penalties associated with Clear Skies implementation. These will interact with similar impacts from 316(b) implementation. It is unlikely that the impacts are simply additive. A new modeling analysis that combines both requirements is needed to determine both the cumulative and interactive effects.

In short, the IPM analysis of the proposed Phase II 316(b) regulations should be combined with the IPM analysis of the Clear Skies Initiative. Both proposals are sufficiently well-defined to support such an analysis, and since both represent Administration policy, it would be appropriate to consider the cumulative effects as part of the analysis of costs as required under Executive Order No. 12866.

EPA Response

EPA disagrees with the comment that it should have included the Clear Skies Initiative in its IPM analysis. The IPM base case includes current federal and state air quality requirements, as known at the time the model version was developed, including future implementation of SO_2 and NOx requirements of Title IV of the CAA and the NOx SIP call as implemented through a cap and trade program. It does not include programs that are still under consideration, such as the Clear Skies Initiative cited by the commenter. EPA does not know – and cannot reasonably predict – the outcome of initiatives still under consideration; therefore, any cost estimates EPA might try to develop would be highly speculative and unhelpful. This practice of only including promulgated regulations is typical for energy market models and the Agency's analyses of Clean Water Act rules.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Johnathan F. Lewis

On Behalf Of:

Clean Air Task Force

Author ID Number:

316bEFR.329

Comment ID 316bEFR.329.001

Subject Matter Code 7.02
Performance standards

Author Name Johnathan F. Lewis
Organization Clean Air Task Force

In its recent notice of data availability (NODA),<FN 2> the EPA has dealt with some of the data gaps that plagued the original proposal. The level of protection afforded to waterbodies has not improved, however. In fact, the NODA gives the impression that EPA will retreat even further from its obligation to issue regulations which "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."<FN 3>

We once again strongly urge the EPA to fulfill its statutory responsibility by selecting the "all closed-cycle option" as the Best Technology Available (BTA). A rule that requires closed-cycle cooling or its functional equivalent in terms of cooling water intake capacity would provide much greater protection against adverse environmental impact than would the EPA's preferred option. We also take this opportunity to reiterate that the EPA has overstated the potential impact the "all closed-cycle option" would have on energy reliability. Recent analysis of the energy sector confirms that which we told the Agency last summer: the amount of electric generating capacity that EPA estimates would be retired if closed-cycle cooling was required at all Phase II facilities is but a tiny fraction of the amount by which the EPA has underestimated long-term total generating capacity. Finally, we submit for the EPA's consideration a recent report prepared by the Clean Air Task Force and the Land and Water Fund of the Rockies that details the harm caused by power plants to water resources in the Western United States. Our report, The Last Straw: Water Use by Power Plants in the Arid West, provides additional evidence that the EPA needs to adopt a CWIS rule that is more protective than the option it currently prefers.<FN 4>

Footnotes

2 68 Fed. Reg. 13522 (March 19, 2003).

3 CWA § 316(b), 33 U.S.C. § 1326(b).

4 CLEAN AIR TASK FORCE AND THE LAND AND WATER FUND OF THE ROCKIES, THE LAST STRAW: WATER USE BY POWER PLANTS IN THE ARID WEST (April 2003) ("The Last Straw"). The Last Straw is attached to these comments as Appendix 2.

EPA Response

Please see response to comment 316bEFR.206.022.

Comment ID 316bEFR.329.002

Author Name Johnathan F. Lewis

Organization Clean Air Task Force

Subject Matter Code 7.02

Performance standards

EPA Must Adopt a CWIS Standard that Truly Minimizes Adverse Environmental Impact

For the reasons set forth in our August 2002 comments,<FN 5> the EPA's preferred Phase II CWIS standard fails to reflect the best technology available for minimizing adverse environmental impact. The EPA is required by law to ensure that "[a]ny standard established pursuant to [Clean Water Act limitations on effluent and thermal discharge] and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."<FN 6> To fulfill its mandate, the EPA must select the available CWIS technology that will best protect aquatic organisms from impingement and entrainment. The Agency has instead indicated it prefers an option – a hodgepodge of compliance methods and various standards based on the perceived sensitivity of the source waterbody<FN 7> – that is patently less protective than the "all closed-cycle option."

The all closed-cycle option would be more effective than the EPA's preferred option at protecting the quality of our rivers, lakes, estuaries, and bays. A Phase II rule that requires closed-cycle cooling or its functional equivalent would ensure that intake capacity levels at existing facilities are reduced by 96% when compared with once-through cooling systems.<FN 8> Mortality from impingement and entrainment would decline by as much as 98%<FN 9> – a significant improvement over the preferred approach, which would require that facilities reduce impingement mortality by 80% and entrainment mortality by 60%.<FN 10> Congress directed the EPA to regulate CWIS by mandating the best technology available for minimizing adverse environmental impact. The all closed-cycle option is clearly better than the EPA's preferred option at achieving that directive, and it is readily available and affordable. Accordingly, the EPA should select the all closed-cycle option as the CWIS standard for Phase II facilities.

Footnotes

5 See CATF CWIS Comments 2002, supra note 1, at 8-10.

6 CWA § 316(b), 33 U.S.C. § 1326(b).

7 68 Fed. Reg. at 13524/1-2.

8 See RICHARD OTTINGER, ET AL., THE ENVIRONMENTAL COST OF ELECTRICITY 281 (1990).

9 67 Fed. Reg. 17121, 17142 (April 9, 2002) (citing Chapter 5 of EPA, Technical Development Document for the Final Rule for New Facilities (EPA-821-R-01-036) (November 2001)).

10 Id. at 17140.

EPA Response

Please see response to comment 316bEFR.206.022.

Comment ID 316bEFR.329.003

Author Name Johnathan F. Lewis

Organization Clean Air Task Force

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

The All Closed-Cycle Option Would Have an Insignificant Impact on Energy Reliability

In our August 2002 comments, we pointed out that the projected market impact of a rule that mandates closed-cycle cooling is miniscule. According to the EPA's projections, only 6560 MW would be closed if the Agency adopted an all closed-cycle rule.<FN 11> That lost capacity would be less than one percent of total generating capacity, an amount the Agency has characterized as "insignificant."<FN 12> We also explained how the IPM 2000 – the model used by the EPA to project the market impacts of the various regulatory options – dramatically underestimates the amount of new generating capacity that is currently under development. As a consequence, the EPA's market impact projections for the all closed-cycle option, which were negligible to begin with, were in fact exaggerated.<FN 13> Finally, our comments demonstrated that the amount by which the EPA underestimated long-term total generating capacity dwarfs the amount of electric generating capacity that the Agency estimates will be retired under the all closed-cycle option.<FN 14>

Several of these findings relied on an analysis of the April 2002 update of the RDI NEWGen database, a proprietary database that contains detailed information on the status of new plant development projects across the country. The database is updated monthly and provides the most timely and accurate method of tracking actual power plant development. By analyzing data from the April 2002 update of the RDI NewGen database and taking into account various project and business criteria, the Clean Air Task Force and our consultants were able to assess the likelihood that power plant development projects across the country will be completed. Based on that assessment, were able to confidently project capacity additions through 2006.

Using the February 2003 update to the RDI NEWGen database, the Clean Air Task Force and our partners have reanalyzed the likely scale of future additions to the United State's electric generating capacity.<FN 15> We found that almost 130,000 MW of new capacity has come online since the beginning of 2000, with more 70,000 MW of capacity currently under construction.<FN 16> An additional 40,000 MW of additional capacity is under development and is likely to go online by the end of 2007.<FN 17> Regional power market reserve margins – a leading indicator of energy reliability – have greatly improved since 1999 and will continue to improve through 2007 in most regions.<FN 18>

Based on our reanalysis of the RDI NEWGEN data, we are able to reaffirm the position we took in our August 2002 comments. The amount of generating capacity that EPA predicts would be lost under an all closed-cycle rule (6560 MW) remains insignificant when considered against the abundance of new capacity that is coming online. Moreover, the Agency's lost capacity estimate is only a fraction of the amount by which the EPA, using IPM 2000, has underestimated future generating capacity additions.<FN 19>

Footnotes

11 Id. at 17188, Exhibit 13 (April 9, 2002).

12 Id. at 17186 (in its description of market impacts associated with the waterbody/capacity-based option, the EPA describes relative larger capacity closures of 1.1% and 1.3% as “an insignificant percentage of total baseline capacity”).

13 CATF CWIS Comments 2002, supra note 1, at 13-15.

14 Id. at 15-18.

15 See Clean Air Task Force, Electric Power Generation Update: Preliminary Results (April 2003) (“CATF April 2003 PowerGen Update”). The update is attached to these comments as Appendix 3. As with our analysis of the April 2002 update, the future capacity forecast assumes many active capacity development projects will be delayed or abandoned due to regulatory or market factors.

16 Id. at 8.

17 Id.

18 Id. at 19.

19 For example, the EPA’s revised market projections suggest that under the base case scenario, a total of 100,634 MW of additional capacity will come online by 2010 (79,683 MW of new additional capacity and 20,951 MW of additional repowering capacity). EPA, Section 316(b) Phase II Economic Benefits Analysis – Chapter B3: Electricity Market Model Analysis B3-12 (NODA Version – March 12, 2003). According to our conservative analysis of recent RDI NEWGen data, however, 113,947 MW of new capacity will be developed by 2007. CATF April 2003 PowerGen Update, supra note 15, at 8. Thus, the amount of new capacity that RDI NEWGen data indicates will come online in the next four years is greater than the amount that EPA projects will come online in the next seven years.

EPA Response

Please refer to the responses to comments 316bEFR.061.001 and 316bEFR.061.008 in subject matter code 9.03.

Comment ID 316bEFR.329.004

Author Name Johnathan F. Lewis

Organization Clean Air Task Force

Subject Matter Code 7.02

Performance standards

Recent Report Underscores the Need for a More Protective Cooling Water Standard

Phase II facilities actively contribute to water scarcity in the Western United States. Existing fossil fuel-fired power plants in the Interior West withdraw well over 200 billion gallons of water per year – enough to accommodate the municipal water needs of almost four million people.<FN 20> New power plants currently under development will exacerbate the problem by withdrawing an additional forty-two billon gallons each year.<FN 21> Most of the water withdrawn by these facilities is used for cooling purposes.<FN 22>

The Clean Air Task Force and the Land and Water Fund of the Rockies recently published The Last Straw: Water Use by Power Plants in the Arid West. The report is included in these comments at Appendix 2. The Last Straw "examines the close relationships between power generation and water, including water use effects on competing uses, water quality and power system reliability."<FN 23> The report finds that coal-fired power plants in particular can significantly impact water resources in the Interior West, especially in overused water basins and in times of drought. "Despite the potential water savings associated with other means of power generation, many older generating units are still in operation today, and coal-fired power plants continue to be the dominant power source in the Interior West."<FN 24>

EPA has the opportunity and the responsibility to limit the impact that these facilities have on Western water resources by selecting the all closed-cycle option as BTA for Phase II facilities. Most of the fossil fuel-fired power plants in the Interior West already use closed-cycle cooling – evidence that closed-cycle cooling is an effective, affordable, and available option for Western power plants.<FN 25> A CWIS standard that requires closed-cycle cooling at all Phase II facilities would protect vulnerable Western water resources by drastically reducing the adverse environmental impact caused by those generators that continue to utilize outdated once-through cooling systems.

Footnotes

20 The Last Straw, supra note 4, at 1. The Interior West consists of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming.

21 Id. at 2. This figure assumes that less than half of the new generating capacity that has been proposed in the Interior West will actually come online.

22 Id. at 4.

23 Id. at 1.

24 Id. at 3.

25 Id. at 4.

EPA Response

EPA agrees with the commenter that water use issues are of concern, especially in areas where limited supplies may be under additional stress. EPA notes that today's rule recognizes the ability of a State to adopt or enforce more stringent requirements.

Comment ID 316bEFR.329.005

Subject Matter Code 7.02

Performance standards

Author Name Johnathan F. Lewis

Organization Clean Air Task Force

In our previous comments, we argued that in order to discharge its statutory duty, the EPA must require that Phase II facilities use closed-cycle cooling or its functional equivalent. Closed-cycle cooling is simply more effective than the various proposed stratagems at minimizing the adverse environmental impact of CWIS. In addition, we argued that the significant environmental advantages associated with a rule that requires closed-cycle cooling could be achieved without threatening the supply or reliability of electricity around the country.

Those comments remain true. The EPA is still incapable of demonstrating that its preferred approach would do a better job of minimizing adverse environmental impact than would a closed-cycle cooling rule. Nor has the EPA been able to show that the closed-cycle option should be precluded on the basis of cost – a factor which the Agency is not even authorized to consider.<FN 26> The EPA's proposed Phase II CWIS rule is an inadequate response to a serious problem. Accordingly, we once again urge the Agency to adopt the all closed-cycle option as BTA for existing power plants.

Footnotes

26 See CATF CWIS Comments 2002, supra note 1, at 10-13.

EPA Response

Please see response to comment 316bEFR.206.022.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed W. Super

On Behalf Of:

Riverkeeper obo Pisces Conservation, Inc.

Author ID Number:

316bEFR.330

Comment ID 316bEFR.330.001

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Best Technology Available for Cooing Water Intakes

Closed-cycle recirculating cooling systems (evaporative cooling towers) are the best technology because they reduce impingement and entrainment of all species by approximately 95%. EPA proposes that instead of closed-cycle cooling, facilities may use other technologies that reduce entrainment by 60-90% and reduce impingement by 80-95% from the calculation baseline. In this section we examine several technical issues related to best technology available and EPA's performance standards: (a) the relationship between intake flow and impingement and entrainment; (b) EPA's concept and definition of the "Calculation Baseline"; (c) the extent to which available intake screening and fish diversion technologies can achieve 60-90% and 80-95% reductions; and (d) the reasonableness of EPA's assumption of 100% mortality of entrained organisms.

EPA Response

EPA disagrees that evaporative cooling towers reduce entrainment by 95 percent for all waterbodies. This statement is somewhat misleading when comparing to the Agency's entrainment standards of 60 to 90 percent for all waterbodies. See response to comment 316b.EFR.330.006 and 316b.EFR.404.034.

Comment ID 316bEFR.330.002

Author Name Reed W. Super
Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.01
Overview of I & E effects on organisms

The Relationship Between Intake Flow And Impingement And Entrainment:

Introduction

In this note we discuss the role of intake velocity in determining the number of fish sucked into a power station intake. In our previous analysis we have produced predictive regression models that relate the number of fish impinged to the volume of water pumped rather than the velocity. Below we first examine the statistical basis for these regression models in more detail and place confidence limits on the regression equations produced. This more refined statistical analysis demonstrates the validity of our previous work ands shows that the volume pumped is a good predictor of total impingement.

Further, we examine intake velocity data and show that in many cases fish will be caught even if the velocities are set at the lower end of the practical limits. This is important because the argument that if the designed intake velocity is set low fish will be able to escape seems to have a logical basis. Put simply, if a fish can swim against the intake water flow then it should be able to escape and thus the rate of impingement will not depend on the volume but rather the velocity. Our use of volume was based on the observation that in practice, no direct-cooled large power plants have intake velocities sufficiently low to allow all sizes of fish to escape. Further, most fish are small and as the swimming speeds of fish are determined by their size (length) and the maximum intake velocities in almost all cases are above the sustainable swimming speed of small fish. The result is that the total number of fish caught is relatively insensitive to differences in average intake velocity.

Finally we will explain below that a key reason why intake velocities cannot in practice be used to predict fish ingress is because velocities usually vary through time and frequently vary spatially across the intake. Without extensive site measurements of flow it is simply not possible to predict what the intake velocities experienced by the fish actually are. A particular point to note is that taking the volume pumped and dividing it by the cross-sectional area of the intake calculates the nominal intake velocity. As will be shown below such an approach takes no account of the water velocity caused by tidal currents etc. It gives no idea of the maximum intake velocity, it is the maximum velocity which must be below the swimming speed of the fish if impingement is to be avoided.

The relationship between volume pumped and the number of fish impinged

The basic regression results previously presented are shown in the Figure below. Three regressions linking the number of fish impinged were calculated, (1) all plants. (2) Marine and Estuarine and (3) freshwater excluding Great Lakes. These will be considered in turn below and the full statistical analysis and confidence intervals calculated.

[See hard copy for figures and statistical analysis results]

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used in EPA's benefits analysis that I&E are proportional to flow.

Comment ID 316bEFR.330.003

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

The relationship between volume pumped and the number of fish entrained

Annual entrainment of fish in for US power plant cooling water systems was estimated using the same approach to that developed above for impingement (See Section 1.1.2).

Predicting entrainment

Two key aspects that affect the number of young fish killed by entrainment are location and size of the intake. It is apparent that, within single water body, the larger the volume pumped the larger the number of organisms that will be entrained. The locality and nature of a water body will influence the abundance of fish eggs and larvae. It is clear that some localities are particularly favoured as spawning grounds whilst other regions, such as highly turbid waters in muddy estuaries, are not. After investigation of the various options source waters were classified into (1) freshwaters of all types and (2) marine and estuarine.

Table 1. The number of fish entrained al freshwater and marine power plants in the USA
[See hardcopy for table]

Entrainment flow relationship for freshwaters

Annual entrainment estimates were collected from the literature for 14 power plants drawing their cooling water from freshwaters including the Great Lakes (Table 1). To be included in the analysis entrainment data had to be collected over at least one year to ensure full seasonal coverage. Using regression analysis the best fit to a simple function gave the equation:

En= 2E+07 V^0.1924

where En is the number of fish entrained per year and V the volume extracted in cubic feet per second. This equation and the entrainment data are plotted in Figure 1.

Figure 1. Total entrainment for freshwater stations in the US.
[See hardcopy for table]

Entrainment flow relationship for oceans and estuaries

Annual entrainment estimates were collected from the literature for 15 power plants drawing their cooling water from estuarine or marine waters (Table 1). To be included in the analysis entrainment data had to be collected over at least one year to ensure full seasonal coverage. Using regression analysis the best fit to the combined marine and estuarine data gave the equation:

En = 457475 V^1.1405

where En is the number of fish entrained per year and V the volume extracted in cubic feet per second.

This equation and the entrainment data are plotted in Figure 2.

Figure 2. Total annual entrainment for marine and estuarine stations in the US.
[See hardcopy for table]

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used in EPA's benefits analysis that I&E are proportional to intake flow.

Comment ID 316bEFR.330.004

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

The Approach Velocities at intakes

The water velocity ahead of the primary (coarse) screening systems of a water intake structure is termed the approach velocity. A more precise definition for the present purpose is the maximum velocity in an intake system against which fish must swim to escape. To ensure that fish can escape, the approach velocity must therefore be kept below the maximum sustainable swimming speeds of the fish.

The swimming speed required for escape, depends on the orientation of the fish. If the screen is not aligned normal to the flow and the velocity is close to the maximum sustainable swimming speed, fish are often observed to swim ahead of the screen, in a direction perpendicular to the screen face (Sonnichsen et al., 1973; Arnold, 1974). This indicates that the fish are orientating to the face of the screen rather than the hydraulic streamlines. A similar behaviour has been observed in fishing gear research amongst flatfish herded by the sweeps and bridles of a trawl (Main and Sangster, 1981). It is generally agreed, therefore, that the design velocity for fish escape should be computed as the velocity vector normal to the bars of an intake and not along the streamline, unless these happen to be perpendicular to the trash-rack face.

Design values for approach velocities have been adopted by various agencies with a view to fish exclusion. Schuler and Larson (1975) cite a design velocity of 76 cm/s for the Southern California Edison Company's (SCEC) offshore intake structures, but from their own experimental trials recommended a modified design value of 46 cm/s for SCEC's San Onofre Nuclear Generating Station. Other utilities in the USA have adopted design values as low as 15-30 cm/s (Sonnichsen et al., 1973). While these are all standards defined almost 30 years ago the age of much direct-cooled plant makes it likely that they were designed using 1970s/1980s specifications.

In Britain Mawer (1982) specifies a peripheral velocity at the capped offshore structure “in the order of 50 cm/s” to enable fish to escape.

It must be borne in mind that other factors influence the choice of approach velocity, for example the necessity to prevent sedimentation in waters with a high silt burden, and the higher cost of the larger structure required to maintain low approach velocities. The final design velocity therefore reflects an optimization of all the salient factors, of which fish exclusion is only one; its importance will depend upon the significance of the locality to fisheries.

EPA Response

EPA appreciates the data provided by the commenter and notes the inclusion, under compliance alternative 1, for a facility subject to impingement mortality performance standards to maintain a through-screen velocity of 0.5 feet per second (fps), thus triggering reduced Comprehensive

Demonstration Study requirements. For further discussion of this alternative, please see the preamble to today's rule.

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Fish Escape

It is generally accepted that if the flow is sufficiently low for the fish to swim away then they will not be entrained or impinged. Below we discuss what
velocities will allow fish to escape. However, it should always be remembered that large fish which almost certainly did have the power to escape are frequently
caught on screens indicating that swimming ability is not the only factor determining the rate of impingement.

To ascertain approach velocities from which fish can escape, it is necessary to consider first the species present in the locality and then the size distributions present. From this information, swimming performance data can be used to predict the proportion of fish vulnerable at any given water temperature. For all species, the probability of escape is lowest when waters are coldest. Where significant seasonal variations occur due to age-selective migrations or growth, separate length distribution and temperature values can be applied for each season.

Velocity Characteristics of Water Intakes

Onshore and shoreline intakes

An onshore intake is defined as one where the water is abstracted without the need for an offshore pipeline and intake structure. Where the marginal water is shallow, water is normally taken via a deep canal, or directly through a sea wall or river bank where the marginal water is deep. The second type is known as a 'shoreline' intake.

A typical onshore intake layout is shown below.

(See 1.1.6. For Missing Diagram)

Water enters via an orifice in a vertical wall. The opening is normally protected by a coarse screen or 'trash rack' of vertical steel bars fixed at circa 15 cm centres. Beyond this is a traveling band or drum screen which removes entrained fish and debris. While it has been shown that live fish released behind the coarse screens into the screenwell area can escape from the system, the hazards of turbulence in the screenwells and of sometimes toxicity due to chlorine injected to prevent bio-fouling render this opportunity unlikely as a general rule. The design expectation should therefore be that fish are enabled to escape before passing through the coarse screens.

The vertical openings of onshore intake designs lend themselves to fish escape since the water currents are predominantly horizontal at the coarse screens. The main consideration for fish escape is therefore that the approach velocity at that point, under all operating conditions, is kept within the swimming speed ranges of the fish. It is preferable that a uniform velocity profile be achieved across the face of the screens but, .if not, that the conditions for fish escape are met at the maximum velocity value.

A difficulty of some canalized onshore intake designs is that the point of maximum approach velocity in the canal is at some distance ahead of the coarse screens and not at the screen face. As a consequence, by the time fish come into contact with the coarse screens and attempt to escape, poorer swimmers become trapped within the system.

A further aspect of great importance is that in tidal waters fish move off the mudflats as the tide drops. To do this they follow the current. If they are in the vicinity of an intake they will follow the water into the intake. Thus their normal behaviour can cause them to move into danger.

Offshore intakes

Offshore intakes vary widely in design, but generally comprise an offshore structure connected by a sub-sea tunnel to the shoreline. Older designs, are open-topped and have strong vertical draw-down currents, whereas more recent designs have capped intakes with a more horizontal flow pattern (see below). Capped intakes may reduce fish ingress but blocking the top of an intake without due regard to the flow pattern is not sufficient to guarantee fish protection. As a simple criterion for a fish protecting intake, Schuler and Larson (1975) proposed that “to create the desired uniformity in entrance velocity and to increase the time for reaction (of fish) to the flow, the cap and lip of the riser must extend horizontally from the riser body 1.5 times the height of the opening” (see below). There are, however, reasons unrelated to fish protection for adopting capped intake designs. Goldring (1984) showed that capped intakes have superior characteristics for selective withdrawal of cooler water in thermally stratified environments - another example of how intake design must reflect a variety of requirements.

(See Figure1 in 1.1.6)

The horizontal flow pattern around an offshore structure is just as important as it is for onshore intakes. In still water, inflow is uniform around the structure and
streamlines are normal to the trash-rack bars. In a tidal cross-flow, the distribution becomes biased, with most of the water entering close to the upstream radial axis where the approach velocity is consequently higher.

HORIZONTAL DISTRIBUTION OF STREAMLINES AND WATER VELOCITY AROUND A CIRCULAR CAPPED INTAKE STRUCTURE IN A TIDAL CROSSFLOW.

Intake flow - 13.7 m3 s-1, tidal velocity of 50 cm s-1, velocity values shown are as measured at mid-intake level along the direction of streamlines at the periphery of the intake structure. Values in parentheses are vectors normal to the periphery. All values are in units of cm s-1. [Based on trials with a 1/50 scale model.

It would be expected from this that catch rate at an offshore structure sited in a tidal stream would tend to be maximal around mid-flood and mid-ebb, and minimal around the slack water period. This has indeed been shown to be the case.

In hydraulic model tests carried out at CERL using a capped, circular intake with a nominal approach velocity (flow/screen area) of 25 cm s-1, the measured peak velocity in a simulated 50 cm s-1 tidal crossflow was 70 cm s-1. As a principle, it is not possible to achieve maximum approach velocities of less
than the tidal cross-flow velocity using a circular intake structure.

The above point has great importance, for it effectively states that irrespective of the velocity that would be generated in still water, in flowing water an offshore intake will have a maximum approach velocity determined by the tidal velocity. As the tidal velocity is frequently greater than the sustainable swimming speed of fish this means that they will be vulnerable to capture no matter how low the nominal intake velocity is.

EPA Response

EPA acknowledges this comment and notes that these are the types of important issues that must be considered when selecting the best technology for a particular site to meet the requirements set in today's final rule.

Comment ID 316bEFR.330.006

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Effect of reducing intake flows by 95%

Reducing the cooling water flow at a facility can produce a larger decrease in impingement than a simple percentage decrease in flow would indicate. The reduced velocities around the intake would mean many more young fish would be able to escape, and the reduced volumes would make effective protection methods such as wedge wire screens possible.

For entrainment, where the organisms are more passive, the relationship will be more linear, with a reduction in cooling water usage producing a similar reduction in impingement. The reduced flow will again make effective protective technologies possible.

EPA Response

First, the Agency notes that the reduction of intake flows due to adoption of recirculating cooling towers leads to a 95 percent intake flow reduction only in freshwater environments where entrainment is not as dramatic an issue as in marine environments. In marine environments, the reduction in flow due to cooling tower installations generally results in flow reductions in the range of 85 to 92 percent. As such, the commenter's basis of assumption for the 95 reduction may be misleading. See response to comment 316b.EFR.404.034.

Regarding intake velocity and impingement. The median intake velocity of intakes within the scope of this final rule is 1.5 ft / sec. This level of velocity is near to the reasonable range of acceptable levels for ensuring survival of impinged organisms for both modified ristroph traveling screens and wedgewire screens. The Agency has found that a significant number of facilities will be able to comply with impingement reduction requirements with their existing traveling screens and relatively simple modifications to these. This is due in large part to the moderate intake velocities of these existing intakes. For other intakes, where the velocity is above approximately 1 ft / sec, the Agency expects and predicts costs for significant changes to the intake in order to overcome the elevated velocity level. These means are discussed in detail in the Technical Development Document. In some cases the changes may involve enlarging the intake to lower the intake velocity, moving the intake slightly or dramatically and simultaneously enlarging the intake, adding barrier net systems that inherently operate at extremely low through-velocity, or installing velocity caps (that rely on a fish's ability to sense and avoid certain velocity vectors). As such, the Agency has accounted for reductions in impingement as required by the rule. Should facilities choose to also incorporate voluntary intermittent flow reduction as a means to meeting various standards, these would be acceptable means in the Agency's view. Therefore, the Agency believes that it is promulgating a rule that will dramatically reduce impingement of aquatic organisms over the absence of the rule.

Regarding entrainment performance of flow reduction, the Agency notes that the comment is only a general statement and does not assert a position in relation to the Agency's final rule requirements.

For further information relating to the basis for the final rule's requirements for entrainment reduction see the efficacy discussion included in the Technical Development Document.

Comment ID 316bEFR.330.007

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 7.02

Performance standards

Calculation Baseline

Introduction

The EPA wishes to impose a reduction in impingement and entrainment at all power plants in the US. One obstacle to applying this reduction fairly comes from the need to recognise the technologies already installed at the facilities - it is unfair if a plant with good intake protection is forced to reduce its entrainment by the same amount as a facility with no protection. To this end, the EPA has come up with the concept of a calculation baseline station.

The calculation baseline station is a theoretical station that is built on the same site as the real station. It has set features that are defined below:

Calculation baseline means an estimate of impingement mortality and entrainment that would occur at your site assuming (1) the cooling water system has been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard 38-inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source water body; and (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment.' (from National Pollutant Discharge Elimination System—Proposed Regulations To Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities; Notice of Data Availability)

We will examine each part of this process in turn.

- Baseline cooling water intake structure is located at, and the screen face is parallel to, the shoreline.

This baseline is calculated to allow for stations with good intake designs, for example having an angled screen or an offshore intake. Offshore intakes are expensive structures and are only used where there is an engineering advantage. They are often the only solution for areas with large variations in water level caused by tides, seasonal low levels or flow, or drawdown. It is certainly feasible for offshore intakes to catch as many, if not more, fish than an onshore intake, particularly in marine environments.

New wording could possibly be - Baseline cooling water intake structure is located with the greatest engineering advantage, with the most cost-effective screening fitted.

- Baseline cooling water intake structure opening is located at or near the surface of the source water body.

Withdrawing water from lower in the water column is not unusual. This is done for a number of sound engineering reasons, chiefly getting the coldest water to the condensers, and maintaining cooling water flow when the water level drops. The intake structures of power plants are designed to allow the facility to operate at full capacity when the water level is as low as it can feasibly get. For example, in the marine environment the intake will be designed to cope with the lowest possible tide in combination with high atmospheric pressure; a facility using lake water for cooling must be able to cope with drought and drawdown. The intake often is placed 3 ft or so below this level. It seems generous to allow a reduction for this factor, that in most cases is done to allow the continued operation of the facility in any conditions.

New wording could possibly be - Baseline cooling water intake structure opening is located at the depth which good engineering practice demands.

- Baseline cooling water intake structure has a traveling screen with the standard 3/8 inch mesh size commonly used to keep condensers free
from debris.

This is sensible as it allows a standard split to be made between impingeable and entrainable organisms.

- Baseline practices and procedures are those that the facility would maintain in the absence of any operational controls implemented in whole or in part for the purpose of reducing impingement mortality and entrainment.

This is fair, as any restriction imposed for the facility to reduce impingement and entrainment is already potentially costing the plant in terms of electrical production.

EPA Response

See comment 316bEFR.330.008 and 316bEFR.063.022.

Comment ID 316bEFR.330.008

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 7.02

Performance standards

Calculating the catch of the baseline

This is probably the most difficult part of this method. Even calculating the baseline figures from a station where data exist will be difficult. The variations caused by small changes of station configuration are very difficult to quantify. For example, recalculating the number of organisms entrained by an existing offshore intake to estimate catches at a hypothetical inshore intake requires considerable background knowledge. Information on where fish live in the area, whether the intake is on a migration route for a fish species, the distribution of larval fish between the inshore and offshore areas and many other factors would need consideration before a realistic conversion could be made.

Estimating the numbers and species of fish impinged or entrained on two facilities close to each other, on the same water body and in similar environments may be possible. However, it would only be a very approximate figure, and the EPA would probably need to add a large safety factor to ensure that I & E were not underestimated. Suggestions have been made to allow data from plants on different water bodies to be used. In our opinion, this is very problematical as, as stated above, minor variations can have very large effects on the potential for I & E.

Data from power plants need to be considered with some care. Take, for example, the situation of a power plant working in an area with a depleted natural population of fish. The population may have been reduced by many years of heavy I & E by the power plant, or by pollution or other environmental factors, but the result will almost certainly be that the power plant records fairly low levels of I & E. If the hypothetical baseline calculations were made assuming an environment with a healthy fish population, the existing plant might appear to have a good (i.e. low) level of I & E, and thus avoid the requirement for reduction. In fact, in terms of proportion of the total population entrained/impinged, the existing station could be performing as badly or worse than the hypothetical baseline station in a healthy environment.

For this reason, it would be desirable to be able to apply some kind of scaling (for example, % of total population impinged, or number impinged per 100,000 population) to existing and extrapolated I & E data, rather than using raw numbers. However, it is appreciated that in practice this may be difficult or impossible to achieve.

The suggestion to use “as built” approach.

In this approach the facility must either use historical entrainment data for the site or collect new data by sampling in front of the intake. This has several advantages in terms of simplicity. The lack of reliance on a hypothetical baseline would make the process more robust, but would involve a considerable amount of data collection, and consequent costs.

EPA Response

See comment 316bEFR.308.014.

Comment ID 316bEFR.330.009

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 4.01

Source data used by EPA

Screen And Fish Diversion Technologies To Reduce Impingement And Entrainment

The new database provided by the EPA does not materially improve the knowledge on these different technologies. Some are studies of well-known methodologies (traveling screens etc) others are of very experimental technologies.

One of the most obvious facts to come from the new data is that most of the technologies produce large between-sites and between-species variations in reduction of I&E. It is therefore impossible to produce a meaningful average figure for the decrease due to a particular technology. The only exception is the effect of reducing the total amount of cooling water used as a facility. This will produce a reduction in the I&E of all species.

EPA Response

EPA agrees that the technologies available to minimize impingement mortality and entrainment caused by cooling water intake structures will demonstrate a range of efficacies affected by physical and biological conditions at a given site. For this reason, EPA has set requirements that facilities must achieve, using whatever combinations of design and construction technologies, operational measures, and restoration measures are necessary to do so. EPA believes that the requirements represent the best, economically achievable, technology available for minimizing adverse environmental impact for Phase II facilities, considered as a group, although site-specific options are also available. EPA has also provided a compliance option that rewards facilities that have reduced flow commensurate with closed-cycle cooling, to be automatically considered in compliance with today's final rule.

Comment ID 316bEFR.330.010

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 7.03

Available I&E technologies

Modified traveling screens - 'Ristroph Screens'

Efficacy of Cooling Water Intake Technologies Chapter 3 adequately summarises the effectiveness of Ristroph screens and fish return systems to reduce fish impingement mortality. The report notes that their effectiveness is highly variable but that at least a 70-80% reduction in impingement can be achieved over conventional traveling screens. In practice this figure is probably higher than will actually be achieved, for two reasons. First, it will depend on the species mix at the particular site and, as will be discussed below, some species of fish are much more easily hurt than others. Second, the need to fit modified screens into existing intake structures may result in less effective performance.

The actual reduction that can be achieved will depend on the dominant species for the locality. Generally clupeid fish are by far the most abundant species and these are particularly vulnerable to damage following contact with surfaces. Further, there are likely to be considerable differences in survival between clupeid species e.g. survival values quoted in chapter 3 show bay anchovy 20-72%; herring 78-82%; alewife 15-44%.

Table 2. 8 hr survival rates for Indian Point (Fletcher, 1990)
[See hardcopy]

Table 2 suggests that an intake situated in waters where alewife were one of the most abundant species caught would be unlikely to achieve 70% reduction in average impingement mortality. The effect of the species mix on the average survival that can be achieved in practice can be appreciated from a consideration of the data for Salem. Bay anchovy are by far the most abundant species impinged and on average represent about 50% of all impinged individuals. The next most abundant species is weakfish, which contributes about 22% of all individuals impinged. Thus these species, with recorded survivals at Salem for bay anchovy of 20 - 72% and weakfish of 18 - 88%, represent about 72% of all impinged fish, and will effectively determine the average survival. It is clear that this value is unlikely to reach 70% and could on occasions be much lower.

An additional factor reducing the likelihood of 70 to 80% survival rates is that the data presented in Table 14 above are 8 hr survival rates, and may not be of sufficient duration to predict the long-term survival of fish. It has been found that stressed and damaged fish can take a number of days to die. There is also the problem with all fish return systems that exhausted, disorientated and damaged individuals can be picked off by predators on their return to the main water body.

Further doubt on the effectiveness of screens with modified Ristroph features comes from studies undertaken at Roseton units 1 & 2. This site has six conventional screens and two modified dual-flow screens. One of the modified screens also has a flow straightening device. Testing of the dual flow screens found that while post impingement survival rates were higher than at the conventional screens, they were not as high as those observed at the Indian Point or Arthur Kill intakes. It was suggested that this was linked to the pattern and magnitude of the water velocity close to the screens.

Velocities were increased because the modified screens had a reduced filtering area. This was the inevitable outcome of fitting modified screens without major structural alteration to the intake system (DEIS for Bowline Point, Indian Point & Roseton GS, VIII-29).

Cylindrical wedgewire screens

Wedgewire screens have a proven ability to reduce both impingement and entrainment mortality at low volume intakes (1 to 50 MGD). Their effectiveness is related to (1) the slot width, (2) through-slot velocity, (3) existence and strength of ambient cross flow to carry organisms away from the screen, (4) the amount of biofouling and (5) the amount of ambient debris. As the EPA note, they are an unproven technology for protecting once-through intakes that typically pump volumes in excess of 100 MGD. As will be discussed below, the effectiveness of wedgewire screens is linked to water velocity across the screen and this has not been quoted in the EPA discussion of effectiveness.

Wedgewire screens with slots widths of 5 to 10 mm have been used to effectively eliminate impingement at freshwater cooling water intakes. They have not been used at marine or estuarine facilities probably because of fears that biofouling and screen blockage would lead to operational problems. Small-scale trials of Johnson wedgewire screens at Fawley, England in the 1980s showed that standard steel wedge-wire screens developed a fouling community (Bamber and Turnpenny, 1986). Even a Johnson 715 alloy (70% Cu: 30% Ni) screen that leached copper and thus poisoned organisms that had settled, experienced some fouling.

To reduce entrainment of fish eggs and larvae appreciably the screen slot widths need to be in the range 0.5 to 3.0 mm. Weisberg et al. (1984) & (1987) found that a 3 mm slit width excluded about 50% of bay anchovy and naked goby larvae in the 5 to 6 mm long size class. A 1 mm slot width gave almost complete exclusion of bay anchovy greater than 8 mm in length and naked goby greater than 7 mm long. To give good protection to the very small larvae a slot width of 0.5 mm is required.

A 0.5 mm slot width will only be highly effective for larval exclusion when used with a suitable intake velocity. At a velocity of 7.5 cm/s this width will exclude larvae less than 6 mm in length. However, at a velocity of 15.0 cm/s (0.5 fps) about 60% of larvae less than 7.0 mm in length were entrained.

The reduction of egg entrainment is related to the size of the egg. However, eggs are not rigid and eggs greater than 0.5 mm in diameter will pass across a 0.5 mm slot. Data on the entrainment of marine fish eggs via a 0.5 mm slot width screen with a velocity of 7.5 cm/s are presented in Table 3.

Table 3. Entrainment of marine fish eggs via a 0.5 mm slot width screen with a velocity of 7.5 cm/s (Sunset Energy Facility proposal for Brooklyn New York)
[See hardcopy]

A species of particular importance in many estuaries is the striped bass. This species has a relatively large egg (2.4 to 3.9 mm diameter) and thus egg entrainment would almost certainly be eliminated by slot widths in the range 0.5 to 1.0 mm. However the striped bass yolk sac larvae range in length from 2 to 7 mm which would suggest that some young larvae would be entrained with even a 0.5 mm slot width, and very limited protection would be offered by a width > 1.0 mm.

It is clear that the reduction in entrainment possible using wedgewire screens will be determined primarily by the slot width, the water velocity across the screen and the mix of species present at the particular locality. The performance values quoted in Chapter 3 – 'Efficacy of cooling water intake structure technologies' indicate exclusion efficiencies of eggs and larvae at or above 90% for a 1 mm screen width (Logan 90%; Seminole 99% reduction; Chalk Point 90%). In localities where the eggs of fish such as the bay anchovy are present, or yolk-sac striped bass are abundant, a 1 mm screen width would not be able to achieve this level of efficiency with any realistic intake velocity. Further, in fully marine localities there are species with egg diameters well below 1 mm. It is therefore unlikely that 90% exclusion could be achieved by a 1 mm screen width at many estuarine sites. At marine sites this level of exclusion would be even more unlikely to be achieved because of the presence of even smaller eggs and larvae and the probability of biofouling.

A more realistic appraisal of the level of entrainment exclusion that could be achieved with a velocity of 7.5 cm/s across the screen would be in the order of 90% for a 1 mm screen width in flowing rivers, 90% for a 0.5 mm screen width in lakes and 80-85% for estuarine sites with a 0.5 mm screen width. There are no data upon which to base an assessment for an intake situated on the ocean, but it would likely be below that for an estuarine intake because of the small size of some marine fish eggs and larvae and problems of screen blockage. Biofouling at ocean and lower estuarine sites is likely to be an insuperable problem which at best would result in regions of high cross screen velocities. It should be noted that in some localities, such as bays and inlets with small tidal ranges there may be insufficient cross-flows to sweep debris and impinged organisms off the screen surface.

Fine mesh traveling screens

The incidence of entrainment can be greatly reduced by the use of 1 to 0.5 mm mesh traveling screens. However, this does not mean that the mortality of young fish is proportionately reduced as the eggs and early stages are now liable to impingement damage. The EPA Chapter 3 discussion may give a misleading impression of the effectiveness of these devices by quoting the reduction in entrainment rather than the increase in survival. Survival on such screens is highly species-specific with clupeid and other pelagic fish such as bay anchovy and Alosa species having low survival. Taft et al. (1981) report laboratory studies of the effects of impingement on fine mesh screens for the larval stages of striped bass, winter flounder, alewife, yellow perch, walleye, channel catfish and bluegill. Survival was highly variable and dependent on water velocity across the screen and the duration of impingement. The highly species-specific nature of survival of impinged larvae was also noted by McLaren & Tuttle (1999).

Fletcher (1990) also noted that the mortality on fine mesh screens is related to the amount of debris retained by the screen. This would suggest that fine mesh screens would not be effective in all waters. Fletcher (1992) reports a study of the effectiveness of fine mesh screens to reduce losses of early life stages of striped bass. The results showed that survival was influenced by mesh size, water velocity and exposure time. It was concluded that impingement resulted in high mortality for young larvae and many larvae that initially survived impingement subsequently died. The results suggested that striped bass up to 8.4 mm long are too delicate to survive impingement.

Given the high maintenance of fine screens together with the known high impingement mortalities of many species these devices cannot be considered a useful protective measure.

Barrier nets

Under appropriate conditions barrier nets can be effective devices to reduce fish impingement. To be effective there must be limited debris in the water, a low incidence of biofouling, relatively low water velocities and sheltered conditions with low wave action, low current velocities, etc. The last of these requirements excludes their use at open water ocean sites. In estuarine conditions the EPA assessments exaggerate their effectiveness. The following is described for the barrier net deployment at Bowline Point GS on the Hudson Estuary.

"The Bowline Point Station (New York) has an approximately 150-foot barrier net in a v-shape around the intake structure. Testing during 1976 through 1985 showed that the net effectively reduces white perch and striped bass impingement by 91 percent. Based on tests of a "fine" mesh net (3.0 mm) in 1993 and 1994, researchers found that it could be used to generally prevent entrainment. Unfortunately, species' abundances were too low to determine the specific biological effectiveness."

This account gives the impression that the 3 mm net was useful for reducing entrainment. In fact as Lawler, Matusky & Skelly Engineers (1997) report in 1993 the net clogged with fine suspended silt and sank. In 1994, even when the net was sprayed to remove clogging it fouled with the algae Ectocarpus causing two of the support piles to snap and the evaluation to end. They concluded that 3 mm barrier nets can only be considered an experimental device.

The available data would suggest that barrier nets can be effective at reducing impingement mortality at intakes situated in lakes and sheltered waters. Fine barrier nets capable of reducing entrainment have not been successful at estuarine sites and Chapter 3 gives a misleading impression of the effectiveness of the 3 mm net at Bowline Point.

Microfiltration

The only microfiltration system considered is the Gunderboom and the report makes clear that the only data available comes from the observations at Lovett GS. It is concluded that 'Entrainment reductions up to 82 percent were observed for eggs and larvae and these levels have been maintained for extended month-to-month periods during 1999 through 2001.

This statement is a clear exaggeration of the observed effectiveness of the Gunderboom at Lovett GS. Overtopping, tunneling and rips have been observed during testing. For example, in the Lovett evaluation report for 1999 it is stated that "the divers documented a substantial gap along the bottom of the boom. The gap extended along the bottom of the boom for approximately 3 m and ranged in depth from 0.5 to 0.6 m".

Figure 3. The ratio of entrained larvae and eggs at Unit 3 and Unit 4 of Lovett during trials of the Gunderboom.
[See hardcopy]

It is clear in Figure 3 of the Lovett 2000 report (above) that there was a gradual increase in entrainment through time. Further, there was also a series of events between May and August 2000 that resulted in short-term total failures. The efficiency of the Gunderboom was assessed by comparing the level of entrainment at unit 3 (protected by a Gunderboom) to that at unit 4 (unprotected). Thus a ratio above 1 for the number of fish entrained at unit 3 to unit 4 shows that the boom was offering no protection. To achieve 82% effectiveness or better the ratio would need to be smaller than 0.18. As shown in the figure below this level of efficiency was only achieved for a short period during May 2000. It is therefore incorrect to conclude that it was achieved for extended month-to-month periods during 1999 through 2001. In fact from late July 2000 the Gunderboom was completely ineffective at reducing entrainment.

Louver

Chapter 3 concludes that "Overall, the above data indicate that louvers can be highly effective (70+ percent) in diverting fish from potential impingement. Latent mortality is a concern, especially where fragile species are present."

Louver systems have been studied at hydroelectric facilities with migratory species in rivers; they have been little studied at steam generating plant and require further large-scale evaluation before the view that they are highly effective or capable of preventing more than 70% of potential impingement can be accepted.

Angled screens

Chapter 3 concludes "Similar to louvers, angled screens show potential to minimize impingement by greater than 80 to 90 percent." This conclusion may give a misleading impression of the proven ability of such systems. There is no evidence that such high levels of impingement reduction would be achieved in practice.

Velocity caps

To claim that velocity caps have been successful in minimizing impingement is an exaggeration. They have been found to reduce impingement by 50 to 80% when compared with an unprotected intake. However, it should be noted that this reduction is usually only observed for pelagic species. Other fish and crustaceans may still be caught in large numbers.

Porous dikes

Chapter 3 gives a fair summary of the present state of knowledge.

Behavioural barriers

The EPA conclude that "Many studies have been conducted and reports prepared on the application of behavioral devices to control I&E, see EPRI 2000. For the most part, these studies have either been inconclusive or shown no tangible reduction in impingement or entrainment." This is certainly a fair assessment of the situation and we know of situations where sound deterrent systems have actually increased impingement. It is therefore rather surprising to read in the final sentence that "Overall, the Agency expects that behavioral systems would be used in conjunction with other technologies to reduce I&E and perhaps targeted towards an individual species (e.g., alewife)." This would suggest behavioral barriers could be usefully implemented. Except perhaps in the case of alewife there is little evidence that such systems reduce impingement and there is no evidence that they reduce entrainment at all.

Other technological alternatives

The heading holds a number of techniques that might be considered simple good practise rather than fish protection technologies.

The fitting of variable speed pumps can reduce the amount of water consumed compared with one-speed pumps and can therefore result in a reduction in the quantity of life entrained and impinged. However, the effectiveness will depend on the coincidence in time of the periods when the young fish are most abundant, the plant has the highest demand for electricity and the source water is warmest. In practice, for some localities the proportional reduction in fish killed will be less than the reduction in the volume pumped because demand, water temperature and young fish abundance all peak during the summer. Therefore the 10-30 % reduction claimed may not be achieved in practice and is more likely to be at the lower end of the estimate.

Continuous screen operation is probably useful as it reduces fish exhaustion prior to their return.

EPA Response

Please see response to comments 316bEFR.077.023 through 316bEFR.077.033, as well as Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.330.011

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Entrainment Survival

Current Position

It has generally been accepted that the only safe assumption for the mortality of fish entrained in the cooling water flow is 100%. This is the view expressed by the EPA in the new 316b regulations; we support that view and present our reasons for believing that 100% mortality is the only reasonable assumption.

Evidence for the assumption of 100% mortality

Survival of organisms in experiments.

Survival tests have shown that larval fish that have experienced passage through a power plant cooling water system suffer increased levels of mortality. The increased mortality is evident over all time periods studied, and fish still show an excess mortality over controls, even many days after entrainment.

Mortality is calculated by studying larvae from before (control) and after entrainment (experimental). The two samples are observed at intervals, often immediately and at 24, 48, 72 and 96 hours, and the number remaining alive in each sample noted. The mortality that is attributed to the entrainment is the difference in the number alive in the experimental and control sample. Performing these experiments is difficult and has many problems, not least because larval fish are extremely delicate.

The collection and handling of these very young fish is a difficult task. The stress of handling the fish can often lead to significant mortality, even in the control populations. This can lead to a masking of any entrainment effects, when the survival rate is lower in the control population than in the entrained fish. In the most extreme example, 100% mortality of the control sample leaves no mortality that can be attributed to the entrainment; combined with 100% mortality of the experimental sample it could even be taken to imply 100% survival. Control samples with 100% mortality occur at several sites, for example from chapter 7 of the § 316(b) Existing Facilities Benefits Case Studies, Part A: Evaluation Methods:

"In many studies, the survival in the intake sample is extremely low, for example the intake survival for bay anchovy was zero percent in studies conducted at Bowline (Ecological Analysts Inc., 1978), Brayton Point (Lawler, Matusky & Skelly Engineers, 1999), and Indian Point (Ecological Analysts Inc., 1978 and 1989)."

However even a more modest mortality level in the control population will mask the true effect of entrainment. If, for example, 50% of the larvae in a control sample were so delicate that they died as a result of the handling procedure, they presumably would also be killed by entrainment. However there is no means of separating the two mortality effects and it can lead to an underestimation of entrainment mortality.

A further bias occurs with the instant mortality rate, as 29 of the 36 studies counted stunned fish as alive, the rest of the studies did not explain how they dealt with these animals. Longer-term studies revealed that the majority of the fish classed as stunned died.

The samples taken are often not representative of the community of organisms entrained. Some species will be under-represented, and others over-represented. This can be due to a variety of factors, including the behaviour of the animals and the pattern of flow through the plant. Some species are extremely fragile and will disintegrate during collection or preservation, and are thus not documented when samples are processed (Boreman and Goodyear 1981).

Boreman and Goodyear (1981) showed that delicate organisms could easily be damaged beyond identification. This leads to an over-estimation of survival as these fish are not counted. Problems with the selection of dead and dying animals also lead to over-estimations of survival. Marcy (1975) showed that healthy specimens are sampled in preference to dead organisms, particularly if the dead organisms tend to settle out of the water.

Mortality of both control and experimental samples increases over time. In other words, fish can take many days to die from the effects of entrainment. Most studies only present the immediate and 48 hour survival times, whereas the effect on larvae might be apparent over a much longer period than this. No experiment has ever shown exposed fish to recover to a mortality rate as low as the controls.

Paucity of the data

The EPA reviewed 36 studies of entrainment survival. Only 21 different facilities have been examined. Only 20 of the 36 studies relate to in-scope facilities, which in turn represents only 3.7% of all section 316(b) Phase II existing facilities. The data presented for the entrainment survival are limited in several ways.

- Limited range. Most of the studies (24) were in the north east of the country with 17, nearly half, of all the studies in the Hudson River. Many studies were old, with 25 being undertaken in the 1970s. Changes in water quality and other environmental factors, biocide usage and plant operations make it difficult to extrapolate from the old data.

- Restricted species list. Possibly due to the restricted geographical range, very few species are represented in the survival figures. Only 24 species or families have data and only a few species have significant number of studies performed on them.

- Short duration. Several studies were short-term, with 15 only sampling for about 2 months. These sampling periods did not always coincide with the period of highest entrainment.

- Low numbers. It is difficult and time-consuming to sample entrained animals. Several of the species in the samples were caught in too small a number to be meaningful. Twelve of the studies had less than 100 individuals of a species in the discharge samples - not enough to estimate the survival of the species.

- Biocide use. The studies were undertaken when biocides were not in use. Biocides will increase the proportion of the larvae which die. With the spread of zebra mussels across the US the strength of any biocides and duration of their use is likely to increase in facilities within affected waters.

The existing studies had many problems with their methodologies. These result in a low confidence in the resultant survivorship estimates. Problems include:

- Counting organisms that have disintegrated or are unidentifiable.

- Difficulty identifying whether fish are alive or dead before entrainment.

- The loss of dead or damaged fish as they settle out of the water column in the discharge canal.

- Including stunned larvae as alive.

- The length of the survival studies.

- Unnatural rearing conditions after entrainment.

- High death rate in the controls.

- Controls being within the power plants intakes, possibly after some mortality has occurred.

- Poor sampling methods, using damaging collection techniques.

- Too short a sampling period to obtain a range of fish sizes and a range of environmental conditions.

- Too few fish recovered in the discharge to make good estimates.

- A lack of information on the amount of water sampled to collect the fish.

- The assumption that sampling mortality and entrainment mortality are independent of each other.

Most of the studies have problems with one or more of the above issues. Some of the problems make the interpretation of the results very difficult.

Predation on entrained organisms

The predation pressure on young fish is very high. Fish returned to the water body after entrainment, even if they are alive, are likely to suffer much higher predation rates than individuals that have not been entrained. It is well-established that injured or disorientated larval and young fish are highly vulnerable to predators. It is therefore likely that many entrained organisms that have survived passage will be eaten. Because returning entrained organisms are easy to catch, there is often a concentration of predators at the outfall that will increase the mortality still further. Increased likelihood of predation can occur for a number of reasons, including:

- Position in the water column. Many species have developed vertical migration patterns within the water column to reduce the predation. On returning to the water body via the outfall of a facility they are unlikely to be in their favoured part of the water column and hence will be more vulnerable to predation.

- Behavioural disturbances. The ability of larval fish to behave normally after entrainment is under-studied. However those studies review by Schubel et al, (1978) found a range of behavioral differences. These included erratic swimming, convulsions, disorientation and jumping.

- Physical effects. It was noted that the response to a rapid cooling, as experienced by a fish returning to its water body after entrainment, is often more severe than the one caused by the initial temperature increase.

Longer term effects

It has been shown that thermal shock can disrupt development of eggs and larvae in fish even if they survive entrainment (Schubel et al, 1978). Long term sub-lethal damage is difficult to observe in larval fish.

There is good evidence that any growth check during the early stages of a young fish's life can results in subsequent poor growth and an inability to compete effectively. Many fish that suffer in early life do not survive their first winter, as they have been unable to grow and lay down sufficient fat reserves.

In the experiments reported, all the fish were reared under carefully-controlled laboratory conditions. In the real world the larval fish and eggs are released back into a natural water body. Natural waters generally have very high levels of bacteria and viruses present, and any slight damage to a larval fish will make it highly susceptible to disease. Eggs' main protection from disease is the integrity of the egg membrane, which is likely to be damaged during entrainment. Larval fish have almost no antibody defense against disease and any small breach of the skin is likely to become infected.

Applicability of data from one station to another.

The effects of entrainment will vary considerably between power plants, which makes it extremely difficult to extrapolate results from one facility to another. Factors such as the length of the culverts, depth and type of intake, the pressure change across the pumps, the rate of mixing at the outfall and the smoothness of the cooling water system would all need to be the same. The environment from which the facility withdraws its water would also need to be similar. Here, factors such as temperature, species composition, water chemistry, presence of diseases, and water movements would all need to be considered.

Conclusion

As has been shown above, quantifying the mortality of eggs and larval fish caused by entrainment is very difficult. Several studies have been undertaken but the totality of the knowledge gained from them does not allow generalisations to be made.

The fact that there is mortality caused by entrainment is certain. The long-term survivorship of eggs and larvae is not. Some fish are certainly alive after entrainment, but how many will survive the longer-term effects of increased predation, affected growth and disease, is still unknown. Given the amount of acute damage and the steady mortality subsequently observed, the increased likelihood of predation, and the long-term impacts of poor growth following trauma, everything points to a very poor likelihood of reaching adulthood. The entrained fish are effectively lost to the population even if they die well after the entrainment event. Combined with the difficulty of using existing survival data to predict the survival rates at another station on a different water body, it becomes clear that the only path the EPA can follow with any degree of certainty is to assume 100% mortality for any entrained fish.

EPA Response

EPA thanks this commenter for this submission. To calculate the environmental benefits associated with the reduction of entrainment due to the implementation of technology to comply with this rule, EPA used the assumption that all organisms passing through a facility's cooling water system would experience 100 percent mortality in the final rule. Please see the chapter, Entrainment Survival, in the Regional Studies for the Final Section 316(b) Phase II Existing Facilities Rule for the updated analysis of this topic.

Comment ID 316bEFR.330.012

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration Measures

EPA is proposing to allow facilities to use “restoration measures” in lieu of or in addition to technologies to reduce impingement and entrainment. In this section we consider the potential for success and the drawbacks of various forms of restoration measures.

Aims of restoration measures

At several power plants, restoration measures have been proposed as a means of mitigating impingement and entrainment (I&E) losses. The concept is that if the productivity of organisms can be increased or augmented, or the organisms’ habitat can be improved or supplemented in the vicinity of a power plant, the increased number of organisms produced by these measures can be discounted from those killed by the plant. For example if the plant were to kill 100 salmon, and 100 salmon were released from a hatchery, and survived to adulthood, the overall reduction in salmon numbers ascribable to the plant would be, arguably, 0.

Types of restoration and measurement of success

There is a very wide range of methods available to man for modifying, restoring or creating habitat; covering the full spectra of scale, target species, habitat type, antiquity and, ultimately, effectiveness. Below are listed some means of altering the physical and biological characteristics of an ecosystem; divided into habitat- (H) and species-related (S) measures. It is of course probable that a combination of measures would be used to address different aspects of an ecological problem.

Creation

- Saltmarsh and wetland creation: managed retreat from protected areas by breaching of existing sea defences or creation of new creek systems. Creation
of entirely new reclaimed land by dumping of spoil, or encouragement of silt deposition and stabilisation. (H)

- Artificial reefs: disposal of fly ash, tyres, etc, sinking of old ships, oil rigs. (H)

- Creation of new river channels; permanent or temporary diversion of flow. (H)

- Translocation of animal or plant species – to new non-threatened habitat or to replace organisms lost/damaged. (S)

- Flooding of low-lying farmland to create water meadows (H)

Restoration/modification

- Physical cleaning, removal of oil, debris, contaminated silt etc; biological or chemical cleaning methods. (H)

- Dredging to restore estuarine habitat lost to siltation (H)

- Removal or modification of large-scale river obstructions: weirs, dams etc. (H)

- Removal, addition or modification of small-scale features, such as litter banks or debris dams, bank profiling, meanders, riffles/pools, adding obstructions, pinch points, bed widening, reedbed and bankside planting, weed-cutting, removal of shading vegetation. Provision of shallows for breeding and juvenile fish. (H)

- Culling or discouragement of damaging species, such as geese or birds of prey: herbicides to remove alien plant species – water hyacinth, Crassula, etc, biological control species. (S)

- Stocking with increased numbers of existing species, or with new, higher value species. (S)

- Regulation of salinity, water depth, sedimentation, by sluice gates; augmentation of flow. (H)

- Closing (or opening) of channels; building of protective barriers, wave screens to protect fragile inshore habitats. Groynes & breakwaters to prevent erosion of beach substrate. (H)

- Changes in input to food chain; removal of organic input from sewage works, agricultural run-off etc. (H)

- Building of fish-passes and ladders. (S)

- Cleaning, de-silting or addition of fish spawning areas such as gravel beds. (S)

EPA Response

EPA believes that there are a large number of restoration methods available.

Comment ID 316bEFR.330.013

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Defining and assessing ecological equivalence

Having identified habitat enhancements which may be employed, the key is to assess how much enhancement, and of what type, is necessary to offset a given scale of ecological harm caused by impingement and entrainment losses. It is clear that, in certain circumstances, like-for-like replacement can sometimes be achieved. For instance, if a power station is built on reclaimed saltmarsh, then a similar area of adjacent saltmarsh can be created or restored. Similarly, an area damaged by thermal discharges could be compensated for by restoration nearby. However, like-for-like restorations for impingement / entrainment are impossible on the community level, implying that a means of assigning equivalence to such losses is necessary.

The principle of Habitat Equivalency Assessment (HEA) demands that

- both a scale or multiplier, and a measure common to both damaged and replacement habitats, exist, and that

- the damage to the original habitat be measurable.

“For compensatory restoration actions, the scaling question is: what scale of compensatory restoration action will compensate for the interim loss of natural resources and services from the time of the incident until full recovery of the resources? The scale of compensatory restoration actions is conditional upon the choice of primary restoration actions. … Necessary conditions for the applicability of HEA include that (1) a common metric (or indicator) can be defined for natural resource services that captures the level of services provided by the habitats and captures any significant differences in the quantities and qualities of services provided by injury and replacement habitats, and (2) the changes in resources and services (due to the injury and the replacement project) are sufficiently small that the value per unit of service is independent of the changes in service levels”. - (NOAA, 1995).

According to this principle, therefore, it is possible to place a value on the resource that is damaged or lost, and create or improve habitat with an equivalent value. For example, if X thousand of a particular species die each year, then their loss can be offset by creating enough habitat to support X thousand more. In most cases, this implies the creation or restoration of estuarine and wetland habitat. It should be noted that almost all examples of habitat equivalency analysis are concerned with the replacement of past damage, such as compensation after oil spillage. It is also evident that a considerable time-lag is likely, between the original damage and the establishment of the new resource at its full potential.

Nona's Habitat Equivalency Analysis (HEA) states: “The principal concept underlying the method is that the public can be compensated for past losses of habitat resources through habitat replacement projects providing additional resources of the same type”. (NOAA, 1995). Thus the origin of the concept appears to be as compensation for finite, existing, discrete and quantifiable losses, rather than justification for continuing and unquantified future loss.

EPA Response

For a discussion of approaches used to determine equivalency in the restoration measure context, see EPA's response to comment 316bEFR.091.014.

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

For a discussion of compensation for past damages through the use of restoration measures, see EPA's response to 316EFR.206.055.

Comment ID 316bEFR.330.014

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Measuring the success of a restoration project.

Probably the most appropriate and complete list of principles for successful restoration is set out by the partnership of Restore America's Estuaries and the Estuarine Research Federation, (RAE-ERF 1999).

RAE-ERF guidelines for successful restoration of estuarine habitat include:

- Preservation of existing habitat is critical to the success of estuarine restoration

- Estuaries can be restored only by using a long-term stewardship approach and developing the constituencies, policies and funding needed to support this

- Restoration plans should be developed at the estuary and watershed levels to set a broad vision, articulate clear goals and integrate an ecosystem perspective

- Project goals should be clearly stated, site-specific, measurable and long-term – in many cases greater than 20 years

- Success criteria for projects need to include both functional and structural elements and be linked to suitable local reference habitats

- Site plans need to address off-site considerations, such as potential flooding and salt water intrusion into wells, to be sure projects do not have negative impacts on nearby people and property

- Scientifically-based monitoring is essential to the improvement of restoration techniques and all-over estuarine restoration

- Ecological engineering practices should be applied in implementing restoration projects, using all available ecological knowledge and maximizing the use of natural processes to achieve goals

- Long-term site protection is essential to effective estuarine habitat restoration

- Public access to restoration sites should be encouraged wherever appropriate, but designed to minimize impacts on the ecological functioning of the site.

EPA Response

See EPA's response to comment 316bEFR.077.042.

Comment ID 316bEFR.330.015

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

Organisms affected by impingement and entrainment

Power plants are indiscriminate feeders, since they can use very large volumes of water in the cooling process. Most power plants take their water from natural water bodies such as lakes, rivers, estuaries or the ocean. The volumes of water abstracted and velocity at which it travels are such that few organisms within the water taken in by the plant can escape. The great majority of organisms within the water column are potentially threatened by I&E.

The organisms which are affected by I&E include many that are not traditionally considered as vulnerable. All planktonic organisms are entrained in approximately the proportion at which they occur in the water. This includes many species of microscopic organisms such as viruses, bacteria, cyanobacteria, fungi, yeasts, protozoa, dinoflagellates, diatoms, algae and many other groups of microscopic life found in water. Amongst the larger animal groups, nearly all those known to occur in the aquatic environment have been impinged or entrained at power plants. This includes crustaceans, insects, molluscs, medusae, fish, reptiles and mammals.

Many studies have been performed on entrained and impinged organisms. A review of entrainment studies was performed by (EPRI 2000), who listed 36 discrete entrainment studies from 21 power stations. Most studies were performed in the 1970s with a few in the 1980s and 90s. Most were performed in the northeast of the country, primarily the Hudson River. The majority of the impingement studies were on fish and the larger crustaceans. Of the entrainment studies most concentrated on young stages of fish and a few common invertebrates. No data were found on numbers of plants, bacteria or protozoans entrained by power plants.

Fish survival of both impingement and entrainment is very variable and changes with species, biocide levels, temperature, time of year, life stage and water type. It can range from 0% for some clupeids to near 100% survival for some gobies. Some groups of zooplankton appear to be quite hardy – many groups of crustaceans showing survivals of 70-90% (EPRI 2000), whereas the worms tested show survival rates as low as 10%. Little is known about the survival of bacteria, viruses or protozoans. Very little work has been done on phytoplankton. Studies by Braind (1975) (in (Beck 1978)) showed diatoms having survivals between 10 and 70%, and dinoflagellates between 50 and 90%. (Morgan and Stross 1969) found that phytoplankton photosynthesis was depressed by the passage through a power plant if the water was warmer than 20°C, showing no recovery after 4 hours.

The majority of the available data relate to fish and some macroinvertebrates from the north east of the USA. This makes predicting the effect on the entire community of animals affected by I&E across the whole of the USA very difficult.

EPA Response

Please see response to comment 316bEFR.206.001. EPA agrees with this commenter in that very few studies have been performed to determine the survival of microscopic organisms such as viruses, bacteria, cyanobacteria, fungi, yeasts, protozoa, dinoflagellates, diatoms, or algae. Nor have studies been performed on higher plants. This lack of data does increase the difficulty and uncertainty when attempting to predict the effect on the entire community of impingement and entrainment by cooling water intake structures.

Comment ID 316bEFR.330.016

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 11.0

Role of Restoration

Available compensation measures

Several measures have been suggested as possible methods for compensating for the loss of animals by impingement and entrainment. Below is a brief review of each of the major types.

Habitat replacement

The principle of habitat replacement as a mitigation for I&E is to modify existing habitat, or create new habitat, to increase production of the species killed. For example, one might modify an area adjacent to a power plant to create a salt marsh, creeks, or eelgrass beds.

What it can do

Habitat replacement is attractive as it can appear simple to cost and cheap to maintain. It can be used to produce large amounts of new habitat of use to both aquatic and non-aquatic organisms. For example eelgrass beds have been produced which benefit several species of fish and invertebrates. However, the drawback is that the community structure of the new habitat is unrelated to the community of the water that is being used for the power plant – the organisms actually lost to I&E. As an example, let us propose the creation of a new salt marsh. This will likely increase the habitat available for inter-tidal and salt marsh fauna, and in consequence increase food resources for predator species. The creeks and channels within the salt marsh will contain some young fish that utilise the shallows as a refuge, and some specialist inshore fish. However, it will do nothing to increase migratory and pelagic fish or invertebrates.

What it can not do

The species composition of a replacement habitat will not be the same as the composition of the animals killed by the power plant. The salt marsh cannot increase the abundance of pelagic fish such as herrings, nor will it help many of the planktonic organisms such as phytoplankton or medusae, or any animal that is only migrating through when it is impinged or entrained.

Drawbacks of habitat replacement

To create a new environment an existing one must be destroyed, or at the very least, altered considerably. If a mud flat is converted to an eelgrass bed the community associated with the mud flat is changed, or lost altogether. Hence, any gain must be measured against the loss of the original environment.

Habitats which are considered of low quality often have their own communities associated with them. Mud bottoms are not as obviously diverse as eelgrass beds or saltmarshes. They do, however, contain important and diverse communities.

Typical examples of abundant organisms on a mud bank include:

- on the surface, diatoms that are preyed on by small surface living snails - Hydrobia (mud snails).

- A large range of small crustaceans called Amphipods; a very common genus is Corophium.

- A wide variety of polychaete and oligochaete worms live in the mud.

Other abundant animals include many burrowing mollusks, particularly bivalves such as cockles and clams, and a range of small crabs. At high water fish will move over the mud to feed - particularly gobies and small flatfish. If the mud is uncovered at low tide, the mud flats are important feeding grounds for waders and ducks. These feed mainly on crustaceans, worms and molluscs.

The abundance of invertebrates on mud flats is often exceptionally high, which is why they are such important feeding grounds for birds. In the above list we have not included the very high number of microscopic forms, including vast numbers of bacteria, nematodes, protozoans and microcrustaceans such as ostracods.

In order for habitat modification to be effective it must be stable. If an eelgrass bed is created there can be no guarantee that it will still remain throughout the 20 to 40-year operating life of the power plant, without a very considerable commitment to protecting and maintaining it. Eelgrass beds can be disturbed by many factors, including hurricanes, pollution, salinity changes, erosion and competition (Thorhaug 1986). The power plant operators are unlikely to be able to guarantee that the bed will maintain its original size, or that a salt marsh will not be altered by sedimentation over the life of the station.

In short, intending to produce a habitat and successfully sustaining it in the long term are two different things. In a review of eelgrass beds (Thorhaug 1986) found that out of 165 attempts to transplant eelgrass, only 75 were successful.

Most species are dependent upon more than one type of habitat in their lives, and have their population size constrained by a variety of different factors. The use of habitat replacement as mitigation for I&E losses will only be effective for species whose primary limiting factors can be affected by the new habitat. One may envisage a power plant impinging considerable numbers of a fish species, with enhancement of neighbouring salt marshes proposed as a mitigating measure. If the size of that species' population is primarily dependent on conditions in the spawning grounds upriver or out at sea, or fishing and predation pressures during its migration, then enhancing the areas used by the fish during this different part of their life cycle can never be an effective mitigation for I&E.

Finally, significant habitat alterations can lead to unexpected results elsewhere. It is difficult, for instance, to model exactly what effect the construction of a large area of salt marsh may have on the deposition or erosion regime of the coast several miles away. This in turn may affect (negatively or positively) the productivity of species throughout the area. These changes, as well as the potential benefits in the immediate area of the habitat alterations, should be factored in when calculating the overall value of mitigation. However, given the unpredictability of such changes, it is likely that the full effects can only be calculated in hindsight.

Summary

In practice habitat replacement cannot replace I&E losses like for like, although it can help with a subset of the lost species favouring the habitat modification. However, habitat must be lost in order to create a new habitat type and unless the area to be reclaimed is abiotic then a judgment must be made whether the new habitat is preferable, in terms of population sizes and diversity, to the existing one.

Removal of fish migration barriers

Many fish face significant obstacles and hazards moving up- or downstream in rivers. Weirs, dams, hydroelectric plants and water works, reduced flows, underwater noise levels, temperature and oxygenation effects all can reduce the ability of a migratory fish to reach its breeding ground, or of its progeny to make the return journey. Removal or modification of these barriers has been suggested as a suitable mitigation for the organisms killed by I&E.

What it can do

Often simple modification of in-river structures can have a large effect on the ease with which fish can pass them. For example fish ladders can be added to weirs, to allow fish to jump from one pool to the next, or safe passages can be build into dams to allow the downstream migration of fish. However, it is plain that removing these obstacles will only help fish that are directly impacted by them.

What it can not do

Because the migration barrier only affects migratory fish, it is obvious that most of the organisms killed by I&E will not be helped by this type of restoration.

Drawbacks of removal of fish migration barriers

Only a few species can benefit from the removal of a migration barrier. What is more, if the migrating species are being heavily impinged or entrained as they pass the power plant, traveling both up- and downstream, then there will still be a large number killed. If the population increases because of the removal of a barrier to migration then it is possible that even more fish will be killed by impingement or entrainment as they pass the station.

Summary

The removal of barriers to migration can be very beneficial to migratory fish. However, it is not, on its own, a useful mitigation to impingement and entrainment of organisms by a power plant, since it does nothing to protect the wider assemblage of organisms killed by the station.

Water quality improvement

It has been suggested that by funding improvements to water quality, power plant operators can mitigate for the losses due to impingement and entrainment.

What it can do

If the water quality is very low, (and in consequence just a few species are present) then improvements to it can make a profound difference to the whole community, by increasing energy flux throughout the system. If the water quality is already reasonable, and many of the hardier species are present, then the improvement may be of greater significance for species that are sensitive to low water quality.

What it can not do

Again, the increased populations found in the improved water will not necessarily be the same as the organisms killed.

Drawbacks of water quality improvement

Improving water quality does not begin to mitigate for the loss of the organisms killed in I&E unless the water is of very poor quality. If the water quality is improved, and the populations recovers in the area, then it is possible that the plant will start to kill more organisms than before the improvements.

Summary

Again the improvement of water quality is a very important issue. On its own, it does not, however, mitigate against the loss of animals by I&E.

Hatchery programs

The concept of hatchery programs is to breed and release organisms (in practice, fish) to mitigate for the loss of organisms to the power plant.

What they can do

Breeding programs can produce large numbers of fish, which when released can augment, or even replace, wild populations. However, breeding animals is a complicated task, and to produce fish in the numbers required to make a noticeable difference can require considerable resources. This has meant that in practice breeding programs may concentrate on only one or two species.

The species chosen for breeding programs are often trophy fish such as salmon and bass. These species, although impacted by I&E, may not be affected as much as the forage fish. Moreover, augmenting numbers of predatory fish will quite possibly increase the predation pressure on already-depleted forage fish.

What they can not do

Being species-specific, breeding programs cannot mitigate at the community level. It is not feasible to produce anything like enough species to help repair the impingement and entrainment losses caused by the power plant.

Drawbacks of hatchery programs

Releasing hatchery-bred fish into the wild has several problems. Studies have found very high mortality rates amongst the released fish, probably due to the fish not having learned predator avoidance behaviour (e.g. (Brown and Laland 2001) For migratory species there are differences in timing of return and in faithfulness to their natal river.

There has also been concern about the presence of different genetic strains in the released stock where the breeding stock is not from the water body where the young will be released (Einum and Fleming 1997).

Environmental impact of large-scale breeding projects include lowered water quality downstream, escaped fish in areas they do not naturally occur in, and the build-up of disease and parasites present in the breeding stock.

Summary

As mitigation for a single-species impact, hatchery programs can help to mitigate losses. However, estimating numbers needed to balance the loss of natural populations is very difficult, complicated by differences in value, whereby a single wild fish is often 'worth' more than a single hatchery-bred fish.

General problems with restoration measures

The restoration measures outlined above can only partly mitigate for the losses caused by I&E. They produce an increase in a few target species and do nothing to mitigate for the loss of the other species impacted. In addition, they may have other ecological effects which tend not to be fully quantifiable until after the event.

EPA Response

For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see EPA's response to comment 316bEFER.056.003 and the preamble to the final rule.

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance. EPA also believes restoration measures may not be feasible for all sites.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

For a discussion of the role of ancillary benefits in the final rule, see EPA's response to comment 316bEFR.032.011. EPA encourages permit applicants and permitting authorities to consider the net environmental benefits of a restoration measure.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in the final rule, including those in sections 125.94 and 125.95.

Comment ID 316bEFR.330.017

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The complexity of ecosystem damage

The damage caused by I&E at the community level can be extremely complex, with different species, groups, and trophic levels being affected in widely differing ways. This can, for instance, have the effect of creating an imbalance between predators and prey in the populations in an area. As a simplified and hypothetical example, one may envisage 3 species, A, B and C. Species C forms the major food source for Species B, which is in turn preyed upon by Species A. If large numbers of C are killed by I&E, but few of A are affected, then population numbers of B will almost certainly decline, and in the long term the levels of all 3 species must be altered, with consequent effects on the rest of the ecosystem.

Figure 1 (below) shows a food web from the northwest Atlantic. This is a vastly simplified representation, with many of the boxes on the figure represents several tens, or even hundreds of species. Predicting the effect that adding one of two species by using a hatchery program, or increasing the amount of salt marsh present, will have on the dynamics of such a complicated system, in beyond the capability of ecology today.

Figure1. Species and links of the northwest Atlantic food web, This tangled “bird’s nest” represents interactions at the approximate trophic level of each species, with increasing trophic level towards the top of the web. The left side of the web generally typifies pelagic organisms, and the right to middle represents more benthic/demersally oriented organisms. (from Link, 1999)
[See hardcopy]

Restoration measures are often, in themselves, good environmental practice. Trying to use them as mitigation of I&E is, however, unjustified. The fact that they are all species-selective in their effects means they cannot in mitigate for the total loss of the community to I&E. In addition, the timescales over which restoration methods work are not the same as the continual killing of organisms by a power plant. For example a restored marsh may take several years to reach its full potential in terms of the mitigated species. During all this time the existing power plant will still be killing the organisms by I&E. The success or failure of a restoration method can take many years to see, whereas decreasing or stopping I&E mortality is measurable immediately.

Unintended effects of restoration measures

Some restoration measures can prove to have worse environmental impacts than the problem they were intended to solve. For instance, following the removal of dams or weirs, or changes in their regime of water flows, increased current velocity downstream can scour sand and silt, disrupt spawning areas, remove nutrients, and damage fragile banks and shallows. It can also release contaminants locked in the accumulated silt layer behind the obstruction, or lead to physical choking by silts.

Following severe erosion problems caused by flow fluctuations at the Glen Canyon dam on the Colorado River, efforts were made to restore beaches and other features of the river; firstly by limiting variations in flow, and secondly by more extreme measures:

“[After limiting flow variations] the center found that conditions on the river were deteriorating alarmingly. Whole beaches had disappeared. Four species of native fish had become extinct. An Asian tapeworm appeared; it now infects most native fish that survive. Rainbow trout, now spawning naturally in the wild, increased their numbers sixfold, so that some parts of the river contained 17,000 trout per mile. Steadier flows apparently increased their survival rates but reduced their food resources, so they became smaller and thinner.

In the spring of 1996 … researchers tried out their first big experiment using the Glen Canyon Dam. For one week, they released 45,000 cubic feet of water per second, using special spillways. They figured the high water would lift sand stored on the bottom of the river and deposit it onto beaches.

While the experiment looked like a huge success at first, it quickly went awry. A year later, most of the sand was gone. “We made a huge mistake,” said Dr. Theodore Melis, a sediment expert at the research center. The sand that built the beaches, it turned out, had come not from the river bottom but from existing beaches and eddies. Then fluctuating flows continued to erode sand as before. Two different experiments in 1997 and 2000 also failed to make beaches or retain sand.

Meanwhile, the rainbow trout continue to proliferate, said Dr. Lew Coggins, a fisheries biologist at the center. As many as a million rainbow trout are now in the river, eating midges, plants and possibly a native fish called the humpback chub. Ten years ago, some 8,300 adult chub lived in the river; today there are only 2,100 large enough to spawn. Biologists worry that this may not be enough to sustain the population”. - (Blakeslee, 2002)

Restoration measures: not a viable answer to I&E

Fundamentally, it is arguable whether designing and building a habitat to promote the few key species identified as being under threat is a suitable replacement for an entire mature ecosystem. It is also questionable whether replacement wetland and estuarine habitats can effectively mitigate for the extremely high numbers of fish and larvae impinged and entrained by CWIS. For example, PSEG planned and created considerable areas of wetland and estuary to offset I&E losses at their Salem plant on Delaware Bay. Their initial estimate that over 5000 hectares would be required to offset losses gives a reasonable indication of the scale of mitigation required. The assumption that the productivity of a relatively small area of habitat can truly replace potential losses of several billion eggs, larvae and adult fish every year must be questioned.

In addition, estuarine improvement may provide extra habitat for estuarine and brackish water spawning species, but it cannot mitigate for losses of deepwater spawners whose juveniles subsequently move into estuaries and are entrained (e.g. atlantic croaker, spot and menhaden), or those species which spawn upstream in freshwater (for instance salmonids and shad) and are entrained or impinged on their journey downstream. Further, it provides no recompense for losses of threatened and endangered species such as the shortnose sturgeon and various turtles.

Whether restoration measures should be offered as a viable alternative to effective measures against

I&E is open to question. The mitigation is never replacing like for like, the outcomes are uncertain and can take many years to see any benefit to the populations being mitigated for. This should be compared to a reduction in I&E, where the benefit is given far more equitably to all species concerned, is guaranteed and is immediate.

EPA Response

EPA believes that there are a number of uncertainties associated with the assessment, design, implementation, and performance of restoration measures. For a discussion of the uncertainties associated with restoration measures, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013.

For a discussion of EPA's authority to include restoration measures in the final rule, see EPA's response to comment 315bEFR.056.003 and the preamble to the final rule.

For a discussion of the use of out-of-kind restoration in the context of the final rule, see EPA's response to comment 316bEFR.206.055.

EPA believes permit applicants and permitting authorities should take the net environmental impacts into account when assessing an environmental measure. All restoration measures must meet the requirements of the final rule.

Comment ID 316bEFR.330.018

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

The Benefits of Cooling Water Intake Technologies

EPA is attempting to quantify in dollars (monetize) all of the environmental benefits of its regulation, i.e., the benefits of requiring all 550 existing US power plants with cooling intake flows above 50 MGD to install technologies in compliance with the regulation's standards. In this section we discuss some of the many problems in EPA's benefits methodology, including (1) weaknesses in EPA's impingement and entrainment and flow data, as well as in the life stage conversion factors EPA uses to extrapolate and standardize regional and ultimately national loss totals; (2) weakness in EPA's models for calculating the worth of commercial and forage species entrained and impinged; (3) the extent of threatened and endangered species affected by intakes; and (4) a discussion of some of the ecological benefits of intake technologies that are difficult or impossible to monetize.

EPA Response

This comment is simply an introduction to other comments, to which EPA responds elsewhere, and therefore provides no specific comment requiring a response from EPA.

Comment ID 316bEFR.330.019

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Impingement And Entrainment Data, Flow Data, And Life Stage Conversions

EPA Entrainment Estimates

Description of method used for Total Number

To calculate the entrainment levels at the various stations, the EPA take the data from each station in turn. The data often have been collected for each life stage entrained (egg, larvae, post-larvae, juvenile etc.). The total numbers of all the life stages are combined to give a total number entrained by that intake for a particular year. Several years are then combined to give a mean level of entrainment. On a site-by-site basis, adjustments are made to the years used to obtain the mean. For example, 1996 data are not used at Salem as the power station was not running for much of that year. For some stations the reported number of entrained animals has been adjusted to allow for survival. The EPA re-adjust the figures to assume 100% mortality. These calculations of the raw numbers of entrained animals are well done.

The method for age 1 equivalence

To obtain a total number of age-1-equivalent fish for each site, the age-1-equivalents are calculated for each year and each life stage in turn. A mean value is then obtained. For entrained animals normally only a few days or weeks old this could be done by simply multiplying the life stage by the probability of survival to age 1. However, as the exact age of animals when they are entrained is not known, a modified survival rate is applied to the first age transition. For example if an egg is caught just before it would hatch the survivorship probability of that egg to a larva is obviously much higher than a newly laid egg. This has the effect of increasing the age 1 equivalent number of fish. Again site-by-site adjustments are made to years used. These calculations of the age 1 equivalents of entrained animals are well done.

Issues Identified with Entrainment Methods

Are the years left out reasonable?

For Salem the EPA omit 1996. The station was shut down for most of this year, and hence the numbers of impinged and entrained fish were very low. Removing 1996 increases the mean catch of the station. It is reasonable to leave the year out of the analysis.

At Brayton the EPA disregarded the last decade's fish numbers, as the populations were severely depressed. However there is a steady decline in numbers impinged throughout the study. The mean numbers for this station will therefore be underestimates.

For all other stations the EPA have used the available data reasonably. They have been fair in their selection of years to use in the case studies.

When the data is given with the assumed survived animals not counted - is the calculation of total mortality reasonable?

Where the survival factors for species entrained are not given in a report, an estimate of the effect is based on a probit method. This is used to back-calculate the effect of the survivorship factors applied to the data. The method does result in higher entrainment figures and is probably the best available.

EPA Response

The commenter approves of several aspects of EPA's assessment, with the exception of the years of I&E data evaluated for the Brayton Point Station. EPA selected these years because (1) the data included more species than recent I&E records, and (2) the data represent I&E rates prior to the significant decline in winter flounder that has occurred in recent years.

Comment ID 316bEFR.330.020

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA Impingement Estimates

Description of method used for total number

Data are taken from each station and the total number of animals killed in each of the life stages summed for each year.

Description of method used for age 1 equivalents

For life stages below age 1, the numbers of animals impinged are multiplied by the survival probability through each of the life stages that the animal has to pass to get to age 1. Animals impinged at age 1 or higher were assumed to be age 1.

“EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death.” (A5-2-1)

“The Equivalent Adult Model (EAM) is a method for expressing I&E losses as an equivalent number of individuals at some other life stage, referred to as the age of equivalency (Horst 1975a; C.P. Goodyear, 1978; Dixon, 1999), The age of equivalency can be any life stage of interest. The method provides a convenient means of converting losses of fish eggs and larvae into units of individual fish and provides a standard metric for comparing losses among species, years, and facilities. For the § 316(b) case studies, EPA expressed I&E losses as an equivalent number of age-1 individuals. This is the number of impinged and entrained individuals that would otherwise have survived to be age 1 plus the number of impinged individuals (which are assumed to be impinged at age 1).” (A5-3.1)

Having made this sweeping generalisation a rather curious adjustment is introduced to allow for the fact that fish may be caught over an entire year and thus are assumed to range from just age 1 to just below age 2. This adjustment has the effect of increasing the number of age-1-equivalents above the actual number impinged.

EPA Response

The majority of the comment is a restatement of EPA methods, which does not require a response. The commenter questions the method of using modified survival rates for application to the life stage in which I&E occurs. The commenter seems to have misinterpreted the motivation for the adjustment and the effect of the adjustment, and the definition of an age 1 equivalent. EPA believes the adjustment is warranted because it accounts for the fact that information about the precise age at impingement is not available. It is reasonable to expect that the estimated number of age 1 equivalents is larger than the number impinged because the definition of age 1 equivalents is the equivalent number of fish on the day they enter their second year. Impinged fish that are labeled "age 1" are actually between 1 and 2 years old, therefore one such fish represents more than one age 1 equivalent because it is older than a fish that is just entering the second year.

Comment ID 316bEFR.330.021

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

The effect of ignoring annual variation in flow.

The importance of flow

One of the key aspects that must be considered is the relationship between the number of organisms killed by impingement and entrainment and the location and size of the intake. It is apparent that within a single water body, the larger the volume pumped the larger the number of passively transported planktonic organisms that will be entrained. However, water bodies differ in their ecology and animal abundance and species differ in their preferred position within a water body, so it can be argued that the locality and position of the intake can have a large effect on the number of fish and other creatures captured. Living animals, particularly the larger fish and crustaceans that are powerful swimmers, do not behave like passive objects and thus their catch rate can vary in a non-proportional manner with the volume of water pumped. As will be shown below there is a clear tendency for catch rates to increase as a power function of the volume of water extracted, but there are some species that behave very differently. Wyman (1984) in a study of impingement at Lake Ontario power plants operating with different numbers of cooling water pumps found that species responded differently. Alosa pseudoharengus and Osmerus mordax were apparently attracted to the water currents entering the intake and were caught in greater numbers per unit volume as the volume pumped increased. This response has often been observed but is usually explained by increased intake velocities leading to more fish entering a zone where water speed exceeds their sustainable swimming speed. Morone americana, Morone chysops, Dorosoma cepedianium and Perca flavescens were caught at a constant rate per unit volume irrespective of flow and Micropterus dolomieui were caught in lower numbers per unit volume as flow increased. It was concluded that this latter species avoided faster flowing waters and was thus proportionately more vulnerable to intakes with a reduced pumping rate.

One of the most comprehensive studies of the relationship between the volume of water pumped and the number of freshwater fish impinged and entrained in power station cooling water systems was that undertaken by Kelso(1979) for direct-cooled power plants on the Great Lakes. They analysed entrainment and impingement rates separately. Using data collected from 37 power plants, the number of fish impingement per annum (I) was related to power plant generating output capacity in Megawatts (Mwe) by the regression equation:

$\log10(I) = 0.414 + 1.844 \log10(Mwe)$.

The number of fish entrained per annum (E) was similarly related by the equation:

$\log10(E) = 2.103 + 1.658 \log10(Mwe)$.

From this analysis they concluded that for entrainment: “The ‘harvest’ is apparently influenced more by plant size than location within the great lakes” and impingement: “ in general there is a significant influence exerted by power plant size”.

The output capacity and the rate of water extraction by direct cooled power stations is positively correlated, irrespective of plant design and Kelso(1979) gave the relationship between cooling water extraction rate (C) in m3s-1 and capacity in Megawatts (Mwe) as:

$C = -1.288 + 0.049$ Mwe.

This empirically derived equation obviously cannot be used to extrapolate water usage for plants much smaller than those included in the dataset, as it would predict negative water use. However, it is sufficiently reliable to be used to predict fish impingement and entrainment mortality at the working power stations that were studied.

Combining the above equations and converting water flow to gallons per second (G) the following equations relate impingement and entrainment rates to flow:

$\log10(I) = 0.414 + 1.844 \log10(G+340.25)/12.944)$

$\log10(E) = 2.103 + 1.658 \log10(G+340.25)/12.944)$.

Antilogging and simplifying the above equations gives the power curves:

$I = 0.023(G+340.25)1.844$ and

$E = 1.816(G+340.25)1.658$ respectively.

A clear example of the importance of the volume of water extracted on the number of fish impinged is given by Benda (1975) in a study of impingement at the Palisades Nuclear Power Plant, Lake Michigan, while operating with once-through and evaporative cooling tower closed cooling. The volume of water extracted in each mode was 8101 and 1226 gallons s-1 respectively. Annual estimates of fish impingement were approximately 452,577 and 7,488 for once through and closed cycle respectively. However, the number of crayfish, Orconectes propinquis, actually increased (see above Benda, John et al. 1975).

Flow calculations for Salem

At Salem, the EPA give the number of fish caught at the station each year for the conditions at the plant that year. They then average this amount to give an estimate of the number that will be caught in the future. They do not seem to take into account flow issues at all.

In table B3-15 the EPA give the operational flow as 1722 MGD. This is much lower than the use when it is running at normal output (see figures B2.1 and 2). The EPA state in B3-5 paragraph 5 that the catch was much larger in 1998 as the flow was higher, and that the flow was expected to be at this higher level from then on. The costs for this plant should be based on this higher figure. This would produce an increase in the value of the catch at the station (see section 3.4).

In this example we will examine the effect that not using the different annual flow of a station has on the predicted number of fish caught in the future. As an example the data from Salem is re-analysed to calculate the number of fish caught per MGD of water. This analysis predicts that the power station would kill on average 160% more age 1 equivalent fish by both impingement and entrainment that the EPA's estimate. The power station has pumped differing amounts of water each year. The catch in age 1 equivalents is divided by the annual flow in each year to give the number of fish caught per MGD (Table 4). This is then used to predict how many age 1 equivalents the power station would kill per year if it were to run at 2612 MGD, since the EPA state in B3-5 paragraph 5 that the catch was much larger in 1998 as the flow was higher, and that the flow was expected to be at this higher level from then on.

The flow to predict the catch of the station was 2612 MGD. The predicted number of fish entrained as age 1 equivalents at Salem increased from 336,020,975 to
553,211,986 and the number impinged from 4,801,447 to 7,894,006.

Table 4. Total Salem catches of all species, excluding the Non RIS species. Adjusted to 2612 MGD.
[See hardcopy]

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used in EPA's benefits analysis that I&E are proportional to flow.

Comment ID 316bEFR.330.022

Author Name Reed W. Super
Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

Is Age 1 equivalent a fair method?

Assessing the value of fish of differing life stages and ages is difficult. How do you compare the value of an egg of a striped bass with an eight year-old fish? To overcome this problem the EPA have used the adult equivalent method. They have projected the number of eggs, larvae and juvenile eggs to the equivalent number of age 1 fish. They do not take into account that older fish impinged are worth more than age 1 fish.

Age 1 equivalent methods only work given good information to base the model on. This includes:

- Good estimates of entrainment and impingement numbers

- Data split into the correct life stages

- Accurate survivorship factors from stage to stage

Impingement and entrainment data quality

For the entrainment and impingement data, the data has been extensively corrected to account for problems found in the sampling methods, day/night and seasonality. The corrections have all been applied to the data to improve its quality, before the age 1 equivalent method is undertaken. There are still many issues with the quality of the data used (see later sections of this document)

Data split into correct life stages

Entrainment data is split into age classes at nearly all stations. There are problems with the identification of some species at the egg and larval stages. The impingement data are sometimes collected with all the age classes separated but the data are combined and treated as age 1 fish. This can have great effects on the estimates of the value of the fish impinged. (See section 3.5.1)

Accurate survivorship factors

Many of the survivorship factors used in the calculation of age 1 fish are based on back calculations assuming a stable population. This is a dubious assumption as there have been major environmental changes in the last 30 years. If, for example, the entrainment data is from the 1970s, before the Clean Water Act significantly improved water quality, the populations of fish could have been suppressed by the poor water quality. This would lead to a significant underestimation of the survival factors. The effect of errors in the estimate of these factors is discussed in section 3.6.

Underestimation of the effects of impingement caused by the assumption that all impinged fish are age 1.

All the calculations are made using as a measure of the total number of fish killed: the age one equivalent value. This is the case for both entrainment and impingement. The situation with respect to entrainment is easy to understand. If a plant sucks through the cooling water system say 10,000,000 larval animals then we cannot value these animals until they reach an age (size) at which they have passed through the period of high juvenile mortality and are at a size that fishermen can catch. The number of larvae is therefore adjusted by the mortality rate up to age 1. The survival rate could be 0.000001, in which case our 10,000,000 fish become 10 age one equivalent individuals. This is a useful way of dealing with the problem, as a larval fish has no market value whereas a one year old or older fish does, so by making the equivalency calculation we are allowing for mortality and getting to an age (size) where it is possible to give a value. Perhaps more importantly, it provides an estimate of the number of individuals that would be lost to the reproducing population, so it is a fair way to proceed.

As the EPA are using age one equivalent calculations for young fish, they should also use them for fish older than age one to take into account impingement losses. They do not, as is made clear in the documentation:

From A5-2-1

“EPA used life stage-specific annual losses for assessment of entrainment losses and assumed that all fish killed by impingement were age 1 at the time of death.”

From A5-3.1 Modeling Age-1 Equivalents

“The Equivalent Adult Model (EAM) is a method for expressing I&E losses as an equivalent number of individuals at some other life stage, referred to as the age of equivalency (Horst 1975a; C.P. Goodyear, 1978; Dixon, 1999), The age of equivalency can be any life stage of interest. The method provides a convenient means of converting losses of fish eggs and larvae into units of individual fish and provides a standard metric for comparing losses among species, years, and facilities. For the § 316(b) case studies, EPA expressed I&E losses as an equivalent number of age-1 individuals. This is the number of impinged and entrained individuals that would otherwise have survived to be age 1 plus the number of impinged individuals (which are assumed to be impinged at age 1).”

It has been demonstrated in numerous impingement studies that for many species of fish there are large numbers of individuals above age one that are impinged. Just as the larval number was adjusted downwards to make an age one equivalent the older fish need to be adjusted upwards to give an age one equivalent. The size of the error that is introduced by the assumption that all fish impinged are age 1 is illustrated below using data from Salem.

The EPA estimate the number of age 1 equivalent white perch impinged at Salem as 540,109; re-calculation indicates that the correct value is 37,880,764 fish. White perch shows a particularly clear example of an underestimate that occurs for all species that live for more that 1 year. This underestimate applies to many of the species caught at power stations. In the following calculations the figures for age 1 equivalent do not match the EPA figures exactly, as the monthly data used to adjust the totals by screen mortalities were not available. However, this is a small proportional difference and does not affect the outcome of the calculations.

The values of the survivorship for each life stage are given in Table 5. The final column shows the number of age 1 equivalents that a fish at a particular life stage represents. For example, it requires 13,500 white perch to enter the age 1 life stage for 1 eight year old fish to be produced.

Table 5. The survival factors (SJ) used to calculate the age 1 equivalents of white perch at Salem. SJ* takes into account the uncertainty of the age at which a individual is caught.
[See hardcopy]

Table 6 shows the unadjusted figures for white perch impinged at Salem as raw numbers and as age 1 equivalents using the assumption that all impinged adult fish are at age 1 (EPA method). The raw number is adjusted to take into account the unknown age at impingement.

Table 6. The raw numbers of white perch impinged at Salem and the age 1 equivalents.
[See hardcopy]

The white perch spends much of its life in inshore waters where it is vulnerable to impingement. In Table 11 the numbers caught in each year class are given. It is evident that there are large numbers of older fish killed by Salem. As a fish above age 1 is equivalent to many age 1 fish, this age distribution can have a significant effect on the total number of age 1 equivalent fish caught at a power station. Table 12 shows the number of age 1 equivalents that the impinged fish of each age represent.

Ignoring the age structure of the white perch impinged results in an underestimation of the number of age 1 equivalents killed by Salem power station by two orders of magnitude. This effect will be found for all species of fish that are impinged at ages above 1. The relative effect will differ depending on the number of year classes vulnerable to impingement and the relative proportions of the age classes caught.

Comments on the changes from phase II. The EPA has now revised its methodology and will be using a realistic age structure to calculate the age 1 equivalent for impinged fish. They are using a correction factor of between 3 and 10 times depending on the type of fish caught. The upper value of 10 may well be too low for some long-lived coastal species. However this modification will result in a more reasonable estimate of the importance of the impinged fish.

Age 1 Equivalent calculation for commonly impinged fish at Salem.

Table 7 shows the number of each age group of the commonly impinged fish caught at Salem. Table 8 expresses these number as a proportion of the total adult catch. It can be seen that for many species, the assumption that most individual caught are age 1 is false. For example, over 90% of the catch bay anchovy is age 2 or over, 30% of blue crab, 80% of non-RIS forage species, 25% of striped bass and 42% of white perch.

Table 7. Numbers of fish caught at each age at Salem.
[See hardcopy]

Table 8. Proportion of the fish caught at each age at Salem.
[See hardcopy]

Table 9. Age 1 equivalent values of species of fish impinged at Salem (total number over all years). These are adjusted for the age at capture.
[See hardcopy]

Table 10. Number of Age 1 equivalents total and mean caught in at Salem. Number of age 1 equivalents calculated totals from report and change expressed as a percentage.
[See hardcopy]

The number of age one equivalents of each of the age groups is given in Table 9. The total number of animals caught at Salem is used. No adjustments are made to account for the problem of 1996 flow rates. This has the effect of slightly lowering the mean number of age 1 equivalent fish killed by the power station. The survivorships used are based on figures given in the Salem input spreadsheet.

Table 10 shows the total and mean number per year of fish killed (age 1 equivalents) when the age of the fish is taken into account. The table also shows the values given in the case study (in table B3.3) for each of the species and the new higher value expressed as a percentage. The increases can be considerable. There are several ways that catching older fish can cause very high age 1 equivalent values.

- For long-lived species which spend a lot of their life in estuaries, such as the white perch, the increase is very significant as some relatively old fish can be caught.

- Some species are caught mainly as older fish, for example the bay anchovy and the non-RIS species. This can result in a much larger number of fish caught in terms age 1 equivalents than a simple total would suggest.

- Species that are impinged at age 2 or more which have a very low survivorship from year to year also give high age 1 equivalents; an example of this is the blue crab. Only about 10% of crabs make it through the first year and only 20% through the second. A two-year-old crab equates to many individuals at the beginning of their first year of life.

For the species that are only caught at age 1 or have very few age 2 or more individuals caught, this method of calculation makes very little difference to the overall total.

Morro Bay on the Californian coast: another example of a locality where age structure is important.

Here we present some examples of species that are caught at greater than age 1 from Morro Bay. Assuming that these are all age 1 would significantly underestimate the number of age 1 equivalent fish caught.

- Topsmelt, Atherinops affinis: the size frequency distribution suggests that almost all the fish impinged were 2 or 3 years old.

- Northern Anchovy, Engraulis mordax: about 50% of the catch were greater than 90 mm SL and presumably older than age 1.

- Plainfin midshipman, Porichthys notatus: the majority of the fish impinged were mature and thus two or more years old. This is to be expected as this species migrates into bays and estuaries to reproduce.

- Pacific sardine, Sardinops sagax: all the impinged fish were larger than the minimum size at maturity and were likely to be 2 or more years old.

Table 11. The number of white perch impinged at different ages at Salem
[See hardcopy]

Table 12. The age 1 equivalents of impinged white perch when analysed using the age information given
[See hardcopy]

EPA Response

The commenter enumerates many principles that guide model development and corresponding possible sources of uncertainty in EPA's analysis. EPA agrees that there can be significant regional and species variation in the age composition of impinged fishes. However, EPA's methods were selected to be widely applicable for the purposes of its national benefits analysis. EPA acknowledges that its analysis will not capture the exact conditions present at each CWIS, but this was not the goal of the analysis. Nonetheless, EPA has revised its assumptions about age distributions of impinged fish in a manner that acknowledges that YOY may be abundant among impinged fishes, as described in the EPA response to Comment 316bEFR.029.105.

Comment ID 316bEFR.330.023

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

The effect of changing the estimates of survivorship through life stages on the age 1 equivalent calculations.

In this example we will examine the effect of differing values for survivorship on the age 1 equivalent calculations. Data will be presented showing that the survivorship values used by the EPA are not the same as some published data. The two examples chosen show variations of up to 50%. Varying the survivorship values used in the age 1 equivalent model produces estimates of age 1 equivalents of up to 116 % higher. First, we examine the survivorship values used by the EPA. Here we will look at two species where we have found published data for survivorship of species entrained at case study power stations.

To match published data some life stages have to be combined. Table 13 shows the values obtained for the striped bass at Salem and by NOAA. The values at Salem are consistently lower that those found in the NOAA estimate. They are on average 48% of the value of NOAA estimates.

Table 13. The proportion of striped bass that survive from one life stage to the next. Data from Salem and the NOAA technical report NMFS circular 443, Synopsis of Biological data on striped bass, Morone saxatilis (Walbaum). E M Setzler et al.
[See hardcopy]

In Table 14 the survivorship estimates of Cunner (Tautogolabrus adspersus) calculated by the EPA and those quoted in Horst are presented. It can be seen that the Seabrook values are on average 72 % of the values quoted by Horst.

Table 14. The proportion of Cunner (Tautogolabrus adspersus) surviving from one age to the next. Data used by the EPA at Seabrook and estimations of the factors from Horst et al.-Effects of Power Station Mortality on Fish Population Stability in relationship to Life History Strategy.
[See hardcopy]

As can be seen from the two examples above, differences of 50% in survivorship estimates are possible. By re-running the entrainment to age 1 equivalent model and adjusting the survivorship values we could examine the effect on the number of age 1 equivalent fish estimated. We adjusted the survivorship by 25, 50,75 and 100%. This was done across all the survival factors.

Table 15. The effect of changing the estimates of survival on the number of entrained fish in various species found at Salem.
[See hardcopy]

Table 15 shows that a 50% increase in the estimates of survival can result in a 116% increase in the estimate of the age 1 equivalent number entrained.

The survivorship figures used in the EPA case studies are largely based on the assumption that the populations are in equilibrium. Because of this assumption, the data used to calculate these figures already have the effect of the power stations built into them. As conditional mortality rates from entrainment are often in the 10 - 25% range and the survivorship values can vary by significant amounts it would seem reasonable to err on the side of caution and increase all the estimates by 25%.

EPA Response

EPA agrees that age 1 equivalent estimates are sensitive to the survival rates assumed for the analysis. Please see Chapter A6 of the Regional Analysis Document (DCN # 6-0003) for further discussion of this topic. For information about EPA's assumptions regarding entrainment survival, please see Chapter A7.

Comment ID 316bEFR.330.024

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 4.01

Source data used by EPA

Dataset Weakness

Old data

How intensively were the stations studied?

Salem is a well-studied station, with 21 years of data available, although there have been some changes in the way the samples have been taken over that period. Pilgrim and Brayton are also well-studied with data from 1974. For Brayton, data are only used from 1974 to 1983 as the populations of fish declined after that time. They do not provide the data to show this effect. Seabrook has 8 years of data. The other sites are restricted to 1 or 2 years of data, often from the 1970s.

EPA Response

Please see response to comment 316bEFR.074.005.

Comment ID 316bEFR.330.025

Author Name Reed W. Super
Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.03
Impacts of CWIS on impaired waterbodies

Trends

Many fish communities have shown larges changes in recent years. In some habitats species are recovering after anthropomorphic impacts, others are still in serious decline. Here we present some data for the Hudson, New York, and Morro Bay, California, to demonstrate that significant changes have occurred over this period.

Hudson River, New York

Taking the Hudson River striped bass and Atlantic tomcod as examples (Henderson and Seaby 2000), it can be seen that data from the 1970s would give very misleading results if applied to the area today.

Figure 4 shows the number of various life stages of striped bass in the Hudson between 1975 and 2000. It can be seen that there has been a 15-fold increase in
numbers over this time. This is related to the reduction in fishing pressure and the cleaning of the estuary.

Figure 4. The abundance indices for the adult stock (CFM) and the larval (YSL) and post larval (PYSL) stages of striped bass. Note that all these indices show a similar trend and sequence of high and low abundance years.
[See hardcopy]

The Atlantic tomcod has been in steady decline over the last 25 years in the Hudson (Figure 5). Again using data from the mid 1970s would lead to a serious misinterpretation of the impact of a station in the Hudson on the tomcod population.

Figure 5. The change in estimated abundance of Atlantic tomcod at age 1. A linear regression has been fitted to the data to show the trend of declining number.
[See hardcopy]

Morro Bay, California.

A comparison of impingement levels observed during the periods 1977-79 and 1999-2000 at Morro Bay, California, illustrates the large changes in fish abundance and thus rate of impingement that have occurred in American waters.

In this example there has been a loss of fish such as shiner perch, Cymatogaster aggregata, and bocaccio, Sebastes paucispinis, which were much more abundant in the earlier study. For shiner perch the following account was given by Duke Energy (APPLICANT'S TESTIMONY ON GROUP IV ISSUES, Energy Resources Conservation and Development Commission Docket No. 00-AFC-12)

“During the 12-month sampling period of 1978, over 5,400 shiner perch were collected (Behrens and Sommerville 1982), while during this study (1999-2000) only 45 were collected. Over 75 percent of the shiner perch impinged during the previous study were newborns (Behrens and Sommerville 1982). Annual indices for young-of-the-year (YOY) shiner perch from the San Francisco Bay monitoring program show a decline from the early 1980s through the last data point in 1993 (CDFG http://www.delta.dfg.ca.gov/baydelta/monitoring/shper.html). This decline is attributed to loss of saltwater marsh areas that are recognized as important nursery areas for this species. Female shiner perch will enter coastal bays prior to giving birth to utilize saltwater marsh and eelgrass beds as nursery areas (Bane and Robinson 1970). The reduction in the area coverage of eelgrass beds in Morro Bay, especially in areas of the Bay that are closer to the intake structures (Tetra Tech 1999) may partially account for the reduced numbers of shiner perch in impingement collections.”

In the case of bocaccio the population along the Californian coast has declined significantly over the past decade, and management measures are in effect to regulate the take of this species. The reduction in impingement may therefore reflect a general decline in the abundance of the species.

Increased species richness and fish and crustacean abundance following plant closure – studies in the Bristol Channel, England

Regular long-term monitoring of fish and crustaceans impinged and entrained at Hinkley Point 'B' Power Station in the Bristol Channel, England has been undertaken for more than 21 years. Henderson & Seaby (2002) conclude “Fish abundance in the estuary is probably 3 times higher than that recorded in the early 1980s and there is also a clear trend for increased species richness” (Figure 6). They consider the reasons for this extraordinarily large increase and suggest that the reduction in power plant entrainment and impingement following the closure of a number of direct-cooled power plants from the late 1980s may be a contributory factor. The passages below are taken directly from their recent report, available from: http://www.irchouse.demon.co.uk/latestreports.html.

Figure 6. The change in the number of fish species impinged per month between 1981 and 2002. The black trend line was fitted by linear regression.
[See hardcopy]

Amongst a number of climatic and anthropogenic changes that may be contributing to the observed increase in species richness and abundance must be considered the recent closure of a number of direct-cooled power stations. Since sampling commenced in October 1980, Berkeley closed in 1989, Uskmouth in 1995, Pembroke in mid 1997 and Hinkley A in May 2000. All of these stations would have been killing fish and crustaceans that were members of the populations subject to capture at Hinkley B. It is highly unlikely that entrainment and impingement in power station cooling water systems would have changed species richness in the region because the estuary presents an open system that would receive a flow of recruits from other waters. However, if mortality rates are sufficiently high it is possible that direct cooled power stations could reduce abundance by a detectable amount. Table 16 gives estimates of the number of fish > 3 cm in length that are captured per year by power stations in the Bristol Channel. The four power stations that have closed since 1989 were estimated to kill 3.44 x 106 individuals per annum. The number of small individuals that would have passed through the filter screens and been killed following entrainment has not been estimated, but would have been at least an order of magnitude greater. “

“…there are indications that the increase in abundance of some species has occurred since power station closure as would be anticipated if power stations had been having an effect on population size. For example, Palaemon serratus (Figure 7) showed a reasonably stable mean population size until 1998 after which it has been increasing almost exponentially. There are also indications that the Common shrimp, Crangon crangon, may have recently increased in average abundance. Amongst fish, sprat, whiting, flounder and sand goby abundance have all increased since the initiation of power station closures.

Figure 7. The change in abundance of Atlantic prawn impinged at Hinkley Point in the River Severn between 1981 and 2002.
[See hardcopy]

Such coincidences cannot be considered proof of a causal relationship. However the Severn Estuary Data Set should allow a more rigorous statistical analysis to be undertaken within the next 18 months.”

Table 16. Estimated number of fish killed on the filter screens of marine and estuarine power stations situated in the Bristol Channel.
[See hardcopy]

EPA Response

EPA agrees that some fish populations have shown significant trends over time. EPA also notes that fish abundances may have increased, decreased, or stayed the same since the time that I&E data were collected, which was often as many as three decades ago. However, EPA asserts that it is extremely difficult to detect ecological effects at the population level (see the book by Schmitt and Osenberg, "Detecting Ecological Impacts", Docket # DCN 2-019A-R21). For this reason, EPA did not attempt to identify potential trends in fish populations for its benefits analysis.

Comment ID 316bEFR.330.026

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.03

Data Issues

Exclusion of species

How were species selected for analysis?

The EPA first pick rare and endangered species that have been affected by the station. They then move on to commercial or recreationally caught species. Finally they consider populations thought likely to be affected by the station. It is not obvious how a species is chosen to be ignored. From the numbers given EPA do, however, analyse all of the significant species present.

The Salem study is the only study where non-RIS species account for a high proportion of the total catch. Non-RIS species were between 30 and 60% of the total impingement and 10 to 40 % entrainment.

At Big Bend unidentified fish make up about a fifth of the total fish count while at San Francisco, Contra Costa and Pittsburg, about 15% of the entrained species are unidentified and about 2% of the impinged species.

Pilgrim gives full numbers of all species caught from 1990 onwards, while before that, from 1974, the non-RIS species are reported as one number. Brayton reports only 19 species caught, though there are unidentified species mentioned.

J.R. Whiting gives all the information for all species caught. Relatively few species are caught at this station. At Monroe unidentified species account for less than 1% of total numbers caught. In the Ohio study approximately 80 species are caught, but full data is given for a reduced set of species.

Did this affect the outcome?

Species that are not rare and have no commercial or recreational value are classed as forage fish. All forage fish appear to be treated the same in terms of value. They only come into play in the calculation of production foregone. Addressing each species individually is unlikely to make much difference at most stations. The exception is where the fish are rare or have a very local population. If the forage fish caught at stations can be shown to have a higher value then it might be worth treating them individually.

Comments on the changes from phase II. These species will need to be separated to allow age 1 equivalents to be calculated for impingement.

EPA Response

See response to Comment 316bEFR.077.020 regarding inclusion of all organisms impinged and entrained.

Comment ID 316bEFR.330.027

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.03.08

Extrapolation Methods

Extrapolation from the case studies to other stations

Here we are looking at whether it is reasonable to extrapolate the data from one or two case study power stations to many stations. In this example we examine the similarity of the types of species impinged and entrained in the Great Lakes and estuaries.

The Great Lakes

Impingement in the Great Lakes.

The two case study stations are dominated by clupeids (over 90%). Table 17 show the different types of fish impinged at two case studies and several other power stations in the Great Lakes (as raw numbers) (data from Sharma, R. K. and Freeman, R. F. 1997, Survey of fish impingement at power plants in the United States. Argonne National Laboratory). The stations are ordered in the table by the abundance of clupeids.

At most stations on the Great Lakes, clupeids are the major species caught (Figure 1), however, at Oak Creek the smelt species make up over 17% of the total catch. Similarly over 18% of impinged fish at JP Pulliam and DE Karn are Perch species. Palisades, a closed-cycle cooling station, mainly catches sculpins whereas at Big Rock and Kewaunee, both once-through systems, smelt species are impinged in large numbers.

Table 17. Proportion of the major species caught at power stations on the Great Lakes. All species with more than 100,000 individuals caught at the case study stations and any species with more that 10% of the other stations are included.
[See hardcopy]

Entrainment in the Great Lakes.

From data given in Kelso and Milburn (1979 no. 453) (Figure 2) it can be seen that entrainment at power plants in each of the Great Lakes is very different. In Ontario, Detroit River and Michigan, clupeids are the dominant group entrained. In Lake Erie it is smelt and in Superior it is the percids. In Huron, smelt and the clupeids are entrained in equal measure.

The two case study stations are on Lake Erie. Kelso and Milburn’s (1979) data would suggest that the species entrained would be predominantly smelts, however the case studies are dominated by clupeids, with more than 85% of the total catch. It can be seen from this that extrapolating from the case studies to other stations on Lake Erie would produce a very different result from that found in Kelso and Milburn (1979). Extrapolation to power plants situated on different lakes is even more liable to error. Extrapolation to all the Great Lakes stations from the case studies is therefore likely to produce an extremely poor match with reality.

Estuaries

The Salem case study is meant to be representative of other estuaries. To examine this we looked at the nearby Hudson estuary and compared the major groups of fish impinged and entrained at each station.

Impingement in Estuaries

Data was obtained for Salem (the case study), Danskammer, Roseton (State Pollution Discharge elimination system permits for Bowline Point Indian Point 2 & 3 Roseton Steam Electric Generating Stations 2000) and Albany (PSEG Power New York Inc's Bethlehem Energy Centre SPDES Modification 2002). The data was classed into five groups - others, bay anchovy, drums, Morone spp and clupeids (Figure 3).

The graph shows that Salem is a poor model station for the Hudson. All the Hudson stations impinge mainly clupeids and Morone spp. whereas Salem impingement is dominated by bay anchovy, drums and the group Others. The Others at Salem include the RIS and non-RIS forage fish plus others that did not fit the above classes.

Entrainment in Estuaries

Data was obtained for Salem (the case study), Bowline, Indian Point, Roseton (State Pollution Discharge elimination system permits for Bowline Point Indian Point 2 & 3 Roseton Steam Electric Generating Stations 2000) and Albany (PSEG Power New York Inc's Bethlehem Energy Centre SPDES Modification 2002). The data from each station was classed into four groups, others, bay anchovy, Morone spp. and clupeids and plotted (Figure 4).

The picture is more complicated for entrainment than it is for impingement. Salem primarily entrains bay anchovy (90%). This is similar to Bowline and Indian Point, but both these stations also entrain significant numbers of clupeids and Morone spp. The species composition of entrained fish at Salem is completely different from Roseton and Albany, which are dominated by clupeids and Morone spp.

The presence of eggs, larvae and young fish is very dependent in estuaries on the exact salinity conditions, flow rates and habitats present.

Implications of extrapolations from case studies to other stations

As can be seen from these examples, extrapolating the catch of fish from one station is prone to many errors. The result of this is that the costs calculated for a case study will not be directly comparable with any other site. For example, using Salem as a model for the catch at Roseton would result in a completely inaccurate estimation of the value of the lost fish. At Salem the majority of all the fish killed are bay anchovy, which has very little commercial value. The majority of the fish entrained and impinged at Roseton are the valuable Morone spp. and clupeid species. Using Salem as the model for the Hudson Estuary would significantly underestimate the values of the fish killed.

Figure 8. Proportion of the different types of fish impinged at Great Lake power plants

[See hardcopy]

Figure 9. Proportion of different groups of fish entrained at power stations at each of the Great Lakes. The number of stations used are in brackets.
[See hardcopy]

Figure 10. A comparison of the proportion of entrained fish from the case study at Salem and stations in the Hudson River.
[See hardcopy]

Figure 11. A comparison of the proportions of entrained fish from the case study at Salem and stations in the Hudson River
[See hardcopy]

EPA Response

The commenter refers to analyses done for proposal. For EPA's final analysis, many additional facilities (a total of 46) were used as the basis for extrapolation, which was conducted on a regional basis. Estimates of I&E for the Great Lakes region were based on extrapolation from three facilities. Estimates of I&E in the mid-Atlantic region were based on six facilities, not just Salem. Please see response to Comment 316bEFR.041.041 concerning EPA's extrapolation approach.

Comment ID 316bEFR.330.028

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Calculating The Worth Of Commercial And Forage Species Entrained And Impinged

The worth of an individual lost to a population can be assessed in terms of the immediate loss to the other species, or man, which might have consumed the individual, or in terms of the future loss caused by the loss of reproductive potential.

In the EPA's calculations, the commercial species killed by entrainment and impingement are valued by calculating the age 1 equivalent number killed and multiplying it by the proportion of the population taken by commercial fishing and their market value. This only considers the immediate loss and places a value on only a proportion of the number killed. This is felt to be an extremely significant omission, liable to underestimate the value of fish killed severely.

Comments on the changes from phase II. This has been addressed by the EPA using a correction for the age structure of the impinged fish.

The fish killed also represent a loss in reproductive potential to the population and thus represent a future loss to the ecosystem and fishermen. The average contribution of an individual to future generations changes with age, so that the contribution of an egg is much less than that of a one year old fish. This is because fish at or close to reproductive age are no longer subject to high mortality rates and will soon produce eggs. Fisher defined a quantity, termed the reproductive value, V, to measure the extent by which an individual of age x contributes to the next generation.

To calculate the reproductive value of fish of age a, we need a table of age-specific survival and mortality rates. If we assume that the population size is stable then the reproductive value is given by:

[See hardcopy for equation]

where l(x) is the survival to age x and m(x) is the fecundity at age x.

If the population is growing or declining then the expression is a little more complex as it includes a term to describe the change in population number. In practice, the above description should give us an approximate measure of the worth of an individual in terms of future eggs contributed to the population that is accurate enough for the estimation of the value of the loss to the population. The reproductive value of a newly produced egg is assumed to be 1 and all later ages have a reproductive value expressed as the number of eggs that would be produced on average over the rest of their lives.

Having calculated the reproductive value for age 1 fish we can use the estimated number of age 1 equivalent fish killed by impingement and entrainment to calculate the lost egg production they represent. This total lost production of eggs can then be converted into age 1 equivalent reproductive value by multiplication with the survival rate to age 1. This age 1 equivalent reproductive value gives the true loss over time to the population of the age 1 equivalent animals killed. The economic loss can then be calculated by multiplying the age 1 equivalent loss by the unit monetary value. One important general observation is that reproductive value tends to increase until an age is reached that is close to when all the fish have reproduced once, and then tends to decline for older age groups.

Striped bass at Salem as a worked example

These calculations will be illustrated using the striped bass at Salem as an example. At Salem the average numbers of entrained and impinged fish (excluding 1996) were 419,505 and 7,200 respectively. When reduced by the 18% lost to commercial fishing, the values were 343,994 and 5,904. Thus the total number of individuals as age 1 equivalent that were not valued was 347,898. It is these fish for which we will calculate a reproductive value and thus estimate the value of their loss to the population.

Table 18 shows the age-specific fecundity and survival of striped bass and the calculated reproductive value at age(x). The change in reproductive value with age is plotted in Figure 12, which shows a typical maximum at an intermediate age in the life cycle.

The total lost production (expressed as numbers of eggs) was calculated by multiplying the reproductive value of age 1 fish (6,515 - see Table 18) by the number of age 1 equivalents caught at the station. This product was then adjusted to an age 1 equivalent number using the survival from age 0 to age 1. These calculations are shown in Table 19. This shows that the 347,898 fish not valued as age 1 equivalents have a future age 1 reproductive potential of 596,142 age 1 equivalent fish. Thus the value of the uncounted fish is the economic value of 596,142 age 1 equivalent fish.

In summary, the EPA calculations are based on the value of 18% of about 420,000 age 1 equivalent fish with a value of about $56,000. Using lost reproductive value we have a future loss of 596,142 individuals which has a value of about $79,000 plus the immediate loss of $56,000 giving a total annual loss of about $135,466 per year.

These calculations can be undertaken for all the commercial species plus many others and will allow a full valuation to be made of the loss

Pilgrim - a worked example of a site

To illustrate the method the most frequently-encountered species at Pilgrim were chosen. The reproductive values of the top 7 species impinged and the top 5 species entrained were calculated using the same method as the Salem above example. The results are given in Table 20 & Table 21.

Comments on the changes from phase II. It seems that the EPA is not fully valuing the non-landed proportion of commercial fish species. By converting young fish into older fish then using the older fish totals as the inputs for their harvest and forage models, they are not counting the fish lost at the younger life stages towards the total production. For example forage fish are translated from eggs/larvae into age 1 equivalents. This is then used to calculate the percentage of those age 1s that are converted to harvestable protein because they are consumed by harvested fish. If so the EPA are not counting the many eggs and larvae that did not reach age 1 and were also consumed by harvestable fish.

Table 18. The age-specific fecundity and survival of striped bass and the calculated reproductive value at age (x).
[See hardcopy]

Figure 12. The change in reproductive value with age for striped bass.
[See hardcopy]

Table 19. The age 1 equivalent values for striped Bass (+ 58% Morone spp.) from Salem (Tables B3-3 and B3-8), multiplied by the reproductive value to find the total number of eggs lost in the future, shown as age 1 equivalents. (From egg to age 1 factor=0.0002615).
[See hardcopy]

Table 20. The age 1 equivalent and reproductive values for the top 7 species imagined at Pilgrim.
[See hardcopy]

Table 21. The age 1 equivalent and reproductive values for the top 5 species imagined at Pilgrim.
[See hardcopy]

EPA Response

Please see EPA's response to Comment 316bEFR.206.065 regarding reproductive value.

Comment ID 316bEFR.330.029

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 6.05

Impacts to T&E species

Threatened And Endangered Species Affected By Intakes

Cooling water systems impact threatened and engendered species directly by entrainment and impingement and indirectly by habitat degradation. Fish, crustaceans and molluscs are often directly impacted because they have swimming stages that can enter the intakes. However, other animal groups such as turtles and even seals have been entrained and caught on screens or in screen wells. Aquatic birds and mammals tend to be indirectly affected via lost food supplies and habitat degradation.

How widespread are threatened and endangered species problems in water bodies affected by power plants?

It should be assumed that all power plants situated on estuarine and coastal sites will impact to some degree threatened or endangered (T & E) species. Major American river estuaries are all heavily utilised by man and because of overfishing and habitat damage they all hold fish populations that are considered endangered or threatened. In many cases these species are fish that were once quite abundant but have been much reduced by man, such as sturgeon and migratory salmonids. Where entrainment or impingement data for a power plant has been thoroughly collected for a number of years it is usually the case that T & E species have been recorded. Where insufficient data are available to make it likely that a rare fish would have been detected there is often information to suggest that T & E species occur in the area and would be vulnerable to harm by the cooling water system. For example, the San Francisco Bay / Delta estuary study includes the following in the list of species vulnerable to I&E:

- Central Valley ESU steelhead - Oncorhynchus mykiss

- Central Valley fall/late fall-run ESU Chinook salmon – Oncorhynchus tshwytscha

- Central Valley spring-run ESU Chinook salmon – Oncorhynchus tshwytscha

- Delta smelt – Hypomesus transpacificus

- Green sturgeon – Acipenser medirostris

- Longfin smelt – Spirinchus thaleichthys

- Sacramento River winter-run ESU Chinook salmon – Oncorhynchus tshwytscha

- Sacramento splittail – Pogonichthys macrolepidotus

Along the same coast at Morro Bay, the April 2002 staff report for the California Energy Commission notes that the estuary used for cooling water by Morro Bay GS is inhabited or potentially inhabited by the federally endangered tidewater goby (Eucycloglobius newberryi) and the steelhead trout (Oncorhyrnchus mykiss). Note that the tidewater goby is not listed as present in the San Francisco Bay area.

Similarly sized lists of T & E species could be complied for almost all ocean and estuarine sites. For example, in the Hudson Estuary both shortnosed (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus) have been impinged on cooling water intakes.

At many ocean and lower estuarine sites young turtles are potentially vulnerable to entrainment. For example, in the recent assessment of the impact of the Sunset Energy proposal for a power plant in New York harbour the following turtle species were listed as potentially present:

- Green sea turtle – Chelonia mydas

- Loggerhead sea turtle – Caretta caretta

- Leatherback - Dermochelys coriacea

- Kemp’s ridley turtle – Lepidochelys kempii

- Hawksbill – Eretmochelys imbricata

With the exception of a few leatherbacks, most of the turtles in nearshore waters in the New York coastal region are small juveniles. The loggerhead is the most abundant, followed by the Kemp's Ridley. These two species, along with a few green turtles, move into harbours and estuarine waters, while the leatherback turtles remain along the coast and are rarely seen in embayments. Kemp's Ridley inhabits the shallower areas of Chesapeake Bay in search of blue crab, their preferred prey. Their preference for shallow waters and blue crabs makes the Kemp's Ridley the most likely sea turtle species to venture into the New York & New Jersey Harbor area. Similar lists would be produced for many east coast marine or lower estuarine power plants situated to the south of New York.

A point to note is that if conservation measures for species such as sturgeons and turtles were successful then populations could greatly increase, resulting in extended ranges and the risk of higher impingement in future years.

It is not so easy to make generalisation about freshwater habitats. Plant situated on rivers, particularly smaller rivers, are almost certain to impact T & E species, as are those situated on the great lakes. Kelso and Kilburn (1979), in an examination of impingement and entrainment at Great Lakes power stations, report:

“There were seven species found among impinged fish that were rare or never before detected (Scott and Crossman 1973) in the Great Lakes including pirate perch (Aphredoderus sayanus), redfin pickerel (Esox americanus americanus), golden redhorse (Moxostoma erythrurum), orange spotted sunfish (Lepomis humilis), brindled madtom (Noturus miurus), warmouth bass (Chaenobryttus gulosus) and chestnut lamprey (Ichthyomyzon castaneus)”.

Plant using water from reservoirs or smaller lakes may not directly impact T & E fish, birds or reptiles. This is because these may be in areas of low aquatic biodiversity or even utilise water from man-made water bodies. However, the isolation inherent in freshwater water lakes and some river catchments results in the formation of distinctive biological races of many species of fish. The maintenance of this genetic biodiversity is recognised as important and loss of genetic diversity may be a more important impact on freshwater fish than is generally appreciated.

In addition to direct impacts indirect effects in terms of habitat degradation are likely to be affecting other T & E species. This is particularly the case when power plants are situated on smaller estuaries, inlets or close to less common types of habitat. For example, Morro Bay Power Plant is situated on a small estuary on the Californian coast and the region holds threatened sea otter (Enhydra lutris) and federally endangered California brown pelican (Pelicanus occidentalis). These species rely on the Bay for food that can be reduced by impingement and entrainment. In many localities the abundance of fish feeding birds is probably directly proportional to the level of food resources available for the birds. Thus any damage to the populations of often rather small, non-commercial fish species can have a direct impact on aquatic birds.

EPA Response

Please see response to comment 316bEFR.077.053 which raises the same points by the same author.

Comment ID 316bEFR.330.030

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 10.02.05

Valuing CWIS effects on other species

Ecological benefits of intake technologies that are difficult or impossible to monetize

Only a small fraction of the life forms present in a water body can be given a monetary value. Yet almost all the species present in the water column or living on the river or seabed in the vicinity of an outfall will be impacted by a direct cooled power plant. Most are not fished or sold in any form and are not of immediate value as tourist features as may be the case for an elephant seal colony or turtle breeding beach. In general somewhere in the region of about 20 of the about 2000 species of multi-cellular animals typically entrained by a power plant can be assigned a monetary value.

The question is how should we consider the worth of the other 99%, many of which are small or even microscopic? The interdependence of species and the fact that all species can be viewed as interconnected units within a food web immediately suggests that the economically important species are dependent upon the existence of many other species either directly because they are their food or indirectly because they help to create some aspect of the habitat that is essential for their existence.

Perhaps the most clear cut, but unusual, situation would be where total dependence can be shown between two species such that a dependent species that has an economic value cannot exist without another supporting species. With this type of situation the supporting species can be assigned a value as a resource base for the economically important species. Given sufficient ecological knowledge it would be possible to calculate how many of the economically important species would be lost if the resource base was diminished in size.

Because almost all the commercially important fish and crustaceans are predators that feed on a variety of prey and can often be quite flexible in their feeding behaviour such a simple relationship will not generally be the case. However, as the vast majority of species with no economic value are lower down the trophic chain than those with economic value, they can be viewed collectively as the resource base upon which the economically important species depend.

Such an approach suggests how we might give a value to the majority of species. Suppose that an estuary has 20 species that can be given a commercial value and these 20 have a production of say 50 kg per hectare per year and this is supported by an ecosystem that achieves a maximum annual standing crop of say 50,000 kg per hectare. Then we might roughly state that 1000 kg of standing crop of all species is needed to produce 1 kg of commercially important species.

Then if entrainment reduces the standing crop by say 10% we can conservatively assume that this will result in a proportionate reduction in the commercial species of 10%. It is conservative because in some cases the reduction could be far greater. Some top predators need a critical mass of food or food density to exist. If the available food drops below the critical amount then their population dies out. To give an unrealistic and extreme example which shows how this can be a grey whale eats about 2500 kg of crustaceans per day, in a habitat that can only supply 10,000 kg per day it is not possible to support a grey whale family group so they will move away or die out. The habitat has food just not enough for the minimum population size required.

Once such a rough relationship is established we can then give a monetary value to any loss to the ecosystem. Some measure of the likely loss of standing crop of plankton can be gained from simple modeling. We can model the plankton community using say a logistic equation such that in the absence of the power plant the population would be at carrying capacity. Then given a daily mortality rate determined by the proportion of the total volume of the habitat that is pumped via the plant the fractional reduction below carrying capacity that results can be estimated.

While the approach outlined above might be used to estimate the overall value of the resource in terms of its food value to economically important species this does not represent the full value of species lost by entrainment and impingement. Unquantifiable losses include the following.

- Loss of recycling efficiency and the loss of nutrients and materials to the local ecosystem. Damage to ecosystems typically results in a loss of ecological efficiency and the release of materials that would have been retained within the ecosystem. Thus a river or estuary may export to the ocean more resources than would have been the case if the ecosystem had been undamaged. In freshwater habitats on hard geology the amount of nutrients in the water can be limited and minerals such as calcium in short supply. Such ecosystems are highly conservative of these limiting minerals and very little is washed down the river to leave the immediate habitat. However, if the ecosystem is damaged or reduced then some of the nutrients that are normally retained locally may escape down stream. Such effects have been shown to occur. The loss in recycling efficiency may result in a gradual long-term degradation.

- Power plant mortality will tend to favour short-lived species at the expense of long-lived forms. This tends to produce a bias in favour of more ‘weed-like’ life forms. The naturally occurring species towards the top of the food chain such as striped bass are typically adapted to live in climax ecosystems in which short-lived species are less dominant. Further, the bias produced may result in a loss of biodiversity resulting in a less stable ecosystem

- Damage and alteration to the ecosystem may allow the invasion of unwelcome aliens. In particular, fasting growing invasive species that have adapted to manmade or disturbed habitats may reach pest levels. It is notable that most of the alien species that have become established in the Hudson estuary for example are invasive ‘weeds’ suggesting that human disturbance may be implicated in allowing them to become established. There are examples of exotic species particularly warm water loving forms becoming established in power plant systems and outfalls. Damage to ecosystems may increase the risk of the development of organisms dangerous to human health. Water bodies receiving heated effluent have been closed to water sports because of the risk of pathogens. Red tides may become more frequent and toxic in highly disturbed and unnatural waters. This can increase the costs associated with environmental monitoring and the processing costs of drinking water. Legionella has been found in power station cooling systems. A protozoan pathogenic to humans called Naegleria fowleri has been found in heated industrial effluents. In the US pathogenic Naegleria have been found in some freshwater lakes receiving effluents from power stations. Pathogenic Acanthamoeba and Nagleria were isolated from cooling water discharges at several coal-fired power stations in the USA (Shapiro et al 1980) and these authors concluded that cooling systems may be the source of some infections.

In addition to the costs that may accrue we can also view the ways in which the ecosystem as a whole can offer us services. Some of the most important are listed below.

- Recycling of human waste. This is probably the most important service that is offered by waters close to human habitation.

- Demobilisation and detoxification of chemical waste products. The living world is involved in both the breakdown and locking away within the sediments of dangerous metals, petroleum products and a vast range of chemical wastes and products.

- The stabilisation and accumulation of sediments. Without vegetation soft sediments would be far more mobile resulting in increased turbidity and sedimentation of channels.

- Support to the terrestrial ecosystem. In many localities there can be a major reexportation of biomass from water to the land via insects and other invertebrates but also via fishing birds and mammals. Thus the presence of a diverse and rich aquatic fauna can enhance the health of the associated terrestrial flora and fauna.

Many animals feed on fish. To illustrate this we show below a list of mammals that are known to feed on fish. The list of birds, reptiles and crustaceans would be very long indeed.

Fish-Eating Mammals Of North America
[See hardcopy for list]

EPA Response

EPA agrees that the majority (98%) of impinged and entrained fish are forage fish have no direct market value, but are nonetheless important for aquatic food webs. To capture the indirect use value of such species as food for recreationally and commercially important species, EPA used a simple trophic transfer model to estimate the contribution of forage species to foregone fishery yield (see Chapter A5 of the Regional Study Document, DCN #6-0003). However, nonuse values are not accounted for.

Comment ID 316bEFR.330.031

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 14.01

RFC: 5% threshold and supporting documents

5% flow threshold for rivers

This proposal is based on the concept that the proportion of eggs and larvae and juvenile fish entrained from a population is directly proportional to the volumetric proportion of the habitat that is pumped through the cooling system. This will rarely be the case because larvae and juvenile fish are not randomly distributed throughout the water. For example, the common eel Anguilla, which migrates up East coast rivers as elvers, often travels close to the bank, sometimes in ribbons of thousands of individuals. For such species the position of the intake is an important factor in determining the level of entrainment. It is therefore essential that the 5% threshold is never taken as a sufficiently protective measure to protect fish, hence allowing poor design and placement of intakes. Given good intake design, the proposed threshold has merit and, as will be discussed below, is probably superior to some of the alternative withdrawal thresholds.

There are concerns relating to the use of mean annual flow, as the level of protection given to the fauna would be far from certain. The use of mean flow could result in a far higher proportion than 5% of the flow being taken during seasonal or unusual periods of low flow. If an animal is to be afforded good protection, then all of its life stages must be protected. Using average flows as the basis for 5% threshold calculations may result in variable levels of protection through time and could produce high mortalities during low flow periods sufficient to negate any protection afforded at other periods. It is common for regions to suffer extended periods of drought lasting one or more years when river flows may be well below the long-term average. During such periods the plants would presumably still be able to extract at a rate determined by the mean annual flow prior to the drought; this could be particularly damaging.

5% of mean flow during the spawning season. This proposal would likely be less protective of juvenile fish and would offer no protection to small migratory fish such as eels and lamprey that can be subject to entrainment and might not be moving past the intakes during the spawning season. It would presumably allow a far larger proportion of the mean flow to be taken outside of the spawning season, resulting in far greater damage to populations than would be the case with the 5% flow threshold.

10% to 15% of mean annual or spawning season flow. These options are considerable less protective of the fauna than the 5% preferred option and should be avoided.

25% of the 7Q10. The flow of most US surface waters is highly seasonal and varies considerably between years so it is possible that the 7Q10 minimum constraint would give a lower constraint than the 5% of average flow threshold. In drought years this constraint would effectively allow a reduction in the level of environmental protection over that offered in more typical periods. Over the usual life of a power plant of 40 years or more it is likely that there will be periods when flow is lower than the 7Q10 and thus, for short periods, even more than 25% of the flow could be removed. The problem from the ecological viewpoint with this proposal is that during extreme droughts, when the aquatic

life is already stressed, the impact from water extraction (and discharge) would be particularly high. This could result in considerable ecological damage from which it might take the river fauna a number of years to recover. It is unclear if this option is
better or worse than the 5% annual average. It is certainly much more difficult to quantify.

EPA Response

See comment 316bEFR.077.034.

Comment ID 316bEFR.330.032

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 16.0

Capacity Utilization

15% Capacity utilisation cutoff

This proposal would remove plants that operate for less than 55 days per year from the need to reduce entrainment. Providing such plants are usually operated during mid summer and mid winter this is probably a reasonable concession. However, there are ways in which it could result in far higher entrainment levels than is implied in the proposed rule.

First, the 15% is “over the course of several years”. This would allow a plant that meets an average of 15% to be used for far more 55 days in some years. This in turn could result in large entrainment losses for some years.

Second, it is implied that the 15% of available operating time would be taken as one or two blocks: “the plants typically operate during two specific periods: extreme winter and extreme summer demand periods”. The implication is that this pattern reduces the need for entrainment protection as these periods correspond to periods of naturally low entrainment, which they often do. However, it is possible to envisage other patterns of operation that would result in 15% availability and which would result in far higher entrainment losses. For example, a plant could be used to meet peak morning and evening demand only.

Third, there is no assurance that the 55-day period of operation would not correspond to periods of high larval fish abundance. Indeed, in a worst possible scenario a plant with 15% utilisation could kill almost as many organisms by entrainment as a plant with a 60-80% utilisation. To illustrate the point the Table 22 shows the conditional mortality rates for abundant larval fish at the Indian Point Power station in the Hudson estuary, NY (reproduced from the Indian Point Draft DEIS).

Table 22. The conditional mortality rates for abundant larval fish at the Indian Point Power station in the Hudson estuary, NY. (Entrainment CMR x 1000). (Reproduced from the Indian Point Draft DEIS). [See hardcopy]

Note that almost all the larval entrainment occurs over two periods, 23-Feb to 28-Mar and 17-May to 25-July. If the plant were used in both these periods even a 55-day utilisation could produce high levels of entrainment. It should also be noted that February and July are often months when electricity demand is at a peak so such an outcome is quite possible.

The above considerations indicate that a simple 15% threshold would not necessarily give the level of entrainment protection that the modest level of utilisation might suggest. A low-utilisation plant kills a large number of organisms by entrainment then the fact that it is not used for the majority of the time should not exclude it from taking protective measures.

Alternative thresholds

All the alternative thresholds proposed are higher than 15%. Given the stated concerns about the 15% level there are even more grounds for concern that higher threshold levels could allow excess entrainment.

EPA Response

The Agency has analyzed the potential national effect of the capacity utilization rate threshold on entrainment. The capacity utilization rate threshold allows facilities with capacity rates of less than 15 percent to comply with impingement requirements, and removes entrainment requirements where they apply. In this analysis (see DCN 6-3586) the Agency determined that less than 1 percent of the actual annual intake flow of facilities projected to upgrade technologies as a result of the rule would fall under the capacity utilization rate threshold. Therefore, more than 99 percent of the actual annual intake flow of facilities that pose significant potential entrainment concerns would not be subject to reduced standards. This is a reasonable basis on the national level for a capacity utilization rate threshold (which, in its implementation will allow the rule to be more affordable to the complying industry without sacrificing the entrainment reduction performance retaining all of the impingement performance and of the rule), in the Agency's opinion.

The Agency has analyzed the potential for overlap of the facilities falling under the capacity utilization rate threshold and the periods of concern to the commenter (i.e., what the commenter terms periods of peak spawning). The Agency analyzed all facilities projected under the threshold and examined the likely operating periods for these facilities. Of the 42 facilities projected to fall under the threshold, 17 of these facilities would be subject only to impingement requirements regardless of the existence of the utilization threshold. Further, of the 25 facilities (5 percent of Phase II facilities) that would receive reduced entrainment requirements under the capacity threshold, the total median operation period per year would be 28 days. Considering that this operational period is broken about in two likely periods in winter and summer, the 2 week period in each season would likely overlap only a small portion of the periods of concern to the commenter. The operational flow of the facilities receiving reduced entrainment requirements over the typical 28 days per year would be 1 % of the total annual intake of facilities within the scope of the rule that are subject to entrainment reduction requirements. Therefore, the capacity utilization rate threshold will not appreciably decrease the entrainment efficacy of the final rule.

Additionally, should the local conditions of the plant warrant, special considerations can be made at the local level by the Director to allow for more stringent requirements than those in the final rule for certain circumstances. See the preamble to the final rule.

Comment ID 316bEFR.330.033

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 20.03

Spatial scale for entrainment trading

Trading Mechanisms

Spatial scale

The EPA would prefer that trades be conducted between water bodies that share similar ecological characteristics regardless of geographic proximity of the facilities to each other.

There are two problems with this preferred option. First, it is unclear what is meant by share similar ecological characteristics. All estuaries share the characteristic that they are nursery areas for marine fish, however the species occupying estuaries differ with geographical locality. This phrase would need to be carefully defined. In particular, the use of ecological characteristics is too vague to be useful.

The second problem relates to the sharing of populations within the region where trading would be allowed. The one key ecological characteristic that must be shared for trading to be ecologically protective would be the populations of the impinged or entrained species. Two rivers or lakes may have many species in common and a generally similar ecology, but their populations may be completely isolated. Therefore improvements in one system would be of no benefit to the populations in an unconnected system. Also, the characteristics and genetics of species change with geographical locality. Therefore geographic proximity and in particular some degree of connectivity are important so that waters can share populations or occasionally swap migrants. This is essential if they are to have ecological characteristics that can be considered shared.

If the primary aim is to protect the populations of fish and crustaceans, then the geographical scale and the nature of the ecological characteristics for consideration must be determined by the extent and isolation of the populations of target species. A necessary, but not sufficient, criterion must be that all waters over which trading is conducted must be connected so that they interchange their most abundant fish species. In situations, such as estuaries, where they are connected by the ocean it must also be proven that trading is occurring between localities between which the main species do actually move. While for some species, such as striped bass, the ocean may be no obstacle, for others it may be effectively insurmountable. A similar situation can occur in large rivers where different tributary catchments can be isolated islands for species unwilling to enter the main stem of the river. This brings into sharp focus the fact that the appropriate geographical scale changes with the species.

The above considerations suggest that trading should only be allowed over limited geographical zones and normally confined within a single estuary, river or lake. Further, in large water bodies, where clear environmental gradients are present, it would be inappropriate to allow trading between sites with very different lists of commonly entrained and impinged species. For example, in the River Hudson Estuary there are great differences in the larval fish entrained between low salinity waters towards the head of the estuary and higher salinity waters towards the mouth. In the case of ocean sites they would need to be within a zoogeographic zone that shared fish populations. For large rivers there would also need to be habitat subdivisions reflecting habitat features. This leads to the conclusion that the appropriate spatial scale is trading within specific water bodies with further subdivisions for large and very large water bodies.

The above arguments lead to the view that trading should only be permitted between sites situated on the same water body and ecological community and that impact the same populations of common species at similar life stages.

EPA Response

This comment is identical to comment 316bEFR.077.051 by the same author. Please see the response to that comment.

Comment ID 316bEFR.330.034

Author Name Reed W. Super

Organization Riverkeeper obo Pisces Conservation, Inc.

Subject Matter Code 20.04

RFC: Potential trading units/ credits

The unit for trading

The EPA propose three possible units of exchange, species density, species counts and biomass. As will be discussed below there are considerable problems with all 3 possible units for trading and further clarification and definition is required.

Using species density; numbers of eggs, larvae, juvenile fish and shellfish species entrained per unit volume would be used. This could only be an appropriate measure for trading if trading were strictly limited between sites in the manner proposed above under spatial scale. The distribution of all species is far from uniform and is variable through time. Therefore this proposal will not offer equal protection to all species. In particular, the density of shellfish species needs to be considered in more detail as it may seriously distort the outcome. Crustaceans are normally much more abundant than fish in both entrainment and impingement samples. For example, in estuarine and marine sites very large numbers of shrimp (Crangon spp.), mysids and young crab are entrained. Is it proposed to give these organisms equal weighting to that of larval fish? The situation is even more difficult if molluscs are to be considered. In some estuarine and marine localities large numbers of small molluscs such as just ready to settle mussels (Mytilus spp.) may be entrained. Such ‘fouling’ organisms are frequently viewed as a pest and sometimes are actively killed using biocides or heat treatment. The implication would seem to be that these would be given equal weight to larval fish for trading purposes. The example of trading under the EPA’s preferred alternative (p17172) is based on only a few abundant fish species and gives no mention to shellfish. A final area that needs to be clarified is the base data that will give a measure of the entrainment at each plant between which trading is proposed. The recruitment of fish and the abundance of other entrainable organisms can vary dramatically from year to year and change greatly through time. A clear example of long-term change is the 15-fold increase of abundance in striped bass in the River Hudson estuary since the 1970s. If trading is to be fair and appropriate it is essential that each of the sites within the trading group must have contemporaneously collected entrainment data and that the time period for comparison between the sites must be of equal length.

Species counts would use data on the numbers of each species. Further, these numbers would be subdivided into age classes. A value would need to be given to each species at each life stage. It is far from clear how each species and stage will be given a monetary value, and the amount of work required to collect and organise the data would be considerable. In reality this method could only be used for selected species. How would these species be selected? There would be a great temptation to focus on important commercial species, as they would be easier to value in monetary terms. As for species density, if trading is to be fair and appropriate it is essential that each of the sites within the trading group must have contemporaneously collected entrainment data and that the time period for comparison between the sites must be of equal length.

Biomass; trading would be based simply on the weight of entrained organisms per unit volume. This would give equal weight to all living (or possibly recently killed) life. The effect would be to effectively have a trading system based on phytoplankton. For marine and estuarine systems these would be mostly diatoms, Phyocystis and other colonial forms and dinoflagellates. In some freshwaters diatoms and even blue-green algae could dominate. The most abundant animal groups are frequently ciliates and other protozoans and microcrustaceans such as copepods and cladocerans. At ocean sites it is often observed that the biomass of ctenophores entrained is considerable. The biomass of eggs and larvae of fish and macrocrustaceans such as crab and lobster would be negligible. A biomass trading system would be completely inappropriate, as it would focus protection towards the rapidly reproducing, short-lived lower-life forms that are best able to cope with the losses caused by entrainment.

EPA Response

This comment is identical to 316bEFR.077.052. Please see the response to that comment.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed W. Super

On Behalf Of:

Riverkeeper Inc.

Author ID Number:

316bEFR.331

Comment ID 316bEFR.331.001

Author Name Reed W. Super
Organization Riverkeeper Inc.

Subject Matter Code 6.01
Overview of I & E effects on organisms

This comment letter was replaced by an updated letter from the author. Please see 316bNFR.404.

EPA Response

Please see response to 316bNFR.404 in the comment response document for the Phase I 316(b) new facility rule.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed W. Super

On Behalf Of:

Riverkeeper obo Synapse, Inc.

Author ID Number:

316bEFR.332

Comment ID 316bEFR.332.001

Author Name Reed W. Super

Organization Riverkeeper obo Synapse, Inc.

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

The EPA has revised its estimate of the net downtime of retrofitting cooling towers at a nuclear power plant from 4 weeks to 7 months. This revision appears to be based solely on the experience when cooling towers were added to the Palisades nuclear power plant in 1973/1974. We do not believe that this change is justified for the following reasons.

First, the amount of time it took to retrofit cooling towers at the Palisades nuclear power plant 30 years ago is not persuasive evidence of how long it would take to complete similar work at nuclear power plants today. In particular, the durations of refueling/maintenance outages at nuclear power plants have been significantly reduced during the past decade. Outages which previously had required two or three months of plant downtime are now routinely completed in fewer than 30 to 40 days. Similar improvements can be expected in the amount of additional plant downtime that would be required for the installation of cooling towers and related plant modifications at nuclear power plants.

Second, Consumers Power Company, the owner of the Palisades plant, has told the EPA that:

Based upon a site review of engineering, accounting and purchasing documents, we can infer that the conversion process spanned over a period from mid-1971 to May of 1974 when the cooling towers became operational. It appears that the outage time for the conversion took about 10 months from August 1973 to May 1974.

Consumers Power also told the EPA the there were several maintenance-related tasks performed during Palisades' 1973/1974 extended outage. Nevertheless, Consumers Power claimed that "it appears that the outage was primarily for the purpose of installing the new circulating water system and the modifications necessary for its operation."

We have reviewed contemporaneous nuclear industry and regulatory documents from 1973 and 1974. Contrary to what Consumers Power has told the EPA, it appears that the extended outage of the Palisades nuclear plant was primarily due to factors other than the installation of the new circulating water system and related modifications.

For example, the NRC has reported the following concerning Palisades August 1973 to April 1975 outage:

An outage was initially estimated for 3 months to repair [the plant's steam generators]. Internal reactor problems and a waste gas release investigation prolonged the outage into 1974. The new cooling towers were completed and placed in operation and the turbine-generator was overhauled.... [Consumers Power] filed a suit against several vendors for startup problems with the condenser, [steam generators], and core internals. Turbine repairs and condenser-retubing extended the outage even further.

According to an article in the October 1974 issue of Nuclear News, Consumers Power had said that the outage was "due principally to steam generator corrosion and damage caused by vibration of the reactor core internals, as well as defective main condenser design and tubing." As a result, Consumers Power sued Bechtel Corporation and four other companies who helped to build the Palisades nuclear plant because "equipment supplied [in 1966 and 1967] was defective" and that defective equipment had not been promptly and adequately repaired.

This information suggests that the Palisades plant remained shutdown during the period August 1973 through May 1974 (and, in fact, into 1975) as a result of serious problems unrelated to the installation of the new circulating water system and related modifications. Unfortunately, the EPA does not appear to have verified or confirmed what it was told by Consumers Power. Instead, it has increased the additional plant downtime for a cooling tower retrofit by roughly 600 percent (from 4 weeks to 7 months).

Third, even if work on the installation of the new circulating water system and related modifications began in August 1973 and was completed in May 1974, it is possible that this work could have been completed in less time if it had been the most critical work during the outage. For example, our review of more than 100 power plant outages has revealed that critical path projects are frequently worked seven days a week and sometimes 24 hours a day. Unfortunately, Consumers Power has not provided any information to enable the EPA or anyone else to determine whether the installation of the new circulating water system and related modifications was worked on such a schedule. Indeed, other, more critical projects during the 1973/1974 Palisades outage might have diverted management, engineering and manpower resources from the cooling tower retrofit and/or might have made the retrofit more difficult and, therefore, longer.

In addition, there is no evidence that the installation of the new circulating water system was even worked every day during the period August 1973 through May 1974. There may have been significant periods when little or no work was being performed on this project.

For this reason, it is unreasonable to judge how long a cooling tower retrofit project might take at existing nuclear power plants based on at the start and finish dates at Palisades in 1973 and 1974.

Finally, the U.S. Department of Energy's National Energy Technology Center issued a study in October 2002 entitled "An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Towers at Existing Power Plants." This study was prepared by the Parsons Infrastructure and Technology Group, Inc. ("Parsons"). In this study, Parsons examined the possible retrofitting of cooling towers to four different power plants, one of which, the Surry site, has two nuclear units.

Parsons concluded that the construction and startup of new cooling tower systems at the Surry nuclear site would not result in extended outages:

With proper planning and coordination with other planned outages, cutover from the older cooling systems to the new cooling towers could be accomplished without loss of generating time. This has been the experience with other plants. Therefore, the analysis shows no cost penalty for extended outages at this time.

In conclusion, we find no evidence supporting the EPA's revised seven month estimate of the additional downtime that would be required to retrofit cooling towers at nuclear power plants. There also is a complete lack of credible support for Consumers Power Company's claim that the retrofit of cooling towers at the Palisades nuclear plant back in 1973 and 1974 required an additional ten months of plant downtime.

EPA Response

First, EPA notes that an estimate of 7 months downtime for nuclear plants is not the full time (10 months) it took the Palisades plant to retrofit their cooling system.

Second, EPA notes that because the maintenance, refueling, and inspection outages for nuclear plants has decreased somewhat over the past 30 years means that construction schedules for connections of cooling systems would have even LESS offset time to coincide with during maintenance and refueling outages compared to 30 years prior. To illustrate the point, the Agency presents a simple example. If the total duration of a downtime takes 10 months in 1974 and the duration of the predictable refueling/inspection outage was two to three months, then the total NET duration of the downtime caused by the cooling tower connection would be from 7 to 8 months. Now, fast forwarding to the present where refueling/inspection outages last between 30 and 40 days on average (say 1.5 months for simplicity's sake) a 10 month total construction downtime due to cooling tower retrofits would only be offset by 1.5 months, thereby giving a NET duration of a modern downtime of approximately 8.5 months (i.e., 1.5 months LONGER than in the past).

The commenter's conclusion that Consumers Energy misrepresented the cause of the construction downtime is not persuasive. In the Agency's view, the contemporaneous reports summarized and referenced by the commenter support the conclusion that the cooling tower conversion could have played the critical role in the outage. The Agency notes that the condenser tube failures at the plant are predictable due to the conversion of the cooling system from once-through to recirculating. The Agency was aware of this possibility in its proposal and NODA analysis of cooling tower retrofits, as evidenced by the fact that the Agency included condenser upgrades for a significant portion of those facilities analyzed for cooling tower retrofits under the rejected regulatory alternatives. EPA notes that the commenter has omitted any discussion of the cause of the condenser failures. Because the main condenser design and tubing were mentioned directly as (at least partial) causes for the outage, and the degree of their contribution cannot be discerned further by the commenter's references, the Agency continues to consider the cooling tower retrofit as a direct contributor to the 10 month outage. In addition, the commenter's discussion of the lawsuit by Consumers Power because of defective equipment and failure to repair said equipment, could be interpreted to support the assertion that the condenser failure was not adequately predicted and that the cooling system change could still be responsible for the majority of the outage.

The rest of the commenter's discussion of the reasons for the Palisades outage are mere speculation without evidence. As such, the Agency maintains that the outage at Palisades could be truly as Consumers Energy reported to the Agency and primarily the result of the cooling tower conversion.

EPA notes that the commenter is either misinterpreting or omitting the findings of the DOE/NETL study (prepared by Parsons). The following quotation from the DOE summary of the study underlines the concerns of the Agency in mandating cooling tower retrofits to nuclear plants:

"Dominion expressed concern with respect to maintaining the integrity of operation of the Surry

Power Station’s Emergency Service Water pumps under the proposed wet cooling tower retrofit design. Preserving the integrity and operation of the Surry Power Station’s Emergency Service Water pumps is a significant safety issue. Dominion’s concern is valid and serves to underscore how the understanding of truly site-specific issues is critically important to the retrofit design process.”

In addition, the DOE study makes note of the fact that construction downtimes were potentially optimistic in the study.

EPA notes that the commenter failed to consider that major construction projects at nuclear plants in many cases cannot operate such as those at other fossil-fuel plants where blasting, major civil works, or intermittent interruptions to intake water can be carried out while operating the plant. Therefore, the commenter’s conclusion (without empirical evidence) that predicted generation loss are phantom is not realistic nor supported by their comment.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Randy L. Kowalski

On Behalf Of:

North Dakota Department of Health

Author ID Number:

316bEFR.333

Comment ID 316bEFR.333.001

Subject Matter Code 7.04
Streamlined Technology Option

Author Name Randy L. Kowalski
Organization North Dakota Department of Health

We encourage EPA to expand on the approach suggested in the NODA for a streamlined technology option proposed for CFR 125.94 that would consider the engineering features of a cooling water intake. Considering the rule is for existing facilities with a variety of configurations it seems that a suite of technology options should be available for consideration under a streamlined approach. We encourage EPA to expand on defining systems that would meet streamlined technology option. This would reduce the burden state NPDES regulators by reducing the number of individual site specific determinations requiring review and determinations regarding adequacy. The engineering aspects of a facility are readily measurable and verifiable. In our experience, studies of aquatic populations can be extremely hard to meaningfully to relate to a single operation particularly when other influences on the water body such as climate, flow management and land use can dramatically effect the populations. Given the extensive analysis conducted to extrapolate the cost of impingement and entrainment from a few study cases, it seems additional effort could be put into quantifying the performance of additional situations and technologies currently in use.

EPA Response

EPA believes that it has expanded and clarified the site conditions required to qualify for the Approved Design and Construction Technology Option. For extensive detail on this option, please see § 125.99 of today's final rule, as well as preamble section VII.C.3

Comment ID 316bEFR.333.002

Author Name Randy L. Kowalski

Organization North Dakota Department of Health

Subject Matter Code 8.01

Proposed standards for FW rivers and streams

The inland waters appear to be poorly represented in the data analysis used to determine adverse impacts and BTA for existing facilities. The limited number of facilities and data for inland waters was not expanded with the NODA. Of interest to us is the lack of consideration by EPA of the existing technology applications in moderately fast moving cold climate river systems where ice and debris would potentially limit the feasibility of some technologies. It does not seem equitable that facilities operating in streams with velocities in the 2 - 3 fps range and intakes with velocities from 0.5 to 1.0 fps should be considered to have the same effect as those operating in near reservoir conditions with their differing aquatic communities.

EPA Response

EPA disagrees. EPA acknowledges that detailed case studies or analyses have not been developed for every region in the United States, nor does it expect to do so. Today's rule establishes protective requirements for all waterbodies, regardless of geographic considerations, by establishing requirements that are not region-specific. For example, the proportion of the mean annual streamflow of a river by a facility or the design intake velocity of a technology are characteristics that are universally applicable to all facilities.

A goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. EPA believes that these performance standards are appropriate for most facilities.

Additionally, EPA compiled a database of documents that analyzed the efficacy of specific control technologies (see DCN 5-4420 in the Phase II NODA docket, Section VII.A in the NODA [68 FR 13538]). This database was the result of an international literature search to develop the compliance ranges for the performance standards. As such, EPA believes these performance standards to be appropriate for most facilities.

EPA also notes that the rule does distinguish between freshwater rivers and reservoirs. Please refer to § 129.93 for definitions of a freshwater river and a reservoir for this rule.

Comment ID 316bEFR.333.003

Author Name Randy L. Kowalski

Organization North Dakota Department of Health

Subject Matter Code 7.01.03

Option 3--Site-specific determination

We anticipate that the affected facilities in our state will be opting for the site-specific options. If a streamlined technology option reasonably applicable to the region is not provided, the facilities will likely seek the site specific BTA determination option. The site specific options appear to be quite resource intensive for NPDES programs as well as the facility.

EPA Response

EPA disagrees that most facilities will seek a site-specific determination of best technology available. Please refer to the response to comment 316bEFR.202.002.

Comment ID 316bEFR.333.004

Author Name Randy L. Kowalski

Organization North Dakota Department of Health

Subject Matter Code 7.04

Streamlined Technology Option

Selecting one or two prescriptive technologies for a streamlined approach seems overly simplistic to characterize the performance of the variety of existing systems.

EPA Response

EPA disagrees that it has only selected one or two prescriptive technologies in the Approved Design and Construction Technology option. Rather, EPA has included a provision which allows any interested person to submit a request to the Director that a technology be approved in accordance with the compliance alternative, making the potential number of technologies limited only by the creativity of the interested parties or by the physical limitation of the technologies themselves. For extensive detail on this option, please see § 125.99 of today's final rule, as well as preamble section VII.C.3.

Comment ID 316bEFR.333.005

Author Name Randy L. Kowalski

Organization North Dakota Department of Health

Subject Matter Code 7.04

Streamlined Technology Option

The rule for existing facilities should provide a streamline option for cooling water intakes on reservoirs constructed solely for the purpose of supplying (recirculating) cooling water. We do not believe it is worth our resources to oversee and assure a site-specific study is completed in accordance with 40 CFR 125.94(a)(3) of the proposed rule when if it were not for the facility the fishery would not exist.

EPA Response

Please refer to § 125.93 for EPA's definition of closed cycle cooling, and to EPA's response to comment 316bEFR.032.015 for EPA's position on determining whether a facility meets the definition of closed cycle cooling.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mike Wilder or Nancy Gilbreath

On Behalf Of:

Troutman Sanders obo Georgia Power

Author ID Number:

316bEFR.334

Comment ID 316bEFR.334.001

Subject Matter Code MISC

Miscellaneous comment

Author Name Mike Wilder or Nancy Gilbreath

Organization Troutman Sanders obo Georgia Power

This comment letter is identical to another letter previously submitted. Please see 316bNFR.322.

EPA Response

Please see EPA's response to the comment referenced in the comment text.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Kerry M. Whelan

On Behalf Of:

Reliant Energy

Author ID Number:

316bEFR.335

Comment ID 316bEFR.335.001

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

General Comments:

While the NODA does not specifically request additional discussion regarding the definition of Adverse Environmental Impact (AEI), Reliant would like to reiterate that the adoption of a practical definition is vital to implementation of the proposed rule. Sound fisheries management principals dictate that impacts or improvements to fisheries resources are best measured at the population and/or community level, not at the individual organism level. A clear definition of AEI based on sound fisheries management principals is required before any management strategies involving CWIS can be realistically contemplated.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule.

Comment ID 316bEFR.335.002

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 6.01

Overview of I & E effects on organisms

As stated in our previous comments, despite years of extensive study nationally, there are very few cases of demonstrative evidence that any fisheries species has been negatively impacted by once-through cooling operations. Where impacts have been identified, they appear to be very specific to certain facilities, further emphasizing the site-specific nature of the impacts. Consequently, it makes little sense to mandate expensive technology-based regulatory solutions to address previously unobserved adverse impacts on an across the board basis. We believe that local and state regulatory agencies, burdened with limited budgets, should have substantial latitude on how best to define, identify and address fisheries impacts under 316(b).

EPA Response

Please see response to comment 316bEFR.025.018 for the discussion regarding the environmental impacts associated with cooling water intake structures. EPA believes that today's final rule gives substantial flexibility to permitting authorities to determine the best technology available for each site. Please see § 125.94 which describes the five compliance alternatives. In addition, § 125.90 allows States to demonstrate that it has adopted alternative regulatory requirements in its NPDES programs that will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

Comment ID 316bEFR.335.003

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 7.03
Available I&E technologies

In regard to EPA's proposed technological solutions, Reliant again questions the efficacy of fine-mesh screens, cylindrical wedge-wire screens, and filter fabric barriers, especially when used in waterbodies subject to; 1) high suspended solids or biofouling loads, 2) frequent occurrence of tropical storms, hurricanes, or flood flows, or 3) limited hydraulic cross-flow to remove impinged debris or nekton. As such, there is considerable question as to whether the implementation of these technologies could achieve the proposed performance measures in various site circumstances.

EPA Response

Please see response to comment 316bEFR.100.004.

Comment ID 316bEFR.335.004

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 7.02.03
Technology Efficacy Database

Performance Standards

EPA requested comments on the Technology Efficacy Database and its ability to support the performance standards. Reliant notes that the database, while fairly robust, demonstrates wide variability as to study approach and design, methodology, implementation and results. This variability underscores the need for site-specific evaluations to determine efficacy of any given design and construction technology for each type of waterbody where it would be employed. Of particular concern, the database contains limited information to support contentions that such technologies could be implemented, much less demonstrated to be effective, in the turbid, particulate-rich waters of many Gulf Coast estuaries.

EPA Response

Please see response to comment 316bEFR.325.004.

Comment ID 316bEFR.335.005

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Entrainment Survival

Currently, EPA does not recognize that organisms may survive entrainment. EPA requested comment on whether it is appropriate to consider entrainment survival in calculations. Reliant supports UWAG's position that EPA should allow consideration of supportable entrainment survival data.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.335.006

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Restoration Activities

EPA identified several sources of uncertainty regarding restoration activities such as marsh creation. Reliant recognizes there is a lag-time before full productivity in constructed wetlands, but suggests that the lost productivity during this lag-time is more than fully off-set by the continued productivity associated with a created wetland that will function long after a specific generation facility has reached the end of its service lifetime. Reliant suggests that voluntary restoration approaches, such as constructing functional wetlands, are an effective way to offset loses associated with impingement and entrainment of organisms at CWIS.

EPA Response

All restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.335.007

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 11.06
RFC: Performance/effectiveness of restoration

Reliant agrees that peer review conducted by local resource agencies familiar with such projects can be an effective means to achieve mitigation success as well as lowering overall mitigation costs, especially for companies with limited experience in such restoration activities.

EPA Response

EPA agrees with the commenter that peer review may be helpful for facilities with limited experience in restoration activities. For a discussion of the role of peer review in the final rule, see EPA's response to comment 316bEFR.312.006.

Comment ID 316bEFR.335.008

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 21.04
Determination of compliance

Representative Indicator Species

EPA requested comments on use of the representative indicator species (RIS) approach to evaluate compliance. Reliant strongly favors this approach over the all species approach. It is simply not feasible to measure performance standards against every single species that may come into contact with a CWIS. For species that are encountered on an extremely rare basis, the impingement of a single organism could cause a facility to violate the performance standards. Instead, by using the RIS approach, facilities could focus their efforts on the few species that are considered ecologically pivotal for the given ecosystem. In Gulf Coast estuaries, the RIS approach may indicate that a relatively limited number of species need to be monitored to demonstrate compliance with performance standards.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.335.009

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 21.04

Determination of compliance

Moribund Fish

EPA requested comment on whether a facility should have the opportunity to remove the number of moribund organisms from calculations when conducting impingement studies. Reliant believes the ability to remove previously moribund organisms can be critical to obtaining representative data at a CWIS. All waterbodies can be subject to natural or manmade fish kills. For example, Gulf Coast estuaries encounter extremes in temperature and other weather conditions that often contribute to fish kills. High temperature and algal blooms can promote fish kills due to oxygen depletion in the shallow turbid estuaries. Freezing weather can likewise result in substantial fish kills when fish are trapped in shallow water bodies. Other fish kills may result from man-induced episodes such as oil or chemical spills. In such cases, large numbers of previously stressed fish can drift into CWIS where they are removed at the rotating screens. Reliant suggests that these fish logically should not be counted as impinged organisms and that the permittee should be able to discount those organisms if they so choose.

EPA Response

For EPA's position on the factoring of naturally dead or moribund organisms, please see EPA's response to comment 316bEFR.306.116.

Comment ID 316bEFR.335.010

Author Name Kerry M. Whelan
Organization Reliant Energy

Subject Matter Code 21.04
Determination of compliance

Compliance Determinations, Timelines, and Schedules

EPA requested comment regarding options for evaluating compliance with performance standards. Specifically, EPA requested comment on whether the Agency should allow the Director to determine how best to measure compliance, either programmatically or as part of individual permit decisions. Reliant stresses that a programmatic "one size fits all approach" while efficient from a regulatory point of view, would likely lead to over regulation of some facilities and under regulation of others. Reliant believes that compliance with performance standards can only be determined on a site-specific basis. We suggest that the implementing authority at the state level is best positioned to determine compliance.

EPA Response

EPA agrees that a one-size-fits-all approach is not appropriate for determining compliance. In today's final rule, therefore, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.335.011

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

EPA requested comment on whether the final rule should allow additional time to complete required studies when a facility's permit renewal date falls shortly after the regulation becomes final. Reliant favors this approach recognizing that the studies required under this regulation will likely require a number of years to complete due to the seasonal and annual variations in species abundance. Reliant suggests that local resource protection agencies are in a better position to determine timeframes appropriate to characterize aquatic species abundance in specific waterbodies

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.335.012

Subject Matter Code 21.04

Determination of compliance

Author Name Kerry M. Whelan

Organization Reliant Energy

Due to the variability in biological communities, EPA is considering implementing compliance schedules for facilities that have installed technologies to optimize their performance in order to meet the performance standards. Reliant strongly endorses this approach and recommends a minimum five-year timeline for such compliance schedules. This would allow for evaluation of impacts under a range of operating conditions through several seasons leading to optimization of control technologies. During this period of optimization, EPA should not hold a facility subject to enforcement for violating the Section 316(b) requirements. When performance standards have been met, EPA should allow facilities to use previous studies and data for future permit renewals as long as conditions at the facility and within the waterbody remain largely unchanged since the previous studies were conducted.

EPA Response

EPA has attempted to address these concerns through the use of a TIOP, when approved by the Director. See the preamble for more discussion of the TIOP. In today's final rule, a permit applicant may have reduced submittal requirements under certain circumstances following the initial permit cycle. Please see EPA's response to comment 316bEFR.034.005 for more details.

Comment ID 316bEFR.335.013

Author Name Kerry M. Whelan

Organization Reliant Energy

Subject Matter Code 7.04

Streamlined Technology Option

In addition to compliance schedules, EPA should expand the approach discussed under "Streamlined Technology Option for Certain Locations". EPA, in conjunction with state resource protection agencies, could identify prescriptive approaches deemed to meet performance criteria protective of aquatic species in specific habitats. Such approaches could include specific control technologies at the CWIS, operational measures, and/or mitigation and restoration activities. Once implemented and maintained, state resource protection agencies could certify that performance criteria have been met. This would greatly reduce the information collection burden imposed on permit applicants and resource agencies should a permittee choose to follow such a prescriptive approach.

EPA Response

EPA believes that it has provided industry and State resource protection agencies the opportunity to expand the Approved Design and Construction Technology Option. For details, please refer to EPA's response to comment 316bEFR.306.062.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Frank Ackerman & Rachel Massey

On Behalf Of:

Global Development and Environment Institute

Author ID Number:

316bEFR.336

Comment ID 316bEFR.336.001

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

We are pleased to have the opportunity to submit comments on the above-captioned notice of data availability. As we discuss below, in our view cost-benefit analysis is an inappropriate tool for adjudicating the policy questions currently facing the Agency. However, even if one accepts cost-benefit analysis as an appropriate means to determine the appropriate level of regulation for power plant cooling water intake systems, the magnitude of the omissions in the NODA renders the exercise meaningless. The difficulties encountered in the attempt at monetization of benefits underscore the need for other approaches to evaluation of policy options.

As we discuss in detail below, despite the large amount of analysis that went into the NODA, the document includes only a fraction of the data that EPA itself considers to be relevant for the regulation. Having discarded the approach to nationwide calculations it used for the original proposed ruling, in the NODA the Agency presents benefit calculations for just two regions of the country. Calculation of both use and nonuse benefits is attempted for only one of the two regions; and even this calculation omits consideration of key biological facts.

The lack of key information in the NODA does not reflect lack of effort in gathering and analyzing data. Rather, the shortcomings of the NODA illustrate the flaws in the methodology that EPA is now pursuing. The task of quantifying benefits will require significant further analysis, and involves methodological quandaries that will not be resolved easily. In our opinion, by converting its regulatory mandate into a lengthy and methodologically questionable program of data collection and analysis, EPA has failed to meet its responsibilities under the Clean Water Act. The Agency has, however, developed a substantial body of data and background information. These data can be applied usefully to developing sound regulations, which should take account of benefits without holding them to the unrealistic standard of precise monetization, as the Agency has done thus far.

EPA Response

EPA's approach to economic analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003).

Although EPA presents benefit calculations for just two regions of the country in the NODA, benefit estimates were developed for all study regions for the final 316b rule analysis. See the Regional Analysis Document for the Final Section 316(b) Phase II Existing Facilities Rule for detail (DCN #6-0003).

The Agency recognizes that quantification and monetization of ecological benefits involves unavoidable uncertainties and thus monetization of nonuse benefits was not included in the final benefit summation for the final Section 316(b) Phase II rule. For example, in addition to presenting monetized benefits EPA presents a qualitative assessment of ecological benefits. The Agency explains its approaches in the Regional Analysis Document for the Final Section 316 (b) Phase II Existing Facilities Rule (DCN #6-0003).

Finally, EPA points out that economic considerations should not strictly determine policy decisions, and that other factors should also be weighed.

Comment ID 316bEFR.336.002

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Background

EPA's original proposed rule calculated estimated costs and benefits for seven possible regulatory options: a waterbody/capacity-based option with two possible tracks; the proposed rule, with "alternative less stringent requirements based on both costs and benefits"; impingement mortality and entrainment controls everywhere; all cooling towers; a dry cooling option; and a waterbody-based option. According to EPA's analysis, net benefits were positive for four of the options examined; they were negative for the "all cooling towers" and "dry cooling" options, and were not costed for the "waterbody-based option." EPA's calculated net benefits were highest, by a small margin, for the "proposed option." For another option, which would have placed more stringent controls on cooling water intake systems, estimated net benefits were more than 99% of the estimated net benefits of the proposed option. <FN 2>

In our comments on EPA's original draft ruling, <FN 3> we presented a number of criticisms. We pointed out that EPA's estimation of net benefits was seriously flawed, and that even conservative adjustments to account for some of EPA's omissions would produce significantly higher benefit figures, and would imply that a different regulatory option had the highest net benefits. In particular, we noted that EPA's use of an outdated "rule of thumb" for calculating nonuse value was misleading, and lacking in theoretical or empirical justification.

We noted that EPA had effectively valued large portions of aquatic resources at zero. One striking omission was the failure to place any value on the unharvested fish that regenerate the population from year to year. We also expressed concern that EPA overlooked important sources of value, ranging from commercial value of shellfish through ecological, recreational, and nonuse value of aquatic flora, bird life, and other organisms.

Footnotes

2 See 316(b) Phase II EBA, Part D: National Benefit-Cost Analysis, Chapter D1: Comparison of National Costs and Benefits. Available at http://www.epa.gov/waterscience/316b/econbenefits/d1.pdf, visited May 2003. Estimated net benefits for the proposed rule were $452 million, while estimated net benefits for the "Impingement Mortality and Entrainment Controls Everywhere" option were $449 million.

3 Comments submitted by Frank Ackerman, August 1, 2002.

EPA Response

EPA acknowledges that its focus on direct use benefits for recreational and commercial fisheries may result in many other types of benefits being omitted from the empirical estimates.

In regard to the comment that commercial shellfish were excluded from the analysis - this is not accurate for the final rule. Commercial shellfish were included in all regions, for all species that the available data permitted.

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits. As stated in the NODA, EPA agrees with the commenters that the 50% rule relies on outdated studies. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. See Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN # XX). Please see Chapter D1 of the final Phase II EBA document regarding break-even analysis.

Comment ID 316bEFR.336.003

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 6.05

Impacts to T&E species

We found EPA's consideration of threatened and endangered species to be a worthwhile, but limited, first step toward an analysis of this topic.

EPA Response

It is unclear in what way the authors believe EPA's consideration of threatened and endangered species to be limited. Please see the response to comments 316bEFR.077.008, 316bEFR.077.053 and 316bEFR.206.064.

Comment ID 316bEFR.336.004

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

We supported EPA's efforts to develop "habitat replacement cost" (HRC) as a methodology for developing more complete and accurate benefits estimates, but cautioned that this methodology requires a level of biological information that is often unavailable.

EPA Response

As in many environmental assessment methods, data limitations can be a significant hurdle to successful implementation. As the commenter duly notes, biological data may not be readily available for broad application of the HRC approach to the full range of biological outcomes associated with I&E. However, the Agency is no longer applying the HRC approach as part of the 316b benefits assessment.

Comment ID 316bEFR.336.005

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

What Changed in the NODA?

The NODA includes a number of adjustments in EPA's methodology. Some of these adjustments respond directly to our criticisms of the original analysis. However, additional methodological problems introduced in the NODA make it difficult to draw clear conclusions about whether EPA's analysis has, on balance, improved.

Important new elements that appear in the NODA include abandoning the outdated "rule of thumb" according to which nonuse benefits were formerly calculated as 50% of recreational use benefits; acknowledging the nonzero value of unlanded fish; and grouping several previously distinct categories of value together in a new "nonuse" category. However, there are also methodological setbacks, where EPA retreats from desirable features of its earlier analysis. For instance, EPA abandons the "Habitat Replacement Cost" method of estimating total ecosystem value; gives little indication of how it expects to calculate use benefits in six of the eight regions or nonuse benefits in seven of the eight regions; and does not attempt any calculation of the value of threatened and endangered species lost to impingement and entrainment in the NODA.

Due to these and other limitations, it is difficult to evaluate the changes in EPA's methodology represented in the NODA. In the absence of a completed national benefits analysis, it is not clear how benefits will be calculated for each region and for the country as a whole. For example, is EPA planning to perform analyses for all eight regions, comparable to the NODA estimates for the North Atlantic? If not, what method of extrapolation will be used to scale regional estimates up to a national total? Within regions, what methods will be used to scale estimates for individual plants up to regional totals? The reclassification of power plants, from waterbody-based categories in the original analysis to regional groupings in the NODA, means that category totals from the two analyses cannot be directly compared.

EPA Response

The commenter notes EPA's revisions to benefits assessment methodologies presented in the NODA. The commenter, however, states that "additional methodological problems introduced in the NODA make it difficult to draw clear conclusions about whether EPA's analysis has, on balance, improved." Specifically, the commenter criticizes EPA for abandoning the HRC method, presenting result for only two of the eight study regions, and not presenting any calculations of the value of threatened and endangered species lost to impingement and entrainment in the NODA.

For EPA's response to comments on the HRC method, please see response to comment #316bEFR.005.035.

For the final 316b rule analysis, the Agency developed benefit estimates for all study regions and presented calculations of the value of threatened and endangered species lost to impingement and entrainment for the region where impingement and entrainment data on special status species were available. See the Regional Analysis Document for the Final Section 316(b) Phase II Existing Facilities Rule for details (DCN #6-0003).

Comment ID 316bEFR.336.006

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.04

National Benefits

Despite these difficulties, we have made an approximate comparison of the NODA to the Economic Benefits Analysis (EBA) performed by EPA last year, by looking at the three plants in the North Atlantic region, Brayton, Pilgrim, and Seabrook, that were included in EPA's case studies for the EBA. We have compared the case study benefits for these three plants to the NODA benefits for the North Atlantic region as a whole, as shown in Table 1 (next page), using the average of high and low case benefit estimates throughout.

When benefits are expressed as dollars per cubic foot/second (cfs) of water flow, the North Atlantic regional benefits are now estimated at roughly $9,000 per cfs of flow. Since most of the region's plants (all but Pilgrim and Seabrook, in fact) are located on estuaries, the closest comparison may be to Brayton, the one North Atlantic estuary plant analyzed in the case studies. The benefit estimate for Brayton amounts to $10,350 per cfs, which is broadly comparable to the NODA value for the region as a whole. Thus we would guess, from the limited information available, that the NODA calculations introduce little change in aggregate estimated benefits. If this is the case, then the effort required to develop and implement the NODA methodology has little impact on the bottom line evaluation of policy options. While some problems in the analysis have been fixed from last year, other problems have been introduced. We showed last year that reasonable adjustments to the EBA methodology would produce much larger benefit estimates; we will demonstrate below that reasonable adjustments to the NODA methodology would likewise produce much larger benefit estimates for the North Atlantic, and thus presumably for the nation as a whole.

Table 1. Benefits/flow, North Atlantic region

[Please See hardcopy for table]

EPA Response

EPA notes this comment and notes that the methods used in the cost-benefits analyses to estimate commercial, recreational, and non-use benefits have changed. This alters the benefits estimates. Because the benefits for the proposed rule were estimated by water body type and benefits for the NODA and the final rule are estimated by region, they are not directly comparable to the results from the proposal.

Please refer to Dr. Ackerman's comments #316bEFR.014.004 and #316bEFR.014.005 as well as EPA's responses to those comments.

Comment ID 316bEFR.336.007

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

NODA Benefits Analysis: Methodological Problems

In the NODA, EPA significantly revises the methodology it uses to calculate the expected benefits of the proposed ruling. However, the NODA includes only a fraction of the information that EPA itself considers to be relevant for the regulation. In our view, EPA has failed to develop a credible estimate of the benefits of the proposed regulation.

Our discussion of the NODA benefits analysis begins with issues of regional disaggregation and the role of meta-analysis. We then turn to the North Atlantic benefits estimates, where we focus on the missing categories of use value, the limited number of species included in the nonuse value analysis, and the geographical coverage of the nonuse value. Finally, we review some of the important categories of ecosystem value that are excluded from the NODA.

Among other points, we note that EPA's nonuse valuation of fish affected in the Peconic Bay estuary is highly incomplete; EPA inappropriately limits the geographic scope of its nonuse benefits analysis; and the NODA fails to consider key biological facts, including interdependence among species and precarious stock status for many populations. Minimal requirements for completing the analysis EPA has begun should include developing a use value for unharvested fish and completing the meta-analysis of existing studies on nonuse value. In addition, EPA must avoid placing an effective value of zero on categories of value the Agency does not have time or resources to analyze in detail.

EPA Response

For EPA's response to the issues listed in this comment see responses to the following comments: comment # 316bEFR.336.001 regarding appropriateness and completeness of information presented in the NDOA; comments 316bEFR.206.047 and 316bEFR.336.013 regarding missing benefit categories in the benefit costs analysis of the Section 316(b) Phase II regulation; 316bEFR.336.008, 316bEFR.336.009 regarding valuation of non-landed fraction of recreational and commercial fish species; comments 316bEFR.336.010 and 316bEFR.336.011 regarding the North Atlantic Benefits Estimates.

EPA did not consider fish population or food web dynamics in its I&E analyses for reasons explained in EPA's response to Comment 316bEFR.005.009. EPA agrees that many fish stocks are in jeopardy, but it was not the intent of EPA's analysis to evaluate the stock status of any commercial or recreational fishery species. EPA notes that fishery species represent only about 2% of I&E losses.

For the final 316b rule analysis, EPA has changed its assessment of non-use values. As stated in the NODA, EPA agrees with the commenters that the 50% rule relies on outdated studies. In response to public comments, EPA agreed to undertake an improvement to the benefits transfer used in the analysis of non-use benefits of the 316b rule presented at proposal. Specifically, EPA developed a more rigorous regression-based meta-analysis that allows for estimation of the relative influence of various study, economic, and natural resource characteristics on willingness to pay (WTP) for non-use benefits. The results of such a regression-based meta-analysis make it possible to predict non-use WTP for aquatic resource changes as a function of site characteristics, the magnitude of environmental improvements, and study design attributes. Chapter A12, Non-Use Meta-Analysis Methodology, in the regional study document prepared for the analysis for the final Phase II rule provides detail on the meta-analysis approach to estimating non-use benefits of the 316b rule (see DCN # 6-0003).

Comment ID 316bEFR.336.008

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Regional disaggregation and meta-analysis

In the NODA, EPA discards its previous system of categorizing power plants by water body type, and instead divides the country into eight regions. The level of detail provided for the North Atlantic region, and for the partial analysis of Northern California, together with the absence of any nationwide generalizations or extrapolations from this data, suggests that most data must be developed separately for each of the eight regions. However, EPA considers only two regions in the NODA: the North Atlantic region and the Northern California region. Furthermore, EPA attempts a full accounting of benefits for the North Atlantic region only; for the Northern California region, EPA has not yet looked at nonuse benefits.

One of the areas that required substantial, and creative, analytical effort in the NODA was the estimation of nonuse values for the North Atlantic region, a topic we discuss below. Unfortunately, the disaggregated NODA methodology suggests that a new analysis at this level of complexity needs to be done seven more times, once for each region. EPA's analysis suggests, though it never states explicitly, that nonuse values must be estimated on a locally specific basis. However, sufficient data may not be available for some regions; will nonuse values be declared to be zero for such regions? On a deeper level, the need for region-specific nonuse studies reflects the dubious assumption (discussed below) that nonuse values are only important in the immediate vicinity of the affected ecosystems. On the more reasonable assumption that nonuse values apply over much wider areas, it would be appropriate to develop a common national methodology to supplement the regional approach.

One way to develop such a methodology is to conduct a meta-analysis of the numerous existing studies of nonuse values. Meta-analysis is a well-established research technique, used in many scientific and economic analyses to evaluate and combine the body of data and results contained in a range of similar studies; the expanded database allows researchers to develop greater confidence and precision in their results. EPA began, but did not complete, a meta-analysis of nonuse values of water resources for use in this case. We recommend that EPA complete that meta-analysis, and use it to support and contextualize national projections of nonuse value. The raw data provided by EPA, from its initial work on the meta-analysis, makes it clear that substantial nonuse values for water resources have been estimated, in several regions of the country.<FN 4> In addition, studies in other contexts consistently support the view that Americans place a high nonuse value on natural resources. Annual willingness-to-pay values for highly visible animals such as bald eagles, humpback whales, and gray wolves add up into the tens of billions; the existence of a less famous endangered species, the striped shiner, is reportedly worth an average of $6 per household per year to the American public, or more than $600 million annually on a nationwide basis.<FN 5> The clear lesson of these studies is that nonuse values are substantial; thus, for a benefits analysis to be complete, nonuse values must be estimated for all the affected organisms.

Footnotes

4 Tudor, et al., "Comparison of Non-use and Use Values from Surface Water Valuation Studies," Memo to the 316(b) Record (DCN 5-1011), March 12, 2003, Appendix A.

5 John B. Loomis and Douglas S. White, “Economic Benefits of Rare and Endangered Species: Summary and Meta-analysis”, Ecological Economics 18 (1996), 197-206; values from Table 1, p. 199.

EPA Response

The Agency agrees that estimating non-use values is critical to obtaining comprehensive estimates of total resource value such that the resulting total value estimates may be compared to total social cost. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

Comment ID 316bEFR.336.009

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

North Atlantic benefits – use values

For more detailed comments on the NODA benefit estimates, we now turn to the North Atlantic regional benefits, the only complete benefits analysis offered in the NODA. The benefits, as estimated in the NODA, consist of commercial use values, recreational use values, and nonuse values. While commercial and recreational benefits are of great importance, they are not the only use values that could and should be estimated.

Another category was omitted in both the earlier analysis and the NODA, namely the use value of the "unlanded" fraction of I&E losses. Estimates of commercial and recreational values are based only on the fraction of fish lost to I&E that would have been caught ("landed") in the absence of cooling water withdrawals. Normally only a small fraction of fish, even of the most valuable species, are caught by commercial and recreational fishing each year. In other words, most of the fish lost to I&E would have survived – and therefore are not included in estimates of either commercial or recreational value. The unlanded fish not only survive, but also reproduce, creating the fish that will be caught in future years. In effect, they are the natural capital of the fishing industry, analogous to the capital goods that are used in manufacturing.

The NODA recognizes that unlanded fish have a nonzero value (NODA, p. 13567), but focuses on their nonuse value; EPA does not propose a methodology for adequately estimating the use value of the unlanded fish. In our comments last year, we demonstrated that even a conservative estimate of the value of the unlanded fraction of I&E mortality has a large impact on total benefits.

EPA Response

As noted by the commenter, EPA's analysis indicates that the direct use benefits estimated for recreational and commercial fishery impacts reflect only a very small portion of the physical losses associated with impingement and entrainment (i.e., EPA's direct use benefits analysis reflects landed age 1 equivalent fish, and the I&E assessments reveal that these account for less than 2% of the individual fish lost to I&E, and over 98% of the physical loss are for the age 1 equivalent fish that not landed by recreational or commercial anglers).

Accordingly, a comparison of the estimated direct use benefits alone to compliance costs probably would be very incomplete and potentially misleading. Taking account of the beneficial values (to reflect the value of protecting the predominant share of the I&E-impacted fish) thus becomes a critical component of the benefit-cost analysis for this rulemaking.

There are several challenges – both conceptual and empirical – associated with trying to estimate the benefits of avoiding losses of fish that are not projected to be landed by commercial or recreational anglers. These issues have been discussed elsewhere in these responses to comment, on topic areas including nonuse value estimation and valuing forage species. A critical concern is that EPA try to reflect the value of unlanded fish in a logical and sound manner without either double-counting or omitting potentially important motives and sources of value.

Forage species are valued in part in the existing analysis through EPA's production foregone or trophic transfer approach, in which the losses in forage fish are converted into changes in the mass of landed recreational and commercial fish. Thus, forage fish are valued in part – but only to the extent that some fraction of forage fish that are spared from I&E due to the rule would be eaten by the specific individual fish ultimately landed by commercial or recreational anglers. This partial accounting of forage species value may only reflect a small fraction of the value of unlanded forage and other fish that benefit from the rule. For example, the forage fish spared by the rule (other than those ultimately consumed by a fish that is later landed) are likely to provide ecological and other value as well, but not through the landed biomass reflected in direct use benefit categories per se. The same point may arise for the recreational and commercially targeted fish spared by the rule from I&E, but that are not part of the landed fraction.

The issue raised by the commenter here is that some value should be assigned to the unlanded fraction. While some portion of the unlanded fraction is valued through the production foregone method as noted above (i.e., the forage fish that add biomass to the landed fish), there remains a large proportion of the physical impact of the rule that does not appear to be accounted for in the benefits analysis of direct use values. In large measure, this fact has led to the considerable discussion about how the Agency might best estimate nonuse values, since nonuse motives may be the category under which such values might be ascertained.

While the issue of potentially omitted benefits is a key concern for this rulemaking, it also is important to recognize the potential for inadvertent double counting when issues of "stocks" and "flows" become intermingled. This may arise, for example, when trying to consider the value of unlanded fish from the recreationally or commercially targeted species. The question is if and how one should value an additional striped bass (for example) that survives to harvest age because of the rule, where this specific individual fish is never landed by an angler. This added individual becomes part of the enlarged fish stock that presumably supports a larger annual harvest. EPA's approach to estimating direct use benefits of the rule is to focus on the "flow" concept of increased annual landings. An added fish that eludes harvest is not directly reflected in the flow values, but instead becomes part of the stock that enables the benefits of higher flows.

Please also see EPA's response to comments #316bEFR.336.009, #316bEFR.306.105, and #316bEFR.005.004; as well as Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN #6-0003) and Chapter D1 of the final Phase II EBA document regarding break-even analysis.

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Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Other important categories of value were also omitted, both in the EBA last year and in the NODA, as discussed on pp.11-13 below.

North Atlantic benefits – species included in nonuse value. In the analysis for its Phase II proposal, EPA developed an estimate of nonuse value by using the outdated "50% rule." This rule arbitrarily sets nonuse value equal to half of the use value enjoyed by recreational users of a resource. As we have previously discussed, <FN 6> in many cases nonuse value is likely to be significantly higher than this figure. Furthermore, it is misleading to develop a nonuse value estimate that refers solely to the recreational users of a resource, since many of the people who place a nonuse value on natural resources are not, in fact, recreational users.

In the NODA, EPA develops an estimate of nonuse value for commercially and recreationally harvested fish, as well as for forage fish and the unharvested portion of the harvestable population. This estimate is based on a willingness-to-pay (WTP) study of values placed on submerged aquatic vegetation (SAV) and wetlands in the Peconic Estuary. EPA's attempt to develop nonuse value estimates on the basis of the Peconic Estuary WTP study is a significant improvement over the arbitrary application of the 50% rule, but still presents serious problems. In particular, SAV and wetlands can serve to regenerate some species of fish, but are inappropriate habitats for others. Thus, some species are not accounted for by a system in which SAV and wetlands are used as a proxy for fish abundance. Furthermore, data limitations forced EPA to base its analysis on a minority of the species that can regenerate in SAV or wetlands; other species might have greater requirements for SAV and wetlands.

EPA's analysis is based on I&E data collected at the Brayton Point and Pilgrim power plants. These data show levels of I&E losses for 37 fish species; apparently EPA did not consider non-fish aquatic organisms in this analysis. EPA attempted to estimate the amount of wetland and/or SAV habitat required to offset I&E losses of these fish species, "based on the amount of habitat necessary for a few species that could benefit from restoration of SAV and wetlands." Of the 37 fish species considered, "losses of seven species could be offset by tidal wetland restoration, and losses of six species could be offset by SAV restoration." EPA notes that these 13 species account for 45.7% of the total I&E losses in the North Atlantic Region.<FN 7> The Agency apparently makes no attempt to calculate nonuse values for the other 24 affected species, accounting for more than half of the region’s I&E losses.

Of the 13 fish species for which wetland and SAV restoration could be relevant, EPA was able to obtain sufficient information to proceed with the analysis for just six species: winter flounder, Atlantic silverside, and striped killifish as candidates for benefiting from wetland restoration, and threespine stickleback, northern pipefish, and scup for SAV restoration. EPA had no data on production rates in the relevant habitats even for these species, so the Agency estimated densities per acre based on abundance data. No abundance data were gathered for the remainder of the 13 species, which include some of the best-known and most valuable ones: American sand lance, grubby, striped bass, bluefish, Atlantic cod, weakfish, and pollock.<FN 8>

In summary, in the attempt to generate data on the nonuse value of the fish lost to I&E in the North Atlantic region – losses that include at least 37 species – EPA estimated the relationship between acreage of two habitat types and likely density of just six fish species. EPA conducted no analysis whatsoever for the other affected species, even though well-known species such as striped bass, bluefish, and Atlantic cod are likely to have substantial nonuse values.

Having estimated area requirements for three species per habitat type (three for wetlands and three for SAV), EPA bases its final analysis on the species that, of each set of three, have the highest area requirements for regeneration. EPA expresses concern that this overstates the acreage required for the other two species for which calculations (in the same habitat type) have been done. But the greater concern is the potential understatement of requirements: there is no way of knowing whether EPA's calculation accurately represents the requirements for regeneration of the seven other species for which wetlands and SAV are relevant; and it explicitly does not include the other 24 species identified in the region's I&E mortality data, ones that cannot be regenerated by these habitats. Nor, of course, does EPA's analysis attempt to measure the value of losses of nonfish species, such as shellfish or smaller, but nevertheless vital, components of the aquatic food web.

Given these large omissions, EPA should, at the very least, state what percentage of total nonuse value for the region it has analyzed and multiply its results by a corresponding factor. For example, does the nonuse value calculated for the Peconic Bay estuary represent an appropriate value for 6 out of 37 species, or about one-sixth of the species identified in I&E loss data? It may be difficult for the Agency to estimate what fraction of the affected fish it has accounted for in its analysis, but if the Agency fails to factor in those it has not accounted for, it has, once again, effectively placed a value of zero on many affected organisms.

Footnotes

6 See Ackerman comments on the proposed rule, August 1, 2002.

7 DCN 5-1010: Tudor, et al., "Estimating Total and Non-Use Values for Fish, Based on Habitat Values for Coastal Wetlands and Eelgrass (SAV)," memo to the 316(b) record, March 12, 2003, p. 3.

8 Ibid., p.4.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

EPA recognizes that not all species and organisms are included in the restoration-based non-use value analysis and that, therefore, the estimates presented may be understated. However, habitat restoration will benefit other species and organisms to some degree, although which species will be affected and by how much is not known. Thus, it would be difficult to multiply results by a particular factor in order to account for these species and organisms.

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Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

North Atlantic benefits – geographical scope of nonuse benefits

EPA then converted estimates of required habitat areas into dollar values on the basis of a survey in which people were asked how much they value wetlands and SAV. The researchers did not tell respondents which fish the wetlands and SAV were expected to regenerate, so responses presumably reflect respondents' general impressions about fish populations, rather than values placed on individual species.

EPA examines two overlapping populations that may place a nonuse value on the aquatic resources of the North Atlantic region -- the 3.65 million households located in the counties abutting affected water bodies, and the 4.2 million households living within a 32.4 mile radius of the affected water bodies. The Agency develops both total and per-household value estimates for each of these areas. Using the households in abutting counties, EPA calculates "a total WTP to reduce impingement and entrainment losses of $4.07 to $7.83 and non-use WTP of $3.44 to $6.52 per household residing in the counties abutting affected water bodies." Using the larger area, with the 32.4-mile radius, EPA finds that "implied WTP values to reduce all I&E losses range from $5.63 to $23.43 and non-use WTP range from $5.61 to $21.83 per household residing in the 32.4 mile-radius area." <FN 9>

It is well known that people living a significant distance from a resource can still value that resource. For example, people throughout the US placed a substantial nonuse value on the ecosystems damaged by the Exxon Valdez oil spill – even though Prince William Sound was hardly a household word before the spill occurred.<FN 10> The Grand Canyon has a powerful meaning to people who live outside Arizona; Yellowstone is important to people who live far from Wyoming. There is no reason to think that the aquatic resources of the North Atlantic region are an exception to this pattern. Indeed, both the Atlantic and the Pacific coasts of the US are generally considered to be a national resource and birthright. Schoolchildren across the country – not just in coastal communities – sing about “America the beautiful” stretching “from sea to shining sea.” All of this suggests that Americans across the country place a nonuse value on coastal ecosystems.

A model for the analysis of nationwide nonuse values for a local resource can be found in the early work of Robert Stavins. It provides an interesting contrast to his recent criticism of EPA’s treatment of nonuse value (and his criticism of our earlier comments on the subject). In 1984 Stavins was the principal author of a cost-benefit analysis of a proposed hydroelectric development on the Tuolumne River, in California.<FN 11> The analysis, which showed that the benefits of development were less than the costs, helped to defeat the proposed dam and to preserve the river in its natural state for recreation. The nonuse benefits of preserving the river were crucial to Stavins’ analysis; without those benefits, his calculations would have strongly favored development.

Stavins argued that it was not surprising that the nonuse value of the Tuolumne was large:

In the case of environmental resources, the so-called nonuser or intrinsic benefits may represent a substantial portion of the resources' total value. <FN 12>

He employed a ratio of nonuse to use value, derived from other published studies, to estimate the per-capita nonuser value. Stavins' next step was to multiply the per-capita nonuser value "by an estimate of the number of people in various regions of the country who are likely to" assign a nonuse value to the resource.<FN 13> His estimate of the number of "interested nonusers," as he called them, was the entire California membership of the Sierra Club (some of whom lived hundreds of miles away from the Tuolumne), plus half of the membership of the Sierra Club in the other 49 states. His calculations assigned a sizeable nonuse value to each of these individuals, even those who lived across the continent from the Tuolumne.

Alternatively, he discussed public opinion surveys suggesting that 40% of the US population feels strongly about the preservation of wilderness, and pointed out that his total nonuser benefit estimate could also be the result of 40% of the US population having a willingness to pay to preserve the Tuolumne of just $0.33 per person per year. After calling for more research to determine the nonuse value more directly, he concluded that

In the meanwhile, however, these estimates represent, at the very least, a reasonable first approximation… [nonuse value] is too important to be ignored. <FN 14>

Following the example of Stavins' early work, we recommend that EPA reconsider its restriction of nonuse value to the population living very close to the plants in question. Suppose, for instance, one accepted EPA's nonuse value for the population in bordering countries, and also assumed that the use value per household in the rest of the country is even 10% as high as in the bordering counties (or alternatively, one could assume that 10% of the households in the rest of the country have a non-use value as high as those in the bordering counties). <FN 15>

There were 106.3 million households in the United States in 2001.<FN 16> Of these, 3.7 million lived in the counties bordering the North Atlantic facilities in question, and 102.6 million lived elsewhere. According to the NODA, the nonuse WTP to eliminate all I&E losses was $20.73 to $33.97 per household in the bordering counties.<FN 17> Thus, our 10% assumption implies that the nonuse WTP for the 102.6 million households in the rest of the country was $2.07 to $3.40 per household; this implies a total nonuse WTP, beyond the bordering counties, of $212.4 to $348.8 million. As shown in Table 2, this adjustment more than triples the total value of baseline losses due to North Atlantic I&E.

Table 2. Value of North Atlantic Baseline Looses

[Please see hard copy for table]

As Stavins accurately observed in 1984, the effect of nationwide nonuse value is too important to be ignored.

EPA Response

EPA agrees that the extent of the market could be larger than that used in its analysis. See EPA's response to comment 316bEFR.311.017 regarding the effect of distance on WTP for non-use values.

The Agency, however, relied upon empirical evidence to determine what the Agency believes is a reasonable and conservative estimate of the affected population. EPA believes that it has conservatively estimated the extent of the affected population in the study area based on households in counties abutting the affected water body, and households within 32.4 miles of the affected water body. The 32.4 mile figure was chosen based on results from the Rhode Island wetlands study. This study showed that Rhode Island residents who live in the most western parts of Rhode Island and as far as 32.4 miles from Narragansett Bay value wetland restoration in the Bay (see Chapter C6 the final Phase II Regional Studies Document, DCN # 6-0003).

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Subject Matter Code 10.02.07

Regional Benefits Approach

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Ecosystem values omitted from the NODA

As in EPA's earlier analysis, the NODA omits important categories of ecosystem value – many of them acknowledged and listed by EPA itself. Thus the calculation of benefits of reduced cooling water take is necessarily incomplete; even if EPA had completed a cost-benefit analysis along the lines of the NODA, a comparison of complete costs with such incomplete benefits would be of little value in evaluating public policy options.

EPA notes that it has no information on the stock status of many of the species affected by I&E. For the North Atlantic region, EPA reviews the information available on stock status of 25 stocks (15 species) of groundfish, noting whether a given stock is "subject to overfishing (the harvest rate exceeds threshold)" or "overfished (stock size is below threshold)." Of these 25 stocks, fully 15 are categorized as "currently subject to overfishing," "overfished," "approaching an overfished condition," and/or "in an unknown condition with regard to overfishing." <FN 18>

Thus, more than half of the groundfish stocks considered are in a condition such that, as far as EPA knows, further I&E losses could conceivably drive the population down to zero. While this will presumably not occur for all the listed stocks, a complete quantification of the baseline losses should include the possibility that a given stock of precarious (or unknown) status could be destroyed by continued I&E. Just as cost estimates include the possible shutdown of plants subject to regulation, benefit calculations should include some calculation of the probability that a population will collapse.

Footnotes

18 NODA, p. 13549.

EPA Response

Data are unavailable to estimate the probability of stock collapse for the commercial and recreational fishery species included in EPA's analysis. Such analysis is beyond the scope of this rulemaking.

EPA acknowledges that its estimates of monetized benefits is incomplete. For a discussion of omitted benefits categories, please see response to Comment 316bEFR.206.047. For a discussion of the benefit-cost test, please see response to Comment 316bEFR.005.020.

Comment ID 316bEFR.336.013

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

To be complete, a benefits analysis should consider all the organisms harmed by I&E losses. Like the analysis conducted for the original ruling, however, the NODA includes no attempt to quantify the value of damage inflicted on birds, or on fish-eating mammals. The NODA also does not look at ecosystem services provided by other organisms likely to be affected by I&E, such as small invertebrates. According to the scientists at Pisces Conservation, important services provided by aquatic ecosystems as a whole include recycling of human waste in waters close to human habitation; demobilization and detoxification of chemical waste products; stabilization and accumulation of sediments, preventing soft sediments from producing turbidity and sedimentation of channels; and support to terrestrial ecosystems (including exportation of biomass from water to the land via invertebrates, birds, and mammals).<FN 19>

Footnotes

19 Pisces Conservation, Ltd., Technical Evaluation of US Environmental Protection Agency's Proposed Phase II Cooling Water Intake Regulation for Existing Facilities (including Comments on NODA), June 2003.

EPA Response

EPA agrees with the commenter that there are many potentially important indirect ecosystem effects resulting from the loss of impinged and entrained fishes. Unfortunately, data are generally not available for quantifying such potential impacts. Nonetheless, EPA has not ignored this issue. Chapter A4 of the Regional Analysis Document (DCN 6-0003) discusses potential direct and indirect I&E effects on birds, Chapter A3 discusses I&E of organisms other than fish, and Chapter A9 discusses the many ecosystem services provided by fish in addition to commercial and recreational fishing and other direct use benefits.

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Subject Matter Code 10.02.07

Regional Benefits Approach

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

EPA gives some attention in the NODA to non-fish species such as lobsters and shellfish, but does not explore fully the range of possibility for these species. For example, EPA discusses the high-value lobster fishery of the North Atlantic region and notes that this fishery is currently subject to severe overfishing. However, EPA does not appear to factor into its analysis the possibility that the lobster fishery could collapse due to continued combined pressure from harvesting and from I&E losses. EPA notes that "the Northeast lobster fishery is second in commercial value after the multispecies groundfish fishery," <FN 20> so the Agency's decisions about how to analyze this population's fate are significant.

Footnotes

20 NODA, p. 13550

EPA Response

EPA was able to identify data on I&E losses of lobster at the Millstone facility only, and the data were insufficient for developing estimates of age 1 equivalents, foregone yield, and production foregone, and therefore could not be included in EPA’s analysis. However, future, more detailed I&E monitoring for permitting purposes will help to fill such information gaps.

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Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

By its own admission, EPA consistently underestimates the number of fish lost to I&E.<FN 21> Many of the data on which EPA bases its estimates are outdated, and were collected during a period when some fish stocks were severely depleted. Furthermore, even current data are misleading with regard to total baseline I&E losses, because many fish stocks have been depleted, for instance by years of continual I&E losses. If initial stocks were at natural levels unaffected by past and present I&E, estimated baseline losses would be higher.

In order to quantify the effects of I&E losses on aquatic ecosystems, an analysis must take into account the full range of trophic interactions. Boreman (2000) emphasizes that all fish in an ecosystem, including those considered "surplus," have ecological significance, noting that "use of 'surplus' production is essentially an allocation issue among competitors for that resource." Thus, 'surplus' can be used "for supporting fisheries, for allowing the population to hedge against bad times, for providing extra sustenance for natural predators, or for supporting other uses of the resource." <FN 22>

Link (1999) describes several trophic phenomena that should be taken into account in analyzing the likely effects of anthropogenic damage to fish populations. One of these is the phenomenon of cycles, in which species A feeds on species B at one life stage, while B feeds on A at another life stage. These cycles can lead to "stock bottlenecks" and can create a negative feedback loop as populations change. Likewise, cannibalism, in which fish consume younger members of the same species, can also interact with these cycles to create negative feedback loops. Link constructs a simplified model of the food web in the northwest Atlantic system in which humans are just one of 75 distinct nodes (some of which represent tens or hundreds of individual species, as Pisces explains in their NODA comments). Link emphasizes the "stochastic nature of this ecosystem" and the "consequent uncertainty in the predictions...." emerging from a system with complex dynamics.<FN 23> Strictly speaking, if we are to correctly carry out the goal of quantifying the benefits of saving an aquatic ecosystem, all the elements of Link's model should be examined and traced through to a service that can be quantified and valued. Examining all these elements may well be an impossibly or impractically large task; once again, this problem highlights the difficulty of using a flawed methodology to develop policy.

Footnotes

21 See 316(b) Phase II Economic Benefits Analysis, Part C: National Benefits, Chapter C1: Case Study Introduction, Section C1-5.1: Data Limitations. Available at http://www.epa.gov/waterscience/316b/econbenefits/c1.pdf. EPA notes: "EPA's analysis is based on facility-provided biological monitoring data. These facility-furnished data typically focus on a subset of the fish species impacted by I&E, resulting in an underestimate of the total magnitude of losses. ... The facility-derived biological monitoring data often pertain to conditions existing many years ago (e.g., the available biological monitoring often was conducted by the facilities 20 or more years ago, before activities under the Clean Water Act had improved aquatic conditions.) In those locations where water quality was relatively degraded at the time of monitoring relative to current conditions, the numbers and diversity of fish are likely to have been depressed during the monitoring period, resulting in low I&E. In most of the nation's waters, current water quality and fishery levels have improved, so that current I&E losses are likely to be greater than available estimates for depressed populations."

22 John Boreman, "Surplus production, compensation, and impact assessments of power plants," Environmental Science and Policy 3 (2000) S445-S449.

23 Link, J.S., 1999, (Re)Constructing Food Webs and Managing Fisheries, in Ecosystem Approaches for Fisheries Management, Alaska Sea Grant College Program, AK-SG-99-01, at p.10.

EPA Response

EPA notes that fish abundances and I&E rates at particular sites may have increased, decreased, or stayed the same as rates reported in older studies depending on the many factors that influence fish populations.

EPA agrees that food webs are complex and multiple trophic interactions must be considered in evaluating ecosystem-level dynamics. Since such information is generally lacking, EPA did not attempt to conduct such analyses for its 316b Phase II rulemaking.

Comment ID 316bEFR.336.016

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.02

Commercial Fishing Benefits

The NODA relies on other questionable methodologies as well. The grounds for discounting future environmental benefits are debatable; underwater ecosystems are not financial assets that can be consumed or saved, depending on an investor's rate of time preference.<FN 24> The calculation of producer surplus, an important part of the estimated use value of fish killed by I&E, is based on a "rule of thumb" derived from just a few published studies – and is now estimated to be significantly smaller than in the EBA.<FN 25> While these points do not have a large impact on the overall benefits estimate in the NODA, they are worth noting for future analyses.

Footnotes

24 Frank Ackerman and Lisa Heinzerling, "Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection," University of Pennsylvania Law Review 150 (May 2002): 1553.

25 NODA, p.13548, 13556.

EPA Response

EPA agrees with the comment about future analysis, and would like to explore an expanded set of studies for estimating producer surplus as a function of gross revenue. For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, and on discounting benefits estimates, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.336.017

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 6.01

Overview of I & E effects on organisms

Responses to Stavins Comments

In comments submitted in this docket, dated April 21, 2003, Dr. Stavins (who is now commenting on behalf of PG&E Energy Systems) responds in detail to our earlier comments on EPA's original cost-benefit analysis. Stavins repeatedly asserts, on the basis of his personal judgment, that we have confused positive and normative analysis or otherwise misunderstood basic principles of economics. Many, though not all, of the issues he raises remain relevant to the NODA. A point-by-point response is inappropriate here; suffice it to say that we continue to disagree on numerous aspects of the substance of the analysis, some of them discussed above.

Perhaps our most important disagreement concerns the magnitude of the environmental damages at stake. See, for instance, Stavins' statement that it was appropriate for him to estimate little or no nonuse value because only "incremental changes in the populations of various aquatic species" are involved in this case (April 21, 2003 letter, p.10, emphasis in original). Since EPA is valuing individuals, not populations, all the changes being analyzed are in a sense "incremental," though perhaps fairly big increments in some cases. Stavins' wording on this subject suggests a prior judgment that the increments at stake are, in fact, all so small that their nonuse value can be ignored.

EPA Response

As noted in responses to numerous other comments on issues related to this topic, EPA's analysis indicates that there are a large number of individual organisms that are impacted by I&E, and that only a small fraction (e.g., 2%) are directly captured in the benefits analysis that focuses on direct use values for recreational and commercial angling. EPA agrees with the comment made here that it is not possible to dismiss nonuse values as irrelevant. It also is not possible to state factually and definitively that the impacts are so small on a population basis (or even an individual basis) that this would make nonuse values trivial or irrelevant. This remains an open, empirical question.

Comment ID 316bEFR.336.018

Subject Matter Code 10.02.06.01

Stated preference (Contingent Valuation)

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

We also want to respond briefly to Stavins' unfounded claims about the economics profession, and the extent of dissent within it. In effect, Stavins asserts that all reputable economists agree with him, and rejects our statements about the extent and influence of dissenting voices within the profession. To cite only the most important example, we mentioned that Amartya Sen, a recent Nobel laureate in economics (and the source of many provocative, innovative new approaches), rejected the idea of individual willingness to pay as a measure of the value of major environmental problems, because a rational individual's willingness to pay depends on what others are doing. Stavins suggests that we misinterpreted Sen, who, he says, was merely making a minor technical point about the free rider problem in the provision of public goods. Here is what Sen actually said on the subject:

The philosophy behind contingent valuation [CV] seems to lie in the idea that an environmental good can be seen in essentially the same way as a normal private commodity that we purchase and consume. The valuation that is thus expressed is that of achieving single-handedly – this is crucial – this environmental benefit. Consider, for example, a case in which it is inquired how much I would pay to save all the living creatures that perished as a result of the Exxon Valdez disaster, and I say $20. As interpreted in CV, it is now presumed that if $20 paid by me would wipe out altogether all these losses, then I am ready to make that payment. It is hard to imagine that this question and answer can be taken seriously by any practical person (with some idea of what the Exxon Valdez disaster produced), since the state of affairs I am asked to imagine could not possibly be true. <FN 26>

Footnotes

26 Amartya Sen, "The Discipline of Cost-Benefit Analysis," Journal of Legal Studies 29 (2) part 2, June 2000, 931-952, quote from 948.

EPA Response

EPA acknowledges that there are many debates within the economics and related professions regarding the best way to design and implement a stated preference (SP) survey instrument, and that writing an SP instrument to pose realistic questions is a challenge. There is some debate on how reliable the findings would be from such an effort. Overall, however, well conceived and designed SP research has provided useful and credible results in many areas. The SP approach is widely recognized and accepted, if the application is done well. Please see response to comment 316bEFR.306.105 for additional information and discussion.

Comment ID 316bEFR.336.019

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 2.04.04

Use cost-benefit tests

Conclusion: The Need For Alternative Approaches

Comparison of costs and benefits is not a necessary part of the decision about regulation of cooling water intake systems. The language of the Clean Water Act does not require cost-benefit analysis; rather, like many other environmental statutes, it sets forth technology and performance-based standards for protection of our natural environment. Retrospective analysis has shown that technology-based regulation is not always the economic disaster that regulatory critics sometimes suggest. For example, a massive, peer-reviewed study found that the first twenty years of the Clean Air Act had monetized benefits of more than $20 trillion, or more than 40 times its costs. <FN 27>

It is fortunate that good decisions can be made without cost-benefit analysis, because it is so often necessary. The problems we have cited in the analysis of the benefits of regulating cooling water intake systems are similar to problems that arise in many cost-benefit studies. Many costs are readily monetized, while many of the benefits of protecting life, health, nature, and future generations are, literally, priceless – not infinite in value, but rather, incapable of meaningful monetization.<FN 28> A broader, multi-dimensional approach to decision-making is required to reflect society's true preferences in such cases; technical economic analysis alone cannot reliably produce the right answers to questions of regulation and environmental protection.

Footnotes

27 US EPA, The Benefits and Costs of the Clean Air Act, 1970 to 1990 (October 1997).

28 Ackerman and Heinzerling, "Pricing the Priceless."

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.336.020

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

Here we restrict our attention to a narrower question of alternative methods: when a comparison of costs and benefits is desired, what methods should be used? In our previous comments, we recommended that EPA abandon the impossible effort to calculate monetary values for all relevant benefits and costs of regulatory options. Instead, we recommended that the Agency simply calculate the cost per household of implementing regulations to protect aquatic ecosystems. These cost calculations could then allow a comparison of aggregate (largely monetized) costs and aggregate (largely non-monetized) benefits. The aggregate comparison of dissimilar categories of value is more sensible than the attempt at disaggregation and monetization of every conceivable benefit. The aggregate comparison recognizes the broad political and social, as opposed to narrow, technical and economic, nature of decisions about protection of natural resources.

EPA Response

The comment recommends that EPA calculate cost per household of implementing regulations. The Agency did present the cost per household of implementing regulations to protect aquatic ecosystems and considered this information in evaluating alternative policy options. See Chapter B2, of the final Section 316(b) Phase II EBA document for detail (DCN #6-0003). In addition, the Agency used the breakeven analysis for the final Section 316(b) Phase II rule. The breakeven analysis calculates the annual value of non-use benefits that would need to be held on average by households in the defined benefit region in order for the final Section 316(b) Phase II rule's total benefits (annual use plus nonuse values) equal or exceed the estimated annual social costs of compliance. EPA then compared the calculated breakeven values to the per household non-use values that were found in the empirical literature. See Chapter D1 of the final Section 316(b) Phase II EBA document for detail (DCN #6-0002).

Comment ID 316bEFR.336.021

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

The "break-even" methodology that EPA proposes in the NODA is a promising start in this direction, but does not go far enough. Recognizing that it is far easier to estimate complete costs than complete benefits, the break-even calculation identifies the cost per household of regulations. However, this cost is presented in the NODA as a hurdle that has to be cleared by the data-intensive calculation of benefit values. We recommend that EPA go further, presenting costs per household of different regulatory options as key inputs into public decision-making. These costs could be accompanied by quantitative and qualitative descriptions, in natural units (e.g., numbers of various species of fish killed, not hypothesized monetary values of those fish), of the benefits of regulation – a vastly simpler task than the NODA agenda of monetization, or even last year's cost-benefit calculations. Under our method, there would undoubtedly still be controversy about the details of the cost calculations, and of the description of benefits - but these would be far simpler, more transparent and manageable disputes than the ones surrounding cost-benefit analysis.

EPA Response

EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003). The Agency agrees with the commenters that looking at the costs of the regulation on a per household basis is a useful tool in the regulatory process.

The cost per household of implementing regulations to protect aquatic ecosystems can be found in Chapter B2 of the final Section 316(b) Phase II EBA (DCN #6-0002). In addition, the Agency presents a breakeven analysis for the final Section 316(b) Phase II rule. The breakeven analysis calculates the annual value of non-use benefits that would need to be held on average by households in the defined benefit region in order for the final Section 316(b) Phase II rule's total benefits (annual use plus nonuse values) equal or exceed the estimated annual social costs of compliance. EPA then compared the calculated breakeven values to the per household non-use values that were found in the empirical literature. See Chapter D1 of the final Section 316(b) Phase II EBA for detail.

For EPA's response to comments on breakeven analysis please see comment #316bEFR.306.106.

Comment ID 316bEFR.336.022

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

The ultimate problem is that the conventional methodology of cost-benefit analysis, no matter how carefully performed, is still a conceptually flawed and inadequate method. As Robert Stavins eloquently expressed it in his Tuolumne analysis,

When particular categories of benefits and/or costs are systematically excluded from an economic assessment, benefit-cost analysis loses its value as an aid to societal decision-making… The B/C [benefit-cost] criterion is neither a necessary nor a sufficient condition for project investment… What is crucial to keep in mind is that the benefit-cost criterion should not be used as an absolute decision rule… Public-policy decisions regarding the use of the nation's scarce natural resources are ultimately political decisions, and should remain so. <FN 29>

In the words of Amartya Sen,

When all the requirements of ubiquitous market-centered evaluation have been incorporated into the procedures of cost-benefit analysis, it is not so much a discipline as a daydream. If, however, the results are tested only in terms of internal consistency, rather than by their plausibility beyond the limits of the narrowly chosen system, the glaring defects remain hidden and escape exposure.<FN 30>

Footnotes

29 "Tuolumne River," 16, 31, 32, 101.

30 Sen, "Discipline of Cost-Benefit Analysis," 952.

EPA Response

This comment is a philosophical one centered on the overall validity of benefit-cost analysis. For discussion of cost benefit as a decision-making rule, see response to comment 316bEFR.005.020.

EPA's approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003).

Comment ID 316bEFR.336.023

Author Name Frank Ackerman & Rachel Massey

Organization Global Development and Environment Institute

Subject Matter Code 10.02

Benefit Estimation Methodology

In conclusion, we regret that the limited scope of the NODA prevents us from commenting fully in advance of the final rule. The lack of information in the NODA creates a serious lack of transparency in EPA's decision-making process; we have no way to examine or evaluate the calculations that will, presumably, form the basis for EPA's final ruling. We recommend first, recognition that comparison of costs and benefits is not the only way to make good decisions, nor is it the method of decision-making set forth in the Clean Water Act. Second, when comparisons of costs and benefits are desired, we recommend that an alternative method of comparison be adopted, building on the foundation of EPA's break-even calculation and comparing monetary costs to environmental benefits. In our view, this will highlight the vast ecological benefits available from strict regulation of cooling water intake systems, at a very modest nationwide average cost – a bargain we believe the American people should, and would, accept.

EPA Response

Although EPA presents benefit calculations for just two regions of the country in the NODA, benefit estimates were developed for all study regions for the final 316b rule analysis. See the Regional Analysis Document for the Proposed Section 316(b) Phase II Existing Facilities Rule for detail (DCN #6-0003).

Economic considerations should be considered with other factors in making decisions. EPA has significant discretion in weighing overall costs and benefits in evaluating various policy options. For detail on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see EPA's response to comment #316bEFR.005.020.

For EPA's response to comments on breakeven analysis, please see response to comment #316bEFR.306.106.

The Agency agrees with the commenter that the expected ecological benefits of the final Section 316(b) Phase II regulation are likely to outweigh its costs.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Elsie N. Zoli

On Behalf Of:

Goodwin Procter obo Entergy

Author ID Number:

316bEFR.337

Comment ID 316bEFR.337.001

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 2.01

Authority to modify 40 CFR

THE NODA, WHICH WOULD APPLY 316(B) TO EXISTING ELECTRIC-GENERATING STATIONS, IS ULTRA VIRES.

As Entergy discussed in its initial comments, the single-sentence mandate of 316(b) provides in its entirety:

Any standard established pursuant to section [301] or section [306] and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

CWA, 316(b), 33 U.S.C. 326(b).

In the NODA, EPA does not respond to Entergy's initial comments questioning EPA's purported "legal authority" for the Rule. See 67 Fed. Reg. at 17124-27; 68 Fed. Reg., passim. Rather, EPA merely asserts without support that it intends to implement the Rule through N/SPDES permits.<FN 2>

Section 316(b) Does Not Apply to Existing Facilities, Absent Significant Modification of Such Facilities' CWISs.

Section 316(b), by its express terms, is not applicable to existing facilities with CWISs.<FN 3> Rather, 316(b) mandates a one-time, pre-construction review of the "location, design, construction, and capacity" of a CWIS. See CWA 316(b), 33 U.S.C. 1326(b) (emphasis supplied). All of these terms - whether the "location," "design," "construction" or "capacity" -correlate to initial construction of CWIS, but are not reasonably applicable once construction has been completed. As such, they cannot reasonably be construed as parameters subject to ongoing post-construction review. Further, they must be considered together, as the conjunction "and" requires, undermining EPA's selective reliance on ''capacity" to support the Rule and the NODA.

The structure of the Act, particularly the absence of ongoing enforcement mechanisms for 316(b), confirms that 316(b) is a one-time, pre-construction provision. EPA has no right to enforce 316(b) after a pre-construction determination is made (as already has occurred for every existing facility). See CWA 309(a), 33 U.S.C. 0 1319(a) (indicating that EPA may enforce in a state-issued permit only 33 U.S.C. 1311, 1312, 1316, 1317, 1318, 1328 or 1345, not 1326); CWA 309(b), 33 U.S.C. 1319(b) (federal enforcement coincident with 1319(a)). Likewise, the citizen-suit provisions of the Act contemplate enforcement of ongoing discharge limitations, but not the pre-construction concerns of 316(b). See CWA 505(a, f), 33 U.S.C. 1365(a, f) (allowing citizens enforcement only of effluent limitations, or EPA or state orders relating to effluent limitations, and specifically defining effluent limitation without reference to 33 U.S.C. 1326(b)). This absence of enforcement mechanisms for 316(b) is irreconcilable with a continuing N/SPDES requirement or effluent limitation, for which EPA and citizens retain considerable enforcement rights.

Rather, the structure and language of 316(b) mirrors the pre-construction mandates of the National Environmental Policy Act, 42 U.S.C. 4331, et seq. ("NEPA"), and any number of state analogues. See, e.g., 42 U.S.C. 4332 (requiring, for "major Federal actions" significantly affecting the quality of human environment, an assessment of "environmental impacts" and "adverse environmental effects," among other factors); 40 C.F.R. 1508.18 (defining "major Federal action" to include "approval of specific projects, such as construction or management activities . . . ."); State Environmental Quality Review Act ("SEQRA"), N.Y. Envtl. Conserv. Law 8-0109(2) (requiring an assessment for any action that may have significant adverse effect on environment); 6 N.Y.C.R.R. 617.2(b)(l) (defining action to include "projects or physical activities, such as construction or other activities, that may affect the environment by changing the use, appearance, or condition of a natural resource or structure . . . ."). The gravamen of these laws - each similar to 316(b) - is that they apply to proposed projects or certain qualifying expansions, not to existing facilities.

The clarity of the Act avoids any need to consult the legislative history. Nonetheless, it is clear from that history that Congress never contemplated that the "location, design, construction, and capacity" of CWISs for electric-generating stations - infrastructure that may cost tens to hundreds of millions of dollars to locate, design and construct - would be subject to relocation, redesign, reconstruction and reconfiguration at every five-year N/SPDES-permit-renewal cycle. See CWA 316(b), 33 U.S.C. 1326(b) (emphasis supplied). More particularly, in 1971, then-Senator Charles Mathias asked then-Senator Edmund Muskie, a 316(b) proponent, whether, in light of the EPA's attempts to require "new steam electric power plants" to build cooling towers, every power facility "to be built anywhere in the United States in the future would have a cooling tower." 117 Cong. Rec. 38855 (1971) (statement of Senator Mathias) (emphasis supplied). Senator Mathias's question demonstrates that Congress understood that, at the time of 316(b)'s enactment, 316(b) was limited to new facilities, i.e., those "new" facilities "to be built" sometime "in the future." Id. (emphasis supplied). Senator Muskie did not disagree, undoubtedly because he also believed that 316(b) did not apply to existing facilities.

Footnotes

2 EPA implicitly has recognized that 316(b) does not fall within the legal limits of EPA's (or states') authorization to issue N/SPDES permits under 402 of the CWA. See, e.g., 67 Fed Reg. at 17125 ("N/SPDES permits restrict the types and amounts of pollutants, including heat, that may be discharged from various industrial, commercial, and other sources of wastewater.") (emphasis supplied). Likewise, EPA implicitly has recognized that 316(b) does not fall within the legal limits of 301 or 306, both of which solely govern discharges. See, e.g., 67 Fed. Reg. at 17125 ("Section 306 of the CWA requires that EPA establish discharge standards for new sources.") (emphasis supplied); id. ("Sections 301,304, and 306 of the CWA require that EPA develop technology-based effluent limitations guidelines and new source performance standards that are used as the basis for technology-based minimum discharge requirements in wastewater discharge permits.") (emphasis supplied). Rather, EPA maintains that 316(b) is "closely linked" to "several of the core elements" ofthe N/SPDES permit program to support EPA's otherwise groundless contention that every existing electric-generating station, at each five-year permit-renewal, is subject to 316(b). See 67 Fed. Reg. at 17125.

3 Substantial reconstruction or expansion of a CWIS, including at an existing facility, may trigger reconsideration under 316(b), consistent with the EPA's 316(b) regulations for new facilities.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII. In addition, EPA disagrees that there is an absence of enforcement mechanisms applicable to section 316(b) requirements. As discussed in the preamble, this rule properly requires implementation of CWA section 316(b) standards through CWA section 402 permits. As such, all CWA enforcement authority applicable to NPDES permit requirements, including the authority to enforce the requirements of the CWA are available to enforce section 316(b) requirements. EPA further maintains the plain language of 316(b) distinguishes it from NEPA.

Comment ID 316bEFR.337.002

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 3.04

Applicability to facilities subject to NPDES permit

Section 316(b) Cannot Be Implemented in N/SPDES Permits.

Likewise, nothing in the Act allows 316(b) determinations to be made in the context of N/SPDES permits, as EPA indicates it will do. See proposed 40 C.F.R. 125.90(a) and 125.92. N/SPDES permits address surfacewater discharges through 301 effluent limitations. See CWA, 53402 (a, b) and 301, 33 U.S.C. 1342 (a, b) and 1311.<FN 4> Effluent limitations solely regulate surfacewater discharges from point sources. See CWA 502(11), 33 U.S.C. 1362(11); see also CWA 301, 33 U.S.C. 1311 ("Except in compliance with this section and sections 1312, 1316 1317 1328, 1342 and 1344 of this title, the discharge of any pollutant by any person shall be unlawful."). Section 316(b) is not an effluent limitation, because it does not govern surfacewater discharges. See, e.g., Virginia Elec. & Power Co. v. Costle, 566 F.2d 446,449 (4th Cir. 1977) (it is "obvious" that regulations implementing 316(b) are not effluent limitations); see also CWA 301(a), 33 U.S.C. 1311(a) (omitting reference to 316(b), but not various other standards regulating "discharges," as providing effluent limitations); CWA 505(f), 33 U.S.C. 1365(f) (deeming certain standards "effluent limitations" for citizen-suit purposes, but not 316(b)).

EPA's many approvals of state-delegated SPDES-permit programs confirms that EPA has never considered 316(b) essential to or even part of the N/SPDES program. To our knowledge, EPA never has required, as a condition to approval of a SPDES-permit program, the State to include a requirement relating to 316(b). Indeed, few of the many states with approved SPDES programs have promulgated any requirements designed to implement 316(b). Were 316(b) an essential element of the N/SPDES requirements, SPDES programs would provide for 316(b)-type determinations, or EPA's approval of them would contravene the Act. See CWA 402(b), 33 U.S. 1342(b) (setting forth the requirements); see also proposed 40 C.F.R. 125.90(d) (proposing to allow states to incorporate alternative 316(b) requirements in SPDES programs by the Rule). Since EPA has taken no steps in over three decades to incorporate 316(b) into delegated SPDES programs, it cannot now reasonably contend that 316(b) is appropriately implemented in N/SPDES permits.

Footnotes

4 N/SPDES permits also implement 306 "standards of performance," but again only as effluent limitations. See CWA 402 and 306, 33 U.S.C. 1342 and 1316. Even if one were to assume, as EPA does, see 67 Fed. Reg. at 17125, that 316(b) is functionally analogous to 306 "standards of performance," EPA's efforts to implement 316(b) at existing facilities through N/SPDES permits must again fail. As EPA acknowledges in the Rule, see 67 Fed. Reg. at 17142,g 306 "standards of performance" apply solely to new, not to existing, facilities. See CWA, 306, 33 U.S.C. 1316; see also S. Conf. Rep. No. 91-1236, reprinted in 1972 U.S.C.C.A.N. 3776,3804-05 (rejecting House bill proposal that 306(a) should apply to modified existing facilities, with the goal that 306(a) applies "solely to new construction").

EPA Response

EPA disagrees with the comment that the Agency lacks authority to include Section 316(b) requirements in NPDES permits. Section 316(b) requirements apply to "any standard" established under sections 301 or 306 of the CWA, and section 402(a)(1) of the CWA authorizes the issuance of discharge permits provided they comply with, in relevant part, CWA sections 301 and 306. Thus, these provisions provide authority for EPA to implement section 316(b) requirements through NPDES permit conditions.

EPA also disagrees that EPA approval of State NPDES programs is relevant to or inconsistent with Agency authority to implement section 316(b) requirements in NPDES permits. The NPDES State program approval regulations implement CWA section 402(b). Generally, these provisions identify NPDES program regulatory requirements that States seeking authorization to implement the NPDES program must have or be consistent with (States requirements need not be identical to, but must be as stringent as, the specified federal requirements). See, 123.25. Until the final Phase I rule, there have been no federal regulations that do more than repeat section 316(b); therefore, 316(b) requirements were (and for facilities not subject to Phase I or Phase II still are) established on a BPJ basis. With promulgation of the Phase I rule, EPA has explicitly added the Phase I regulations to the State program requirements. Nevertheless, among the long-established permit requirements applicable to state programs are requirements that permit conditions require compliance with CWA sections 301 and 306 (as noted above, section 316(b) requirements apply to “any standard” established under sections 301 or 306 of the CWA), as well as with all CWA requirements, which includes requirements in section 316(b). Finally, section 316(b) requirements have historically been implemented in NPDES permits by both EPA and states authorized to implement the NPDES program.

Comment ID 316bEFR.337.003

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

EPA MUST DEFINE THE STATUTORY TERM ADVERSE ENVIRONMENTAL IMPACT.

EPA's fundamental justification for the Rule, including as articulated in the NODA, is that the technology changes that the Rule requires - at a considerable disruption and cost to the nation's electricity providers - nonetheless are "worth it," because such technology will offset significant demonstrable damage reasonably attributable to CWISs - that is that an AEI actually exists. However, despite the many comments from regulators and regulated entities requesting a definition of AEI, EPA continually has declined to undertake the necessary analysis to establish whether AEIs will exist and, therefore, to what extent national environmental policy will affect the U.S. power supply and numerous American resource waters. See 68 Fed. Reg. 13522; see also 67 Fed. Reg. at 17136-40; proposed 40 C.F.R.125 and 85 (omitting any definition of AEI) and 93 (same); Comments of the Utility Water Act Group on EPA's Proposed 316(b) Rule for Phase II Existing Facilities and ICR No. 2060.01, at 21-23; U.S. Department of Energy, Detailed Comments on the EPA's April 9, 2002 Proposed Regulations to Establish the Requirements for Cooling Water Intake Structures at Phase II Facilities, Comment No. 16.

Rather, EPA continues to dodge this threshold issue, instead presuming an AEI necessarily results from the entrainment and impingement of early life stages of fish and other aquatic organisms. See, e.g., 68 Fed. Reg. at 13524 ("EPA expects that the proposed regulation would minimize adverse environmental impact, including substantially reducing impingement.. .and entrainment.. .at existing facilities over the next 20 years) (emphasis supplied); 67 Fed. Reg. at 17137 ("EPA believes that many cooling water intake structures clearly have a significant negative impact on aquatic organisms at the individual level.") (emphasis supplied).

As discussed herein, EPA's presumption, hedged as an "expect[ation]" or "belie[f]," remains untenable. Id. First, EPA must define AEI to properly carry out its functions under the Act. Indeed, by avoiding notice and comment on a definition for AEI, EPA sidesteps a critical debate about the heart of 316(b). Second, EPA's presumption that harm to individual fish from impingement and entrainment invariably constitutes an AEI contravenes the plain language of 316(b) and sound science. Both inadequacies are detailed below.

As EPA has acknowledged, the plain language of 316(b) expressly provides that AEI is a threshold issue - one which must be definitively established prior to the application of any analysis of the "best technology available" ("BTA'). See CWA 316(b), 33 U.S.C. 1326(b); see also In the Matter of Pub. Sew. Co. of N.H., Case No. 76-7, Decision of the EPA Administrator (June 10, 1977), 1977 WL 22370 (E.P.A.),*6 (noting that, consistent with the preamble to the then-existing EPA regulations governing CWISs, at 40 C.F.R. Part 204, "the Agency must identify or predict adverse environmental impacts and then select the most effective means of 'minimizing' . . . the adverse effects"); 41 Fed. Reg. at 17387, 17388 (Apr. 26, 1976) (same). Thus, establishing an AEI is an essential condition of any 316(b) determination.

Certainly, by authorizing the EPA Administrator to "prescribe such regulations as are necessary to carry out his functions under this chapter," see 33 U.S.C. 1361, Congress contemplated, and the federal courts expect, that EPA would appropriately define all operative 316(b) terms, including AEI. Michigan v. EPA, 268 F.3d 1075, 1082 (D.C. Cir. 2001) ("When Congress has explicitly or impliedly left a gap for an agency to fill, there is a delegation of authority to the agency to, give meaning to the specific provision of the statute by regulation . . . ."); United States v. Markgraf, 736 F.2d 1179, 11 85 (7th Cir. 1984) (noting that it is the agency's responsibility to fill in "essential details" of a statute that only provides "generalized guidance" to an administrative agency, owing to the "danger of arbitrary action in the absence of articulated standards"); Stephenson v. Davenport Cmty. Sch. Dist., 110 F.3d 1303,1310 (8th Cir. 1997) ("[F]ailure to define the pivotal term of a regulation can render it fatally vague."); Georgia Pacific Corp. v. Occupational Safety and Health Review Comm'n, 25 F.3d 999, 1005 (11th Cir. 1994) ("Where the Secretary is unable to settle on a single definition of a critical term or phrase in its own regulation, . . . the regulation is unconstitutionally vague . . . .").<FN 5>

Worse yet, while it has declined to define AEI, EPA has not declined to presume AEIs exist - an abdication of EPA's policymaking function, because the Act contemplates that a selected technology will be used to resolve an identified AEI. Thus, EPA's presumption circumvents the essential balancing test that 316(b) requires, particularly in the context of the site-specific analysis EPA has established as a "safety valve" for the regulated community.

EPA's presumption of AEI also impermissibly contradicts the scientific evidence that has been submitted for the record. See, e.g., Motor Vehicle Mfis. Assn. v. State Farm Mut. Ins. Co., 463 U.S. 29,43 (1983) ("[A]n agency rule would be arbitrary and capricious if the agency . . . offered an explanation for its decision that ran counter to the evidence before the agency."). The record is replete with the evidence of leading fisheries experts who have concluded that it is inappropriate to invariably equate individual entrainment and impingement losses with an AEI. See, e.g., Status and Trends of Hudson River Fish Populations and Communities Since the 1970s: Evaluation of Evidence Concerning Potential Impacts of Cooling Water Withdrawals (Jan. 2002) (Appendix 3 to Comments of Entergy Corp., Its Subsidiaries and Affiliates on EPA's Proposed 316(b) Rule for Phase II Existing Facilities). EPA has not responded to, let alone addressed this evidence in the administrative record. These infirmities, unless resolved by the EPA's appropriate definition of AEI, compromise the Rule, inviting time-consuming and protracted litigation.

Footnotes

5 Where Congress has intended that EPA focus on individuals, it has clearly directed as much. Thus, the Endangered Species Act ("ESA") protects individual members of certain species. EPA's presumption also contradicts twenty-five years of interpretation of 316(b) by the Agency and other regulators. See, e.g., Seacoast Anti-Pollution Leanue v. Costle, 597 F.2d 306 (1st Cir. 1979) (upholding EPA's acceptance of once-through cooling, despite entrainment); New Jersey Dep't of End. Prot., NJPDES Permit No. NJ 0005622, Salem Generating Station (June 29, 2001) (SPDES-permit renewal with once-through cooling); Maryland Dep't of Env't, NPDES No. MD0002658B, Chalk Point, Potomac Electric Power Co. (Apr. 29,2001) (SPDES-permit renewal with once- through cooling). Implicit in each of these permitting decisions is a rejection of an overly narrow focus on only entrainment and impingement losses.

EPA Response

Please see the response to comment 316bEFR.011.004 for the discussion regarding EPA's decision not to define "adverse environmental impact" in today's final rule. See also preamble to the final rule.

Comment ID 316bEFR.337.004

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 2.01

Authority to modify 40 CFR

THE NODA IS PROCEDURALLY FLAWED.

As discussed below, EPA has failed to include in the NODA several documents, studies and analyses that EPA will rely on or consult in promulgating a final rule, precluding meaningful public comment.

The Administrative Procedure Act ("APA"), particularly the APA's public-comment period for proposed rulemaking, is designed to provide sufficient information and opportunity for meaningful comment by affected entities. 5 U.S.C. 553(b)(3); see, e.g., Connecticut Light & Power Co. v. NRC, 673 F.2d 525,530 (D.C. Cir.), cert. denied 439 U.S. 835 (1982) ("The purpose of the comment period is to allow interested members of the public to communicate information, concerns, and criticisms to the agency during the rulemaking process."). Because technical interpretations and decisions by an agency often, as is the case here, drive the rulemaking process, it is fundamental that an agency must "identify and make available technical studies and data that it has employed in reaching the decisions to propose particular rules." Id.

Failure to reveal even portions of the technical basis for a proposed rule in time to allow for meaningful comment is procedural error sufficient to invalidate the resulting rule. See, e.g., Sierra Club v. Costle, 657 F.2d 298,397 n.484 (D.C.Cir.1981); National Crushed Stone Association v. EPA, 601 F.2d 11 1, 117 (4th Cir. 1979), reversed on other grounds, 449 US. 64, 101 S.Ct. 295,66 L.Ed.2d 268 (1980); United States v. Nova Scotia Food Products Corn., 568 F.2d 240 (2d Cir. 1977); Home Box Office. Inc. v. FCC, 567 F.2d 9, 55 (D.C.Ck.), cert. denied, 434 U.S. 829, 98 S.Ct. 111,54 L.Ed.2d 89 (1977); Portland Cement Association v. Ruckelshaus, 486 F.2d 375,392 (D.C.Cir.1973), cert. denied, 417 U.S. 921 (1974). As evidenced by the NODA, the EPA has yet to complete studies, calculations and a peer review of central importance to the Rule; has correspondingly failed to publish the results and findings; and, therefore, has denied Entergy and other interested members of the public the opportunity to critique and comment upon those matters.

Specific incomplete and/or undisclosed technical information on which EPA suggests it will rely in promulgating the proposed Rule are numerous, and include the following:

- EPA acknowledges that it has not completed its analysis of the potential economic and operational impacts of the various regulatory options considered in the NODA, including the preferred option. See 68 Fed. Reg. at 13530 n.8 ("EPA is currently completing additional IMP runs and will develop analyses of both options using both base cases.").

- EPA has not undertaken planned peer review of Chapter A7: Entrainment Survival Analysis of the Section 316(b) Phase II Existing Facilities Rule ("Entrainment Survival Analysis") - the document in which EPA rejects the entrainment survival data established by multiple facilities. Instead, EPA concludes that a zero percent entrainment survival default assumption is proper. See 68 Fed. Reg. at 13541.

- EPA has not yet examined other new information suggesting site-specific factors may affect other costs of retrofitting wet towers at existing power plants. See 68 Fed. Reg. at 13527.

- EPA intends to expand the Tampa Bay case study used in the Rule, but has not completed or made available the results of the revised study. See 68 Fed. Reg. at 13543.

- EPA has yet to complete its review of 18 surfacewater-valuation studies that will impact the Agency's treatment of non-use and use values in the Rule. See 68 Fed. Reg. At 13575.

- EPA admits that it has not analyzed all options, but seeks to reserve the right to promulgate said options without publicizing the results of such an analysis. See 68 Fed. Reg. at 13528 ('EPA would use the same methodology as described in Chapter B3 of the EBA [as amended in this NODA] to analyze other options not explicitly analyzed in this NODA if they were chosen for promulgation.").

The individual and cumulative effects of EPA's failure to undertake, complete and publish the studies and analyses listed above prevents interested parties, such as Entergy, from critiquing and commenting upon technical determinations that EPA admits will influence the final Rule. 5 U.S.C. 553(b)(3); see, e.g., Portland Cement Association v. Ruckelshaus, 486 F.2d 375,392 (D.C.Cir.1973) (finding "critical defect in the decisionmaking process" in the inability of petitioners to obtain in timely fashion the test results and procedures which "formed a partial basis" for the rule under challenge).

In particular, EPA's failure to timely conduct and publish the results of its anticipated peer review of its Entrainment Survival Analysis, see 68 Fed. Reg. at 13541, the outcome of which EPA presumes will support its decision to reject the findings of site-specific entrainment studies in favor of a default assumption of zero percent survival, illustrates the degree to which EPA's failures to complete and disclose in the NODA the technical analysis and review on which the Rule will be grounded impermissibly denies Entergy and other interested parties the opportunity to critique and comment on technical issues of central importance to the proposed Rule.

As discussed herein, Entergy firmly supports the use of site-specific entrainment survival data in individual 316(b) determinations and believes that there is simply no justifiable reason for EPA's wholesale rejection of the accumulated entrainment data that the Entergy facilities and others would intend to use for the purpose of establishing compliance with performance standards. Entergy also believes that, having rejected the numerous individual studies establishing entrainment survival rates of up to 100%, there is similarly no justifiable basis for the EPA to adopt a zero percent survival assumption. EPA's decisions have the effect of profoundly distorting the national benefits analysis <FN 6> To justify its decision, EPA invokes an anticipated "external peer review" (the results of which EPA presumes) that it ''plans to conduct" of the document by which it has rejected all 36 studies in favor of the zero percent survival assumption. However, such review has not been undertaken. The results of such review have not been noticed. No opportunity has been given for comment and critique of this "planned external peer review," as a foundation for an EPA decision that unquestionably impacts the national benefits analysis of the Rule.

Footnotes

6 Where the benefits of the Rule with respect to commercial fishing are defined as "the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated," see 68 Fed. Reg. At 13547, use of a default zero-percent entrainment survival rate causes any entrainment survival (which multiple studies have calculated as high as 70%) to be improperly counted as a "benefit" of the Rule.

EPA Response

EPA provided adequate notice of the final rule and its bases and therefore, EPA has complied with the Administrative Procedure Act's requirements and due process requirements.

EPA published the proposed rule on April 9, 2002, and made the supporting records and technical development documents available to the public. EPA published the NODA on March 19, 2003, along with support documents to update the data, information, and rulemaking process for the public consideration. In addition, as described in detail in section III of the preamble to the final rule, EPA has conducted extensive public outreach throughout this rulemaking and the Phase I rulemaking that preceded it, including holding or participating in stakeholder meetings, forums, workshops, and technical symposiums. Further, in a concerted effort to respond to a questions concerning the data and analyses that EPA developed as part of the Phase II proposal, EPA held a number of conference calls with multiple stakeholders to clarify issues and generally provide additional information. To supplement these verbal discussions, EPA drafted three supporting documents: one that explained the methodology EPA used to calculate entrainment rates; and two others that provided specific examples of how EPA applied this methodology to calculate benefits for the proposed rule. In addition, EPA prepared written responses to all questions submitted by the stakeholders involved in the initial conference calls. Thus, EPA has made substantial efforts to make information available, be responsive to inquiries, and to generally provide reasonable notice regarding this rulemaking. EPA notes that given the complex technical issues addressed in this rule, and the variety of comments and information developed and received, final rule development has been very dynamic. For example, much of the information presented in the NODA was generated based on comments on the proposal. Throughout this process and to the extent consistent with the defined schedule under the consent decree, EPA has provided reasonable notice of, and access to, available information and how the Agency anticipated using such information, particularly with respect to the core aspects of the rule, including the scope of the rule, the basic options proposed and considered, and the performance standards. EPA notes that the Agency received a significant number of substantive comments (i.e., estimated in excess of 3000 distinct comments) in response to the public notice provided in the proposal and NODA.

With regard to EPA's peer review of its assessment of entrainment survival data, EPA notes that EPA initial findings were fully described and discussed in the proposal and NODA. The peer review process was sought to gain an additional level of review of these data. EPA also notes that the final rule allows for consideration of an entrainment survival rate other than zero based on a study approved by the Director where a facility is seeking a site-specific determination of BTA.

EPA provided adequate notice of the methodologies it used to assess cost and benefits in the proposal, the NODA, and supporting documents.

Comment ID 316bEFR.337.005

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 18.0

Discussion of Site-Specific Approaches

EPA'S JUSTIFICATION FOR THE RULE REMAINS INFIRM, AND MAY COMPROMISE INDIVIDUAL 316(B) DECISIONMAKING.

In the Rule and NODA, EPA presents the basis for its national policymaking, and also provides direction regarding future individual 316(b) decisionmaking. As discussed below, EPA's estimates of both benefits and costs are flawed, undermining the basis for its decisionmaking. Further, EPA's poor justification for its national policymaking infects future individual 316(b) decisions.

The comments below address EPA's justification for the Rule. Discussion of the inadequacy of EPA's direction to regulators regarding individual 316(b) decisionmaking follows in Section V of these comments.

EPA 's National Benefits Assessment is Overstated.

Entergy appreciates EPA's clarification that its national benefits assessment, as described in the Rule and NODA, is not intended for use in individual 316(b) determinations. In particular, Entergy strongly agrees with EPA that:

[a]t the individual permit level it should be generally necessary to conduct a more detailed, site-specific analysis of the environmental ramifications of the cooling water intake structures . . . than is necessary or feasible for this national-level rulemaking analysis.

68 Fed. Reg. at 13543. Moreover, this comports with the most rational approach to individual 316(b) determinations - that is, using site-specific information over inaccurate extrapolations from information related to noncomparable facilities. To that end, an appropriate methodology for site-specific cost-benefit analyses is set forth and well-documented in National Economic Research Associates' ("NEIU") White Paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Determinations Under the Clean Water Act (attached hereto, and incorporated herein, as Exhibit A), the use of which Entergy supports. In particular, NERA establishes an approach consistent with settled EPA guidelines and three decades of EPA and state permitting practice.

With this background, Entergy approaches EPA's lengthy discussion of its estimated national benefits solely as EPA's means of legitimizing what EPA perceives to be the national costs of compliance. See 68 Fed. Reg. at 13543-80. Conceptually, EPA's movement to a regional benefits assessment represents a step in the right direction, as it may reduce the errors inherent in extrapolating data from coast to coast, as EPA initially proposed. Unfortunately, EPA's regional approach to benefits estimates in the NODA suffers from many of the flaws of EPA's initial approach in the Rule.<FN 7> In particular, as discussed below, EPA's approach to commercial, recreational and non-use benefits fails to consider fundamental biological and economic principles and, in so doing, substantially and needlessly overestimates the benefits of the Rule.

As tellingly, the NODA confirms that fish populations - measured by EPA as stock available for commercial and recreational fishermen - remain far more robust than EPA's approach in the Rule and NODA suggests.

Footnotes

7 Indeed, by largely targeting the Northern California and North Atlantic "regions," see 68 Fed. Reg. At 13544, it is far from clear in the NODA whether EPA actually has produced a genuinely regional assessment.

EPA Response

EPA disagrees that the framework of the final rule is inappropriate. Please refer to section VII of the preamble to the final rule for more information.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

For detailed responses to the NERA report, please refer to the responses to comments 136bEFR.338.501 to 521.

Comment ID 316bEFR.337.006

Subject Matter Code 10.02.02
Commercial Fishing Benefits

Author Name Elsie N. Zoli
Organization Goodwin Procter obo Entergy

EPA Overstates Commercial Fishing: Benefits

The first flaw in EPA's approach is the assumption that the relationship between stock and harvest is linear, "such that if, for example, 10% of the current commercially targeted stock is harvested, then 10% of any increase in stock due to the rule would be harvested." 68 Fed. Reg. at 13547. This linearity assumes a demand for the theoretical increase in stock size due to a reduction in impingement and entrainment. Of course, if only 10% of an available stock is harvested, it suggests that demand is limited and, in fact, is the dominant factor in the market for that particular species. Without evaluating the strength or weakness of demand in the market for a given species, EPA assumes additional demand exists and, therefore, substantially overstates the commercial fisheries benefits of the Rule.

EPA Response

Levels of harvest (e.g., 10%) are a function of supply, in addition to demand, making it difficult to conclude that demand is a dominant factor in the market for a particular species. EPA only included in the commercial analysis species for which there was a significant annual catch from 1993-2001. Several species with low demand were excluded from the model or classified as a forage species only.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Second, EPA calculates benefits as “the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated.” See id. (emphasis supplied). Of course, EPA’s proposed performance standards do not purport to eliminate all impingement and entrainment. The proposed standards are 60-90% for impingement and 80-95% for entrainment and, therefore, benefits are needlessly overstated by as much as 40% for impingement and 20% for entrainment.

EPA Response

In the cost-benefit analysis EPA estimated benefits to commercial fisheries in three steps (see Section XII.D of the preamble). First, EPA estimated total current losses to commercial fisheries in each region. These losses can correctly be interpreted as “the increase in gross revenue that would be expected if all impingement and entrainment impacts were eliminated.”

Second, EPA estimated the percentage reduction in impingement and entrainment at each in-scope facility and calculated an expected percentage reduction for the region.

Third, for each region EPA multiplied the estimated total losses by the estimated percentage reduction to calculate estimated benefits.

Thus, benefits are not over-stated as suggested by this comment, because EPA did account for the fact that the 316b would not totally eliminate all I&E at in-scope facilities.

Further information on the methods EPA used to estimate commercial fishing benefits is provided in the regional study document prepared for the analysis for the final Phase II rule. See Chapter A10: Methods for Estimating Commercial Fishing Benefits.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Third, EPA neglects the simple fact that any impacts to commercial fisheries from impingement and entrainment necessarily already is on the margin, representing an imperceptible fraction of existing losses that EPA recognizes are solely attributable to commercial fishing. See, e.g., 68 Fed. Reg. at 13558 (estimating a loss of 46,355 pounds of winter flounder lost due to entrainment, or a mere .4 % of NMFS commercial catch data indicating annual regional landings exceeding 11 million pounds). Thus, the proper measure of impact to the commercial fishery is the increase, if any, in marginal cost of capturing the fish necessary to satisfy demand, not the theoretical increase in gross revenues. This is particularly appropriate, given that the marginal theoretical impacts to the commercial fishery price will remain essentially unchanged, and fishermen may not experience any increase in revenues. Consequently, any increase in marginal costs to the fishermen would be the extent of the impacts to the commercial fishery. If the market is supply driven, and price increases with a reduction in supply, the fishermen is left with the choice of catching the same number of fish at marginally higher costs and selling them at a marginally higher price (thus recovering those costs). In the supply-driven market, the extent of impact is the marginal increase in price to the consumer, which would essentially be the same as the increase in marginal costs to the fishermen to satisfy demand. Entergy submits that EPA must consider these and other market fundamentals in assessing impacts to the commercial fishery.

EPA Response

EPA's analysis assumes that a reduction in impingement and entrainment will result in a small increase in the quantity of fish caught while fishing effort remains the same. Thus, overall costs will not increase significantly and the marginal cost will decrease slightly. In an unregulated market, fishing effort will increase until marginal costs return to their original level. In a regulated market, fishing effort will remain unchanged and there will be a small perpetual benefit to fishermen. The magnitude of the changes in quantity is not expected to be large enough to affect prices.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.02.02

Commercial Fishing Benefits

Fourth, EPA's assumptions compound errors when the change in consumer and producer surplus are considered. While Entergy applauds EPA's reduction in the range of effects on producer surplus (from 40-70% to 0-40%) where no change in price is expected for individual species, the fact that the surplus is calculated as a percentage of the gross revenues exacerbates the error inherent in the gross revenues calculation (discussed above).

For additional comments on the calculation of commercial fisheries benefits, including a discussion of the economic incentives inherent in an open access fishery, which lead to zero profit for each fisherman, please refer to NERA's White Paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Determinations Under the Clean Water Act (Exhibit A).

EPA Response

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.02.01

Recreational Fishing Benefits

EPA Exaggerates Recreational Fishing Benefits

The NODA does not provide substantially greater detail on the analysis of recreational benefits. However, EPA persists in its assumption that recreational anglers "will get greater satisfaction, and thus greater economic value, from sites where the catch rate is higher due to reduced impingement and entrainment." 68 Fed. Reg. at 13546. Whatever the truth may be, EPA's approach fails to consider several essential threshold questions: What is the increase in catch rates, if any, due to reduced impingement and entrainment? What level of increase in catch rates is necessary to generate the "greater satisfaction" EPA presumes for recreational anglers? On what basis does EPA assume that any increase in catch rates, even an increase that is not perceptible by the individual angler, represents a recreational benefit?

A more sound and defensible approach is that EPA first should determine the likely actual increase in catch rates associated with the Rule, which in all likelihood is quite small given the size of the populations of interest. Then, recreational anglers should be surveyed to determine what they would be willing to pay for the projected incremental increase in catch rates. This information would form a reasonable basis for developing estimates like these that EPA relies on in the Rule and NODA.

For additional comments on EPA's approach to recreational benefits, please refer to NERA's White Paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Determinations Under the Clean Water Act (Exhibit A).

EPA Response

The commenter states that EPA’s approach to analyzing recreation fishing benefits for the final 316(b) rule fails to consider several important questions. The commenter questions the validity of this method and further suggests that EPA should use a stated preference approach (i.e., “survey”) to evaluate recreation fishing benefits of the 316 (b) rule. Each of the specific issues raised by the commenter is addressed below.

Question 1 – What is the increase in catch rates: EPA does in fact determine the likely increase in catch rates associated with the Rule. The comment does not offer a specific critique of EPA's method for doing so, or offer an alternative, so EPA cannot provide a more thorough reply to this point.

Question 2 – What level of catch rates provides "greater satisfaction" to anglers: EPA's RUM models show that any increase in catch rates would provide greater utility to anglers, based on the fact that the coefficients on catch rates in the models are positive and significantly different from zero. EPA uses these coefficients to determine the value of specific increases in catch rates, estimated using the anticipated changes in I&E resulting from the Rule. EPA estimated the RUM model using the square root of catch rates, to allow for diminishing marginal utility with larger increases in catch rates. Therefore, estimated values change with the change in catch rates, in a non-linear fashion. This is in accordance with standard economic utility theory.

Question 3 – What is EPA's basis for assuming increases in catch rates provide benefits: First, there is no evidence that the anticipated increases in catch rates would be imperceptible to anglers. Numerous recreational fishing studies have shown empirically that anglers respond to, and receive positive benefits from, a wide range of changes in catch rates. Second, EPA assumes that anglers receive benefits from increases in catch rates based on the empirical evidence provided by the statistical results of the RUM model, as described above.

Finally, the comment suggests that EPA should have used a CV survey of recreational anglers' willingness to pay for increased catch rates. EPA does not believe that a CV survey is the best option for valuing recreational angling benefits. There is general consensus in the economics profession that revealed preference methods are preferred to stated preference methods for measuring use values, as revealed preference methods rely on observation of actual behavior, rather than questions about hypothetical behavior. There is a long history of revealed preference modeling of recreational angling benefits, and the methods have been well-researched, extensively developed, and demonstrated to be valid. In fact, most of the comments received by EPA agree that RUM models are the best means of estimating recreational fishing values. EPA has thus used the best available method for valuing increases in recreational fishing catch rates – the RUM method - and has applied that method according to generally accepted standards. The results show that anglers do, indeed, value increases in catch rates of recreationally important species.

See response to comment 316bEFR.041.452 for additional details.

Comment ID 316bEFR.337.011

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA Improperly Relies on Non-Use Benefits in its Assessment

EPA necessarily concedes that "estimating non-use values is an extremely challenging and uncertain exercise, particularly when primary research using state preference methods is not a feasible option (as is the case for this rulemaking)." See 68 Fed. Reg. at 13579. Moreover, "EPA recognizes that benefits transfer of state preference-based [willingness to pay] estimates to a policy context that differs from the study context can be problematic, given the significant influence of context on stated-preference values." See 68 Fed. Reg. at 13568. Nonetheless, EPA appears ready to forge ahead with valuing non-use benefits, using what is essentially its concededly debunked HRC methodology to do so. See id. ("First, the Agency developed a benefit transfer approach that combines an estimate of the amount of habitat required to offset impingement and entrainment losses . . ."). The HRC methodology is roundly criticized in both NEWS Economic Evaluation of the Habitat Replacement Cost Methodology in the U.S. Environmental Protection Agency's 316(b) Benefits Case Study for Pilgrim Station, and ENSRs Comments on Proposed EPA 316(b) Regulations for Existing Facilities, both submitted in conjunction with Entergy's initial comments on the Rule.

Perhaps even more fundamental to the non-use benefits analysis is the threshold question whether such benefits are likely to be relevant or significant under the Rule. As more fully described in NERA's White Paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Determinations Under the Clean Water Act (Exhibit A), non-use benefits are not expected to be relevant or significant in the context of 316(b) determinations. As NERA's assessment confirms, EPA's use of the methodology contradicts settled scientific practice.

EPA Response

EPA disagrees that use of HRC methodology contradicts settled scientific practice. EPA used the best scientific practices available and, in some cases, chose to use less sophisticated models because of the greater scientific uncertainties associated with more sophisticated models. In this rule, however, EPA chose not to use the HRC methodology.

EPA disagrees that it is evident that "non-use benefits are not expected to be relevant or significant" for the 316b rulemaking. This is a matter that can only be resolved through additional, credible empirical research. As discussed in the Regional Study Document for the final rule, EPA believes that non-use benefits are significant (please see Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods).

EPA notes that "NEWS Economic Evaluation of the Habitat Replacement Cost Methodology in the U.S. Environmental Protection Agency's 316(b) Benefits Case Study for Pilgrim Station" is a document prepared by industry consultants, and is not a peer reviewed article or paper.

Please also see EPA's response to comments on the habitat replacement cost (HRC) methods

(#316bEFR.005.035), the societal revealed preference (SRP) methods (#316bEFR.005.006), and the feasibility of doing original stated preference research ((#316bEFR.306.105). Please also see the following documents for EPA's discussion of non-use valuation: Chapters A12, Non-use Meta-analysis Methodology, and A9, Economic Benefit Categories and Valuation Methods of the final Phase II Regional Studies Document (DCN # XX); and Chapter D1 of the final Phase II EBA document regarding break-even analysis.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA 's National Costs Assessment Is Likewise Flawed

The many flaws that characterize EPA's national benefits assessment also infect the Agency's national cost calculations. Several of these flaws are discussed below.

EPA's Capital Operation and Maintenance Cost Estimates Remain Error-Ridden.

EPA's revisions to its cost calculations in the NODA, while appreciated, illustrate the fallibility of EPA's approach and the lack of reliability of its data. In the NODA, EPA indicates that "[f]or the preferred option" capital costs increased by 66% and operation and maintenance costs increased by 48%. See 68 Fed. Reg. at 13524. No discount factor is applied, with the result that EPA substantially has understated the effect of its correction. See id. Not surprisingly, therefore, the U.S. Department of Energy, among others, continues to maintain that EPA's cost assessment is unsupported. See, e.g., 68 Fed. Reg. at 13527. In short, EPA's efforts to establish the national costs of the Rule remain speculative. Absent a reliable assessment, the Rule continues to be impermissibly flawed.

EPA Response

The commenter is incorrect in asserting that the U.S. Department of Energy stated that EPA's cost assessment for the preferred option were unsupported. To the contrary, the Agency worked closely with the U.S. Department of Energy in evaluation of the costs of the final rule (based upon the preferred rule option from the proposal and NODA) and have jointly determined that the costs of the final rule are accurate.

The commenter asserts that the Agency's cost estimates remain "error-ridden," and yet their only example pertains to the Agency's generic and narrative comparison of the general change in costs of the preferred rule option from proposal to NODA. Despite its best efforts, the Agency fails to understand how a generic comparison of total technology capital costs or total O&M costs should be discounted for the purposes of comparison, as the commenter strangely believes. The commenter does not declare what type of discount factor he believes should be utilized, nor the methodology for his recommendation to utilize discounting. The Agency notes, for the record that the cost basis for the preferred option at proposal and NODA inherently incorporated an annual construction cost index, and in the chance that the commenter was mistaken that the dollar years had not been "discounted" to compare on a equal basis between NODA and proposal, that this was not the case. Regardless, incorporation of a discount factor of any other type for this basic and broad-brush comparison (which the Agency reiterates was provided in the NODA as a narrative comparison of costs) is a concept that in no way supports the commenter's assertion that cost estimates are "error-ridden."

Comment ID 316bEFR.337.013

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

EPA's Assessment of Energy Costs Is Misleading

It is axiomatic that energy costs - the effect on the various independent systems that compromise the national electric system - must be accounted for with utmost accuracy and credibility. The reason is simple: Electricity remains the nation's economic engine, as well as an essential service for Americans. Significant adverse impacts to system reliability or increases in electricity prices have the ability to derail that engine and to compromise the services on which Americans depend.

Despite the importance of system impacts, EPA's assessment in the NODA remains glib. For instance, as the Agency concedes, EPA's Integrated Planning Model ("IPM') runs are incomplete, internally inconsistent and have not been made available to the public. See, e.g., 68 Fed. Reg. at 13528 (conceding that EPA had failed to analyze its preferred option in the Rule "because of time constraints"); 68 Fed. Reg. at 13530, n.8 ("'EPA is currently completing additional IPM runs . . . EPA intends to place these additional analyses in the docket during the comment period on this Notice. EPA expects to use . . . these additional analyses to support decisionmaking for the final [R]ule."); 68 Fed. Reg. at 13534 ("EPA intends to place additional IPM runs in the record during the NODA comment period to allow direct comparisons of both policy alternatives under both cases.").

Further, in the NODA, EPA aggregates the information for all 551 affected facilities into ten (10) North American Electric Reliability Council ("NERC") regions, distorting the significant likely effects of EPA's decisionmaking at the relevant level, namely on independent system operators or even more localized units (depending on system constraints). See 68 Fed. Reg. at 13527. In fact, EPA provides no reasoned explanation for its NERC-wide view and does not identify the obvious weaknesses of this unusual selection process; e.g., that a NERC-level analyses focuses on interconnected bulk power, not relevant system function.

By way of example of the risk of power reductions on electric systems, the New York Independent System Operator's ("NYISO) annual assessment conveys a dire assessment of current power production in New York State:

[T]he State's short-term needs continue to be met only by a combination of emergency actions . . . the prospect for a steady addition of plants to meet long-term needs has gotten significantly worse

The future outlook for adequate, efficient and environmentally friendly generation is bleak.

NYISO, Power Alert III (May 2003), pp. 9-10 (attached hereto, and incorporated herein, as Exhibit B). The EPA's assessment of the relevant NERC region, i.e., that power losses will have no significant effect, cannot be reconciled with the conclusions of NYISO regarding its own system. Certainly, however, additional power losses in New York attributable to the Rule would produce an even more grim prognosis by NYISO, one that EPA's analysis has entirety failed to capture or account for.

Further, EPA is nonchalant about its conclusions, despite the fact that even its skewed analyses reveal baseline closures (e.g., of nuclear assets), increases in energy prices and decreases in generation, among other significant consequences. See 68 Fed. Reg. at 13530-32. In short, EPA has failed to adequately assess and account for electric-system impacts.

EPA Response

EPA disagrees with this comment. EPA notes that complete and internally consistent IPM runs were provided for the NODA. The additional runs referred to by the commenter were placed into the docket on June 19, 2003.

EPA further notes that analysis at the NERC region level is entirely consistent with regulatory analyses such as the one in support of the section 316(b) regulation.

Finally, the commenter provides no support for the claim that the final Phase II rule might cause additional power losses in New York. EPA's analysis shows minimal impacts as a result of the final rule on the Northeast Power Coordinating Council: cost increases are estimated to be 0.2 percent and no additional capacity is projected to close as a result of the final rule. EPA notes that baseline closures are not an impact attributable to 316(b) regulation and that estimated increases in energy prices (-0.1%) and decreases in generation (0.4%) are small.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

EPA's Capacity Utilization Rates Are Improper and Poor Policy

The Rule and NODA exempt certain so-called "peaking" facilities from the performance standards applicable to all other electric-generating facilities, including those that are indistinguishable from exempt facilities except in their operating behavior. See 68 Fed. Reg. At 13528 ("facilities with a capacity utilization rate of less than 15 percent may be subject to less stringent compliance requirements than facilities with a utilization rate of 15 percent or more,,); see also 68 Fed. Reg. at 13525, 13529 (indicating that the capacity factor is based on 2008 or forward-looking data, not historic operations). As a result, EPA encourages "peaking" power- production behavior, by rewarding such facilities with significantly reduced costs of compliance. As discussed below, whatever EPA intends to achieve with this approach, the Agency's short- sighted scheme creates perverse incentives that are likely to be damaging to existing power production, electricity pricing and the environment.

In particular, the Rule and NODA provide that any facility that operates less than 15% of the available operating time, i.e. , a peaking facility, is exempt from installing entrainment-compliance technology. See 67 Fed. Reg. at 17153-54; 68 Fed. Reg. at 13586 (perpetuating in the NODA the exemption for these facilities in the Rule).<FN 8> In doing so, EPA ignores the consequences of its policy decision, assuming economically rational behavior by existing facilities to operate as peaking facilities. Certain existing fossil-fuel facilities undoubtedly will undertake cost-benefit analyses and conclude that reducing operating times to avoid 316(b) compliance makes economic sense. This is because peaking facilities may be able to operate when market prices are highest and, therefore, may be able to reduce operations without significant decreases in total annual revenue.<FN 9> If output of otherwise "base load" facilities is limited to avoid 316(b) compliance, the electric system experiences a net loss in available capacity and likely a corresponding increase in market price. Further, more plants are necessary to generate the same needed power, with attendant environmental impacts; e.g., additional use of land resources, additional interconnections and related aesthetic considerations. Indeed, EPA's stated 316(b) goals may not be realized: The operation of multiple peaking facilities, all operating at just less than 15% without 316(b) controls, if EPA's presumed AEI assessment is to be believed, not only avoids decreases in entrainment but could result in greater cumulative entrainment.

Certainly, EPA has not in the Rule or NODA taken into account the results of the peaking facility exemption on its decisionmaking, national energy supplies or the environment. In particular, we have identified no modeling by EPA of the likelihood that facilities would change their operating behavior to avoid 316(b) compliance costs, the number of such facilities, the resulting reduction in energy production, the impacts on electrical-system reliability and market pricing, or the impacts on the environment. Without this analysis, EPA has failed to address fully the costs and benefits of the Rule.

Footnotes

8 Significantly, the NODA does not identify how such facilities would be "capped" to operate less than 15% of the year, particularly relative to the effect of IS0 or regulatory mandates, exacerbating the concern identified in these comments. See

68 Fed. Reg. at 13529.

9 By contrast, certain facilities, such as nuclear facilities, cannot feasibly function as peaking units. Accordingly, EPA's policy decision also favors fossil-fuel facilities and correspondingly may result in a net increase in air emissions.

EPA Response

The Agency analyzed the energy generation implications from the capacity utilization flow cutoff. The Agency determined that less than 1/2 of 1 percent of the annual electricity generation from the facilities within the scope of the rule would be from those facilities receiving regulatory relief from the entrainment reduction requirements due to the capacity utilization threshold. Additionally, the Agency examined those facilities within reasonable range of the 15 % capacity threshold (i.e., those at or below 20 percent capacity utilization threshold), whom according to the commenter "might" seek to reduce their generation in order to receive reduced requirements and, in turn, marginally reduced costs. The percentage of total annual generation associated with those facilities with entrainment requirements at or below 20 % capacity utilization is approximately 1 percent of that within scope of the final rule. Hence, the hypothetical, and undocumented theoretical concept that the commenter has outlined might have the not-so-dramatic effect of reducing the annual electricity generation of the Phase II in-scope facilities by approximately 1/2 of 1 percent.

These facts contradict the commenter's assertions that there exists the potential for even a minor disruption to electricity generation due to the capacity utilization rate threshold. Never mind the fact that the commenter has dramatically overstated the difference in costs between impingement only requirements and those of entrainment requirements, let alone when they are considered in light of the revenues for even the smallest of facilities within the scope of the rule. The median annual cost difference between entrainment and impingement requirements is roughly a factor of 2. This means that should a small generator experience annual costs on the order of $150,000 for entrainment requirements, that it would (if not already only subject to impingement only requirements) potentially save on the order of $75,000 annually by seeking to limit its generation by a marginal percentage. If the combined set of facilities between 15 % and 20 % capacity utilization rate that are subject to entrainment requirements decide that they wish to consider lowering their generation to comply with lesser requirements of impingement only, the total savings for these facilities would be on the order of $775,000 annually. Meanwhile, these facilities would be sacrificing approximately $500 million dollars in net generation revenue in order to save these meager compliance costs for the 316(b) rule. The comparison is elementary and does not require further analysis. Nonetheless, the Agency examined the break-even point for facilities examining the prospect of small amounts of money to comply with lesser 316(b) requirements versus generating electricity. This break-even point will fall around the capacity utilization threshold rate of 15.1 %. The Agency estimates that one facility out of the entire phase II in-scope list will be close to this break-even threshold.

Comment ID 316bEFR.337.015

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

EPA'S DIRECTION TO REGULATORS REGARDING INDIVIDUAL 316(B) DECISIONS IS INADEQUATE.

EPA's direction to regulators wrestling with 316(b) implementation, particularly its direction in individual 316(b) decisionmaking efforts involving the "significantly greater" tests, is woefully inadequate.

EPA Should Clearly Affirm its Commitment to Site-Specificity in Individual 316(b) Decisionmaking.

As discussed above, Entergy firmly supports EPA's clear distinction between its rulemaking function, in which extrapolation of appropriate facility-specific data may allow assessment of national benefits, and its decisionmaking function, in which site-specific information must be the basis for individual 316(b) determinations. See, e.g., 68 Fed. Reg. At 13543.<FN 10> EPA's approach makes common sense, as the relevant factors that may vary from site to site are innumerable, but likely include the biology of representative important species, hydrology, impacts of bio-fouling, geotechnical constraints on the implementation of specific technologies, navigation considerations, space limitations, a facility's generation profile (e.g., base load facility), and climatic conditions. EPA's approach also fosters consistent regulatory policy, since for three decades EPA and other regulators have sought and performed site-specific 316(b) determinations. As such, Entergy supports EPA's efforts to resist a "one-size fits all" approach to implementation of the Rule.

Moreover, EPA should not limit the use of site-specific data to the "significantly greater" context. See 68 Fed. Reg. at 13524. Rather, site-specific data is essential to determining whether a facility already meets the proposed performance standards by virtue of previously-installed technologies and site-specific ecological data. Thus, for instance, the first of EPA's three options for compliance, i. e., demonstrating that the facility's existing design and construction technology, operational measures and/or restoration currently meets specified performance standards, see 68 Fed. Reg. at 13524, also must rely on site-specific information. Accordingly, EPA should expand its commitment to the use of site-specific data in the final Rule to any circumstance where its use is appropriate.

Footnotes

10 Each presentation at the EPA-sponsored Symposium on Cooling Water Intake Technologies, held on May 6-7, 2003 in Arlington, Virginia, emphasized the need to use and importance of site-specific information in individual 316(b) determinations.

EPA Response

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

For more information on the use of the term "significantly greater," please refer to the response to comment 316bEFR.006.003.

Comment ID 316bEFR.337.016

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The "Significantly Greater" Test Remains Needlessly Vague

The Rule and NODA fail to provide adequate or appropriate guidance on the application of the "significantly greater" tests that are, as the "safety valve" for the regulated community, a critical component of the Rule. See 67 Fed. Reg. at 17221 (to be codified at 40 C.F.R. 125.94(c)) (the facility's costs are to be compared to "the costs considered by the Administrator when establishing such performance standards" or to the "benefits of complying with such performance standards at your facility"); 68 Fed. Reg. at 13541 (not altering Rule).<FN 11>

Absent a standard for comparing the site-specific costs against EPA's estimates, the basic structure of the Rule remains unclear. See, e.g., Georgia Pacific Corp. v. Occupational Safety & Health Review Comm'n, 25 F.3d 999, 1005-06 (11 th Cir. 1994) (where a regulation "forbids or requires the doing of an act in terms so vague that [people] of common intelligence must necessarily guess at its meaning and differ as to its application" it is impermissibly vague). First, the "significantly greater" standard for the cost-cost and cost-benefit tests should be clarified to aid regulators in determining what qualifies as "significant" and to appropriately limit discretion. As a corollary, where a facility does not meet the standards, EPA must clarify how compliance will be determined. Second, in relation to the cost-benefit test, EPA must allow facilities to identify, as EPA's chosen technology, the least-cost solution that will meet EPA's performance standards; instead, EPA appears to have effectively inflated costs and benefits by requiring something more, namely the best-performing solution. Third, EPA must establish what the essential comparison is. This requires clarification of what factors EPA proposes as relevant for the test, including how energy costs and impacts are evaluated in the site-specific analysis. Each of these flaws is discussed below.

Footnotes

11 This "alternatives" approach to the otherwise applicable numerical performance standards provides flexibility in application of the Rule, by responding in those important circumstances where the costs of meeting the performance standards are "significantly greater" than either the benefits or costs that EPA has developed. See 67 Fed. Reg. at 17143-44.

EPA Response

See responses to 316bEFR.006.003, 018.009 and 337.021. EPA also notes that the rule and preamble address how costs are assessed and how the site-specific portions of the rule are to be implemented.

Comment ID 316bEFR.337.017

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA Must Provide A Clear Standard for the "Significantly Greater" Test

EPA has not provided a clear standard for implementing the "significantly greater" analysis for the cost-cost or the cost-benefit tests. First, EPA has failed to account for economic practicability on a facility-level. Second, EPA has provided insufficient guidance for implementing the "significantly greater" standard. Each is discussed below.

Anything that compels a standard in excess of economic "practicability" contravenes the express language and legislative history of 316(b) and, therefore, must be rejected. See CWA 316(b), 33 U.S.C. 1326(b) (establishing a correlation between impacts and technology); Conf. Rep. No. 92-1236 (1972), reprinted in 1972 U.S.C.C.A.N. 3776,3814-15; In the Matter of Pub. Serv. Co. of N.H., Case No. 76-7, Decision of the EPA Administrator (June 10, 1977), 1977 WL 22370 (E.P.A.) (determining that it would not be reasonable to interpret Section 316(b) as requiring use of technology "whose cost is wholly disproportionate to the environmental benefit to be gained"). EPA makes no allowance for economic impracticability in the NODA. Instead, EPA determines, on a national level, that its estimated compliance costs are practical, by comparing the estimated costs to revenues, either as determined by EPA's modeling or based on each facility's "domestic parent's sales revenue," where publicly available. See 68 Fed. Reg. At 13535-36. EPA's comparison is false. Among other errors, a cost-to-revenue comparison is not an accurate measure of economic practicability, because it fails to take into account the cost of achieving that revenue. Likewise, a parent company's financial status is not relevant, as such revenue may not be a measure of the subsidiary's revenues. Thus, EPA's national assessment is not appropriate guidance for individual 316(b) decisionmaking.

EPA Response

See responses to 316bEFR.006.003 and 018.009. EPA agrees that economic practicability is an appropriate test for determining section 316(b) requirements. EPA is authorized to exercise its discretion in how it determines such practicability in this rule. See the preamble to the final rule and the record for discussion of EPA's basis for the site-specific provisions in the final rule and the Agency's determinations regarding economics and costs for this rule.

Comment ID 316bEFR.337.018

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.07.02

RFC: Appropriateness of “significantly greater”

Further, the “significantly greater” test fails to identify what difference in cost is “significantly greater” than EPA’s estimate of costs or benefits. EPA’s failure to clarify this vague standard leaves regulator with no guidance for applying this critical component of the Rule, and likely will result in arbitrary determinations.

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Comment ID 316bEFR.337.019

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Further, in relation to the cost-benefit test, the "significantly greater" standard is ill-advised. Requiring costs that exceed benefits by any amount is irrational, and cannot be based on sound economic principles.<FN 12>

Footnotes

12 Further, a "significantly greater" standard is a departure from EPA's mandate to maximize net benefits. See Executive Order 12866(1)(b)(6) (requiring that agencies "propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costsyy). As such, "significantly in this context must be low hurdle; i.e., where the facility-level costs of complying exceed the benefits of compliance by the facility, the test is met.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020. See also response to comment #316bEFR.060.002.

Comment ID 316bEFR.337.020

Subject Matter Code 18.03

Process for determining site-specific BTA

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

As a corollary to this discussion, and as EPA has requested, see 68 Fed. Reg. at 13527, Entergy submits that EPA must clarify the process for applying the cost-cost or cost-benefits tests as follows: Each facility will propose compliance technology at its facility that meets the Rule's performance standards at the least cost to that facility. The facility may then undertake site - and facility - specific costing of the selected least-cost compliance technology, with the goal of determining if its costs are "significantly greater" than EPA's cost estimate for the least-cost option selected for comparable model facilities. Thus, for example, a facility that determines that fine-mesh screens are its selected technology and will achieve compliance with a selected performance standard (e.g., 60% reduction in entrainment) will perform a site-specific assessment of the costs of that equipment at that facility. If costs are significantly greater than EPA's least-cost model costs for a comparable facility, then that technology is too costly and need not be implemented.

Once the site-specific cost tests have resulted in a determination that the selected compliance technology is too costly, the facility may propose less costly technology, operational measures and/or restoration measures "to the extent justified by the significantly greater cost." See 67 Fed. Reg. at 17,144. EPA concedes that this analysis may result in a determination that no additional technology is required. See 67 Fed. Reg. at 17,146. No further clarification of this approach is provided. Entergy submits that this process is iterative. The facility would then compare site-specific costs of its proposed alternative technology (that may not meet EPA's performance standards) to EPA's least-cost model costs (or, if not available, a cost estimate prepared using EPA's methodology) of similarly effective technology or to EPA's estimated benefits of that technology to determine if these costs are "significantly greater." At this point, however, the facility should have the option of proposing alternative operational measures and/or restoration measures that would meet the anticipated performance standard for the alternative technology. EPA should clarify this process in the Rule.

EPA Response

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Please refer to the responses to comments 316bEFR.005.020 and 316bEFR.410.001 for a discussion of the application of the cost-benefit and cost-cost tests.

For information on the role of restoration, please refer to sections VII and VIII in the preamble to the final rule.

Comment ID 316bEFR.337.021

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

EPA Must Clarify Its Intention to Require More Costly Technology than Necessary to Meet Performance Standards, To Avoid Biasing the "Significantly Greater'' Tests

EPA appears to have "tipped the scales" to increase costs and benefits by modifying, in the NODA, the technology on which the test is based. In particular, "EPA revised its traditional least cost approach," see 68 Fed. Reg. at 13526, and "selected the best performing technology . . . that was suitable for each site, in order to ensure that the technology on which costs were based would in fact achieve compliance." See id. As such, EPA has selected technologies that cost more, and may exceed performance standards.

As EPA concedes, see 68 Fed. Reg. at 13527, this approach likely will adversely affect any facility conducting the cost-cost test, which must compare its chosen least-cost technology with a technology chosen by EPA that likely exceeds standards, presumptively at greater societal costs for which neither EPA, nor the regulator, has accounted. Likewise, a facility conducting the cost-benefit test is faced with comparing its chosen least-cost technology to benefits from a superfluous technology. In both cases, EPA has biased these tests to favor technology that exceeds EPA's statutory mandate. As such, they may bring about unforeseen and potentially damaging results to an already radical proposal.

EPA Response

EPA disagrees. In the NODA EPA attempted to refine costs primarily in response to comments that the proposed cost estimates may not have fully reflected actual facility costs. The revised approach and results were explained in detail in the NODA and background documents, and comments were requested. EPA notes that the comment is incorrect in its characterization that EPA selected compliance alternatives that exceed what was estimated to be necessary for a facility to meet the rule requirements. As described in the NODA, under the revised approach, EPA focused on compliance alternatives that were expected to achieve compliance with the rule, but did not assume the use of compliance alternatives that were expected to exceed rule requirements. Contrary to the implication in the comment, the cost estimate revisions were not based on any aspect of any compliance option. Nor does the comment identify any technical aspects of the revised cost estimates that are incorrect. The revised costs estimates are as accurate as possible within the constraints of this rulemaking.

Comment ID 316bEFR.337.022

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

EPA Must Clarify Site- and Facility-Specific Costs Relevant to the "Significantly Greater'' Tests.

Nowhere does EPA specify what costs may be relied on by a facility in preparing its site-and facility-specific cost estimate.<FN 13> Presumptively, the range of costs EPA has evaluated and relied upon in its national assessment for the Rule and NODA are appropriately considered and employed in individual 316(b) decisions.

However, that baseline - mere inclusion in EPA's national or model assessment - is not enough. Rather, to foster appropriate decisionmaking, the costs of compliance relevant in any individual decision must incorporate any appropriate costs of the facility in question. See EPA's Guidelines for Preparing Economic Analyses at 119-22 (September 2000). Any contrary determination would be based on potentially misleading information. See, e.g., Alvarado Community Hosp. v. Shalala, 155 F.3d 1115, 1122-24 (9th Cir. 1998), op. amended, 166 F.3d 950 (1999) (determining that agency acted arbitrarily and capriciously in setting regulatory threshold based on older data without adequately explaining use of that data); Hughes River Watershed Conservancy v. Glickman, 81 F.3d 437 (4th Cir. 1996) (remanding where improper economic assumptions "impair[ed] fair consideration of the project's adverse environmental effects") (quotation marks and citations omitted). As such, it may result in a net detriment to society, an obviously improper result.

While the range of relevant costs will be necessarily site-specific, certain obvious omissions in EPA's national assessment exist and, therefore, require that EPA clearly affirm their use in individual circumstances. In particular, EPA fails to fully address costs attributable to the purchase of land, labor and non-NPDES approvals associated with complying with 316(b). Further, EPA's analyses of energy costs and the resulting electrical-system impacts are flawed, and should be abandoned in individual circumstances in favor of a cogent site-specific approach. Each is discussed below.

The Cost of Labor.

EPA acknowledges that labor costs will be incurred, but does not describe what constitutes "labor costs." See EPA's Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule, April 9,2002 ('Phase II TDD") at 2.8. Labor costs should include salary, benefits and overtime costs for facility personnel to the extent they are working extended hours, and contractor and subcontractor labor costs (at union or prevailing wages), including overtime, contractor markup, supervision, administration and home-office support. See, e.g., An Investigation of Site-Specific Factors for Retrofitting Recirculating Cooling Water Systems at Existing Power Plants, prepared by Parsons Infrastructure and Technology Group, Inc., for the United States Department of Energy (October 8, 2002) ("Parsons Retrofitting Report") at 3-8. Labor costs will increase if expedited construction schedules are utilized, which is likely when a facility is down for interconnection or if EPA retains its current proposed compliance schedule, factors which should be account for. See EPA's Economic and Benefits Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule (February 28, 2002) ("Phase II EBA") at B1-3 to B1-6. These are essential costs, and, for the reasons discussed above, should be included.

Site Preparation and Acquisition Costs.

EPA acknowledges that some site-preparation costs are appropriate. See Phase II TDD at 2.7. Where necessary based on site-specific factors, more than clearing trees may be required. In particular, blasting may be required, at a significant expense, at many sites. Further, demolition or re-location of existing structures, including utilities, may be required. Where these site-preparation techniques are not feasible or would not provide sufficient land for siting cooling towers, purchase of additional land may be necessary, if available. Each of these and other analogous costs are essential costs of compliance, and, for the reasons discussed above, should be included.

Costs to Obtain Non-NPDE Approvals

As EPA acknowledges, governmental approvals may be required. See 316(b) Phase II Cost Module 2.2, at 5. These may include CWA 404 approvals, air permits, zoning approvals and environmental-impact reviews. Further, private authorizations or negotiations may be required, such as where existing easements or contractual obligations would interfere with retrofitting activities. Such approvals and authorizations, where obtainable, may lead to extended delays, and costs may be affected significantly. Where such approvals or authorizations cannot be obtained, the retrofit will be infeasible. In this latter circumstance, the proposed technology should not be deemed "available" technology, and also should be deemed "significantly greater" than estimated costs. Entergy further submits that where the facility determines appeal of such denials is appropriate, any requirement to complete the retrofit should be delayed, but that the facility should not be required to pursue such an appeal.

Energy Costs and Reliability Impacts

Because EPA's national analysis of energy costs and the resulting electrical-system impacts is flawed, regulators may fail to properly allow facilities to account for significant costs and impacts that may result in relation to individual technology retrofits. As EPA concedes, any cooling-tower retrofit, if feasible and within the range of acceptable costs, will result in a long-term reduction in available capacity due to the ongoing operation of the required technology, <FN 14> and a temporary outage for installation of the required technology.<FN 15> See Phase II EBA at B1-6. As discussed below, EPA's national analysis of energy costs and impacts improperly aggregated national and temporal effects, "averaging away" significant impacts, with the result that assumptions as to system reliability and energy prices are inaccurate. Further, EPA utilizes certain assumptions that, even if appropriate for a national analysis (which seems doubtful), are clearly inappropriate in individual 316(b) decisions. These errors and improper assumptions not only undermine the national analysis on which the Rule is based, but may mislead and confuse regulators, with the result that significant local effects may be ignored in the site-specific cost tests. Further, to avoid any confusion in implementation of the Rule by regulators with no expertise in energy policy, we recommend that EPA include quantitative impact-thresholds and require sign-off of the agency with authority over energy policy.

First, in individual 316(b) analyses, it is inappropriate to obfuscate critical power-supply impacts by national and temporal aggregation, as EPA has done. As EPA is aware, power does not flow freely within any NERC region.<FN 16> More particularly, use of the ten NERC regions fails to account for local distribution and transmission limitations (with the result that potentially severe local impacts may be averaged away). By way of example, a report recently issued by NYISO identifies significant transmission limitations within New York State which EPA's analysis overlooks. See NYISO, Power Alert III (May 2003), pp. 11-14, 22 & 39-40 (Exhibit B).

Second, in EPA's national assessment, the Agency arbitrarily determines that only a few facilities will be installing cooling towers each year, see Phase II EBA at B 1-20 to B 1-21, effectively masking the otherwise severe energy-supply impacts of simultaneous outages. The Rule and NODA, in conjunction with EPA's own assessment of the status of current permits, indicates otherwise. See EPA's Memorandum Regarding Implementation of Section 316b) in NPDES Permits (February 27, 2003) (identifying N/SPDES permits at existing sources with majority having expired and awaiting renewal as a "priority" upon promulgation of the Rule). EPA further limits impacts by modeling each facility as having one-fifth of its downtime in each modeled year during its five-year compliance period, although this is inconsistent ,with EPA's compliance schedule in the NODA. See 68 Fed. Reg. at 13529. Where these assumptions are inaccurate, as is the case absent a change in EPA's compliance deadlines, a site- and facility- specific cost analysis should have the opportunity to employ more appropriate assumptions for its analysis and to utilize cumulative impacts. Finally, in EPA's national assessment, the Agency assumes that the only increase in energy prices will be to recover the costs of the compliance technology. See Supporting EPA's Documentation of Changes to Economic Impacts (March 12, 2003) (Docket 5-3004). In reality, in non-regulated markets, prices may increase in periods of reduced supply. The social cost of this decreased electrical supply may be valued by analyzing the reduction in the capacity of the electrical system and the value of the lost power. See NERA'S White Paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Permitting Decisions under the Clean Water Act, at 35-39 (taking into account any resulting increase in the price of power) (Exhibit A). These costs may be significant, especially in areas where distribution and transmission are constrained and new-capacity siting efforts may stall.

Indeed, removal of two baseline facilities serving metropolitan New York results in severe reliability impacts and an increase in the aggregate price paid by consumers over this period. See NEW'S Electricity System Impacts of Nuclear Shutdown Alternatives, March 2002, submitted in conjunction with Entergy's initial comments on the Rule. As this analysis shows, impacts may be substantial. As EPA is not in the business of electrical-system analysis or setting national energy policy, we recommend that EPA either incorporate into the Rule specific thresholds, which, if met, result in a retrofit being deemed too costly or require appropriate regulatory sign-off from the agency with authority over energy policy on any 316(b) decision where the electric-system impacts analysis submitted by the facility shows potential impacts on system reliability or the cost of power.

Footnotes

13 This confusion may be caused by EPA’s approach in the Rule and the NODA, which conflates national and individual analyses. See 68 Fed. Reg. at 13534; 67 Fed. Reg. at 17181 (in each case, discussing the annualized private compliance costs of all facilities before analyzing national impacts due to energy capacity decreases). As a result, regulators may incorrectly presume that national assumptions are appropriate in individual 316(b) determinations. The potential errors are substantial.

14 The long-term reduction in capacity may be due to reduced unit efficiency (which may be caused by increased turbine back-pressure) and/or increased auxiliary power requirements to operate the required technology. See Phase II EBA at B1-6 to B1-7. In addition, the long-term reduction in capacity may be due to shifts in planned outages and seasonal reductions in unit efficiency where seasonal flow reductions are implemented.

15 As EPA appropriately has acknowledged, especially at nuclear-power facilities, the temporary outage will significantly exceed EPA’s original estimate in the Rule of one (1) month, and may exceed EPA’s revised estimate of seven (7) months. See 68 Fed. Reg. at 13525. However, at all facilities, site- or facility-specific factors may further extend this period,

including where the facility must be taken off-line for construction of an additional intake or for blasting, where construction delays are encountered, and where downtime may be scheduled during an otherwise necessary outage.

16 By way of example, the NERC region includes the Canadian Maritime Provinces, Quebec, Ontario, Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, and New York. Yet power does not flow freely within NERC regions. In particular, transmission constraints within the state of New York have required the NYISO to require certain generating capacity be located within New York City and Long Island. Further, transmission between independent system operators is limited. New York, for example, is able to receive only about 2,400 of its needed MWs from the neighboring Pennsylvania, New Jersey and Maryland interconnection. See NYISO, Power Alert III (May 2003), pp. 34,36-37 (Exhibit B).

EPA Response

See the preamble to the final rule and the record for discussion of EPA's basis for the site-specific provisions in the final rule, implementation of these provisions, and the Agency's determinations regarding economics and costs for this rule. Also see 40 CFR 125.94(a)(5)(i).

EPA notes that the final Phase II rule does not require installation of cooling towers. See the cost modules in the Technical Development Documents for a discussion on the costs considered for each technology.

Comment ID 316bEFR.337.023

Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

OUTSTANDING ISSUES

EPA 's Lack of Clarity Regarding Cooling-Tower Technology Is Damaging.

We understand that EPA has not concluded that the Rule mandates cooling-tower technology. While the Rule and NODA support this conclusion, that support is not definitive. See, e.g., 68 Fed. Reg. at 13526 (estimating number of facilities that "would upgrade their cooling system from once-through to closed-cycle . . . ."). Clarification is appropriate.

EPA Response

Cooling towers do not form the basis for any requirements of the final rule. See the preamble to the final rule.

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Author Name Elsie N. Zoli

Organization Goodwin Procter obo Entergy

Subject Matter Code 21.04

Determination of compliance

EPA Should Affirm its Use of Representative Important Species in the Rule.

EPA has used representative important species (‘RIS’’) in 316(b) decisionmaking for three decades. To abandon this approach now would constitute an unexplainable departure from historical practice and precedent, undermine the value of data collected at the direction of EPA, run contrary to the biological value concept and present a needlessly impracticable data, collection mandate.

Since 1977, beginning with its Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b), P.L. 92-500 (May 1, 1977) (the “Draft Guidance”), the EPA has directed the use of RIS for individual 316(b) determinations. In electing to employ RIS in the 1977 Draft Guidance, EPA expressly recognized that “[i]t is not practicable to study all species that may be directly or indirectly harmed by intake structure operations,” see Draft Guidance, p. 15, and the stated goal of conducting intake studies was to “obtain sufficient information to aid in determining whether the technology selected by the company is the best available to minimize adverse environmental impact.” See Draft Guidance, p. 4. Further, almost a year after publication of the Rule, EPA expressly affirmed the use of RIS in 316(b) determinations. See Memorandum to Water Division Directors Regarding Implementation of Section 316(b) in NPDES Permits (February 23,2003).

Today, study of all species is no more practicable, nor is it any more necessary to implement § 316(b), than it was in 1977. First, the various methodologies for assessing potential impacts of CWIS on aquatic species are informed by study of those populations over time. By introducing “all species” into the calculus now, the NODA drastically dilutes the value of existing data sets. Second, adoption of an “all species” approach necessarily requires facilities to undertake studies that EPA has recognized as impracticable, if not infeasible, at substantial costs. Third, an “all species” approach also contradicts the Act. Congress would have required an automatic AEI assessment if it believed every CWIS necessarily created an AEI. Likewise, EPA would not have authorized the construction of hundreds of once-through CWISs if it had concluded that such systems necessarily create AEIs. The RIS approach, as compared to an “all species” analysis, recognizes as much by providing a workable framework for a regulated entity’s and a regulator’s analysis.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.337.025

Author Name Elsie N. Zoli
Organization Goodwin Procter obo Entergy

Subject Matter Code 21.04
Determination of compliance

Utilization of a No-Controls Baseline is the Appropriate Measure for Achievement of Performance Standards

EPA has requested additional comment on the inclusion or exclusion of certain design specifications in the definition of the calculation baseline for evaluating compliance with the performance standards of the Rule. See 68 Fed. Reg. at 13581. Entergy suggests that a calculation baseline should reflect facility operation at full capacity and with no impingement or entrainment controls, presuming -to the extent that EPA rejects survival data in its national benefits assessment - 100% for impingement and entrainment mortality rates. This approach corresponds to what EPA proposed in the Rule, i.e., that the “calculation baseline was an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls.” See 67 Fed. Reg. at 17221.

It also provides the platform for an equitable measure of compliance among facilities, by eliminating the influence of innumerable factors that may have depressed historic operations below 100% of permitted capacity. Use of a full operation/full capacity/l00% mortality baseline in the final Rule further accords the baselines adopted by EPA in analogous programs intended to allow measurement of decreases from existing operational facilities. See, e.g., 51 Fed. Reg. At 27977 (controls “not included in a federally enforceable requirement” not considered for purpose of estimating baseline emissions in establishing NESHAP for arsenic); 58 Fed. Reg. at 28843 (“no-controls” baseline proper for establishing NO, reductions).

In the NODA, EPA proposes changes that would focus in part on “baseline practices and procedures . . . that the facility would maintain in the absence of any operational controls . . . implemented in whole or in part for the purpose of reducing impingement mortality and entrainment,” see 68 Fed. Reg. at 13581 (emphasis supplied), and needlessly complicate the analysis by calling into question the purpose for which operational controls were implemented. This approach needlessly risks divergent calculation baselines and inequitable evaluations of compliance among various facilities.

EPA Response

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today’s final rule (see §125.93). For additional explanation of EPA’s definition of calculation baseline, please refer to EPA’s response to comment 316bEFR.034.013.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mark F. Strickland

On Behalf Of:

PSEG Services Corp obo PSEG Power, LLC

Author ID Number:

316bEFR.338

Comment ID 316bEFR.338.001

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

While PSEG believes that the Agency's preferred approach, as outlined in the Proposed Phase II Rule, could provide a reasonable framework for implementing 316(b) that would reflect good science and economics; PSEG continues to believe that this is the case if, essential if the Final Rule is to reflect sound public policy.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.338.002

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Site-Specific Determinations

PSEG remains convinced that the statutory mandate of selecting the best technology available ("BTA") for minimizing adverse environmental impact ("AEI") due to a CWIS is best addressed through site-specific decision-making. This is especially the case for existing steam electric generating stations that are the subject of Phase II Rulemaking. Scientific studies at such facilities have demonstrated the absence of AEI at the population and community levels of aquatic species, even after years of CWIS operations and numerically large losses of aquatic organisms due to entrainment and impingement.

PSEG believes that EPA's Preferred Approach can provide a workable and acceptable means of implementing § 316(b) if, and only if, the site-specific option can be reasonably utilized by facilities subject to this rulemaking. In other words, if EPA sets the bar so high for the threshold cost-cost or cost-benefit tests, then this option can be rendered illusory.

The site-specific option provides permitting authorities with an appropriate level of flexibility to allow them to consider the objective of § 316(b), the best available scientific data, and the unique circumstances found in the highly variable natural environment. States could consider developments in fisheries science, actual impacts on fisheries populations, the status of those fisheries, specific concerns about endangered species and other issues important and discernable on a case-by-case basis. States such Maryland, which endorse the site-specific option, could continue to implement their permitting programs in a manner that utilizes the States' knowledge and experience concerning their particular environmental needs and conditions, to achieve the goals of the CWA.

EPA Response

EPA recognizes the site-specific nature of impacts at some facilities and has established a flexible rule to accommodate site-specific conditions. However, EPA did not adopt an exclusively site-specific regulatory options for several reasons. Please refer to section VII.E for a discussion of why EPA opted not to promulgate a purely site-specific rule. Please also see the preamble for a discussion of the final rule.

EPA adopted this regulatory scheme because it provides a high degree of flexibility for existing facilities to select the most effective and efficient approach and technologies for minimizing adverse environmental impact associated with their cooling water intake structures. This approach also reflects EPA's judgment that, given the various factors that affect the environmental impact posed by the range of Phase II existing facilities, different technologies or different combinations of technologies can be used and optimized to achieve the best results. Finally, this approach provides clear standards of performance based on the criteria in Section 316(b).

Comment ID 316bEFR.338.003

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Restoration

Healthy tidal wetlands that are linked to estuarine and coastal waters provide critical ecosystem support through direct contribution to food webs and by serving as highly favorable habitat for aquatic organisms. EPA's inclusion of provisions for restoration measures in the Proposed Phase II Rule directly supports important Congressional and government-wide goals to promote the restoration of estuarine habitat and to create and maintain effective estuarine habitat restoration partnerships.

Wetlands restoration is a valuable and effective tool for coastal environmental management. With the experience developed by PSEG and others throughout the country in a variety of voluntary and compensatory wetlands mitigation projects, wetlands restoration can achieve reliable and predictable results. PSEG documents its successes in estuarine restoration in Chapter III, and addresses factors that could help ensure successful restoration projects, such as adaptive management plans, uncertainty analyses and margins of safety. PSEG notes, however, that such factors should be tailored to the individual restoration projects. Accordingly, the permitting authority should be allowed to apply them as appropriate to ensure a successful project.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

For a discussion of the three factors the commenter mentions, see EPA's responses to comments 316bEFR.311.022 and 316bEFR.307.047.

Comment ID 316bEFR.338.004

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

Metrics and Compliance with Performance Standards

Four different performance standards are defined in the Preferred Approach, and each facility that selects BTA demonstration alternative (1) or (2) would be required to comply with one of the four performance standards. The metrics and the tests of compliance are key to the reasonableness and technical validity of the performance standards.

In the NODA, EPA requested comments on alternative metrics that might be used in tests of compliance with performance standards. EPA indicated it was considering numbers of organisms, biomass of organisms, all species of fish and shellfish, and a subset of species of fish and shellfish. PSEG believes that the final rule should provide for flexibility in the choice of appropriate metrics that takes into account site-specific considerations. Flexibility is particularly important if a facility has implemented or plans to implement restoration measures. In some cases, the number of organisms from a subset of species (expressed in terms of numbers at a particular age) might be the most appropriate metric. In other cases, the biomass of all fish and shellfish by trophic level might be the most appropriate metric, particularly in cases where wetland restoration measures are used to satisfy performance standards.

While neither the Proposed Rule nor the NODA provide a clear or definitive statement of EPA's proposed approach for testing compliance with performance standards, PSEG makes several assumptions and provides comments concerning how compliance might best be measured and comments on compliance tests that it believes would be consistent with EPA's intent. Specifically, PSEG discusses approaches to address potential problems due to naturally-occurring inter-annual variability and technologies that increase impingement while reducing entrainment.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.338.005

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Mark F. Strickland
Organization PSEG Services Corp obo PSEG Power, LLC

Economic Considerations

The methodologies that EPA applied to estimate national recreational and commercial benefits in the NODA are substantially improved over those applied in developing the Proposed Rule;

EPA Response

EPA agrees with the commenter.

the nonuser benefit methods discussed in the NODA, however, are not sound and cannot reasonably be applied to site-specific benefit assessments.

EPA's Guidelines for Preparing Economic Analyses 2002 ("Guidelines") provide a comprehensive set of recommendations for developing benefit-cost analysis studies for environmental regulations, including explicit discussions of the methods that should be followed to develop valid benefit transfer studies. Relying on these Guidelines, PSEG documents why the methodological approaches (benefit transfer methodologies) for estimating nonuse benefits described in the NODA are inconsistent with the Guidelines ,and with accepted economic analyses. Specifically, EPA's Single Study Approach is not an appropriate application of a benefit transfer methodology, the rule-of-thumb approach described by EPA has no valid conceptual basis, and the studies used in a meta-analysis are not relevant to this case.

The potential implications of incorrect methodologies are significant. Invalid benefits estimates would set incorrect precedents for EPA, result in inaccurate site-specific benefit-cost analyses, and lead to a § 316(b) rule that is not in society's best interests. EPA's acknowledgment that the nonuse benefits approaches in the NODA represent new studies that may be "problematic" greatly understates the issue, and the results of these analyses should not form the basis for the final rule. EPA, furthermore, should clarify that these methodologies are not valid for use in individual § 316(b) proceedings.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

As stated in the Notice of Data Availability (68 FR 13580), EPA is not using the rule-of-thumb approach in the cost benefit analysis for the final Section 316(b) Phase II rule.

Comment ID 316bEFR.338.007

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

As PSEG has stated in its previous submissions to the Agency, PSEG believes that § 316(b) requires first a determination of whether an adverse environmental impact ('AEI") is occurring or will occur at a biologically relevant endpoint and, then next, the identification of measures to minimize that site-specific AEI. PSEG believes that such determinations would provide the best means of ensuring that aquatic ecosystems are protected. PSEG further believes that such site-specific determinations provide the requisite flexibility to allow states to address CWIS-related effects in a holistic manner that reflects the state's knowledge and understanding of the ecosystems within their jurisdictions and what is needed to best ensure their protection. Finally, this interpretation is clearly consistent with the language of § 316(b) and with EPA's initial and long-standing interpretation of its requirements.

EPA Response

EPA disagrees that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative. Please refer to the preamble for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b)determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

Comment ID 316bEFR.338.008

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

USEPA's Proposed Phase II Rule includes a preferred regulatory option ("Preferred Approach") based on performance standards and proposes three alternative means of demonstrating best technology available ("BTA"):

- Cooling water intake flow commensurate with operating with a closed recirculating cooling system;

- Compliance with the performance standards applicable to the water body type and facility capacity factor of a given facility through the implementation of technological, operational and/or restoration measures; or

- A case-by-case determination of BTA, if the permittee can meet one of two proposed cost tests.

While EPA's Preferred Approach does not entirely endorse the site-specific approach PSEG believes to be the best means of implementing § 316(b), the Agency does propose to allow applicants to propose a technology most appropriate for achieving compliance with numeric performance standards as well as the option to petition for a site-specific determination of compliance with § 316(b) based on whether the applicant can meet either a cost-cost or a cost-benefit test. PSEG wholeheartedly endorses the Agency's recognition in its Proposed Phase II Rule that the regulation of a CWIS at an existing facility requires a substantially different approach than the establishment of uniform national technological requirements, which the Agency adopted in its final new facilities rule.<FN 4>

Footnotes

4 65 Fed. Reg. 49059 (Aug. 10,2000) [Proposed]; 66 Fed. Reg. 65255 (Dec. 18,2001) [Final].

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information. Also refer to section VII of the preamble to the final rule for more information on why EPA rejected a purely site-specific approach.

Comment ID 316bEFR.338.009

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Likewise, PSEG strongly supports the Agency's proposal to allow permittees to utilize restoration measures to demonstrate compliance with § 316(b) under either a performance standard or site-specific demonstration.

EPA Response

EPA acknowledges the commenter's support of the two options. Restoration measures must meet the requirements described in the final rule.

Comment ID 316bEFR.338.010

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

EPA'S DECISION TO INCORPORATE A SITE-SPECIFIC OPTIOM REFLECTS SOUND PUBLIC POLICY, CAN BE IMPLEMENTED WITHOUT UNDUE BURDEN ON PERMITTING AUTHORITIES AND IS SUPPORTED BY THE ADMINISTRATIVE RECORD

As PSEG indicated in its Comments on the Phase II Rule,<FN 9> PSEG continues to believe that EPA's Preferred Approach can provide a workable means of implementing § 316(b). This, however, is the case if, and only if, Compliance Option III, the site-specific option, is included as a truly available means of determining compliance with § 316(b). In other words, if EPA sets the bar so high for the threshold cost-cost or cost-benefit tests, then this option can be rendered illusory. Given the language of the statute, the strong public policy reasons that support site-specific rulemaking and the flexibility such an option provides to states and EPA regional offices in terms of how to ensure protection of aquatic resources, the Agency has more than ample justification for allowing site-specific decision-making in the final Phase II Rule.

Footnotes

9 PSEG's Comments on USEPA's National Pollutant Discharge Elimination System Proposed Regulations to Establish Requirements for Cooling Water in the Structures at Existing Facilities: Proposed Rule ICR No. 2060.0167 Federal Register 1722. April 9, 2002 submitted to EPA on August 7, 2002 under cover letter fiom Maureen F. Vaskis, Esq. and Mark I;. Stricklaiid.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.338.011

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The Goal Of § 316(b) - Minimization Of Adverse Environmental Impact- Can Be Fully Achieved Through A Site-Specific Approach

PSEG remains convinced that the statutory mandate of selecting the BTA for minimizing adverse environmental impact due to a CWIS is best addressed through site-specific decision-making. This is especially the case for existing steam electric generating stations that are the subject of the Phase II Rulemaking. To do anything other at existing facilities ignores the essential fact that the power plant and the CWIS have already been sited; further and more importantly, in many instances, it ignores the wealth of information that has been collected to assess the effects of the CWIS on the environment.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.338.012

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 6.04

Impacts of CWIS at ecosystem level (popn. vs. indiv.)

As discussed below, there are studies that demonstrate the absence of AEI, based on data indicating the absence of adverse effects at the population and community levels, even after years of operation of intake structures, which causes numerically very large entrainment and impingement losses.

Certain of the most controversial of § 316(b) decisions related to power plants located on estuaries, including estuaries for which long-term data are available from monitoring programs <FN 10> to assess the effects of these facilities. These monitoring programs have demonstrated that the fish populations in the water bodies have continued to improve over the years of the facility's/ facilities' operations. As noted by Charles C. Coutant, Ph.D., Senior Scientist at Oak Ridge National Laboratory during the closing session of EPA's May 2003 Symposium on CWIS Technologies, the concerns about the effects of entrainment and impingement on fish populations based upon earlier, predictive studies of impact have been disproved by the long-term data on the status of the populations. Dr. Coutant referred specifically to the Hudson River and Salem power plant studies. The papers presented at an EPRI-sponsored symposium on Connecticut Yankee and the status of the fish populations in the Connecticut River reached similar conclusions. Likewise, scientists working for the State of Maryland's Power Plant Research Program ("MdPPRP") have published an article indicating similar results from their studies of fish populations in Maryland waters. <FN 11> The MdPPRP representative at the recent CWIS technologies symposium repeated these conclusions.

The studies conducted in the Connecticut River associated with the Connecticut Yankee Generating Station (''CY'') encompassed the period 1965-1987; the Station began commercial operations in 1968. On November 15-1 6,2001, EPRI sponsored a conference entitled, "Connecticut River Ecological Study Workshop: Revisiting the Impact of a Power Plant" ("Connecticut River Workshop"). The conference afforded scientists specializing in aquatic ecosystems and fisheries & opportunity to re-examine the original Connecticut River Study in relation to the long-term operation of CY and in relation to the current ecological condition of the Lower River. The published Summary from the Connecticut River Workshop include an assessment of the status of the river and its biota. Steve Gephard of the Connecticut Department of Environmental Protection ("CDEP") stated in his presentation entitled, "Status of Diadromous Fish Populations in the Connecticut River, Thirty Years Later" that "In general, the [Connecticut] [R]iver is in much better condition than it was during the ecological study. The ecological study and time have proven that the effects of the CY plant on the [Connecticut] [R]iver were relatively benign. "' <FN 12>

Likewise, the Delaware River studies associated with the Salem Generating Station have been on-going for better than 30 years. In 1999, an assessment of the potential for adverse environmental impact was conducted. This assessment concluded that Salem's operation had not resulted in a change in species composition, abnormal fluctuations in species abundance, or increase in nuisance species. It also concluded that Representative Important Species ("RIS") populations were stable or increasing except for two species, blueback herring and spot. Blueback herring have been subject to long term, coast-wide declines, which began prior to the initiation of the operation of Salem's cooling water system. Spot is subject to interannual variability in the Delaware Bay, which is the northern edge of this species, geographical distribution.

Footnotes

10 In some instances, the monitoring programs have been funded solely by the utilities in response to NPDES requirements. In other instances, such as the Delaware and Hudson Rivers, the data include the results of long-term studies conducted by the Delaware Department of Natural Resources and Environmental Control (“DNREC”) and the NJDEP on the Delaware and the New York State Department of Environmental Conservation (“NYSDEC”) for the Hudson.

11 See also, Richkus W. and R. McLean, 2000. Historical overview of fhe efficacy of two decades of power plant fisheries impact assessment activities in Chesapeake Bay. Environmental Science & Policy 3 (2000) S283-S293

12 EPRI. Workshop Summary. Connecticut River Ecological Study Workshop: Revisiting the Impact of a Power Plant, November 15 & 16,2001.

EPA Response

The information presented by this author highlight the fact that many factors concurrently affect fish populations. It is extremely difficult to separate the effect of any one factor. Today's final rule seeks to reduce the stress on fish populations due to impingement and entrainment by cooling water intake structures. Fishery management plans, water quality improvements and habitat restoration will also improve fish populations. Please see the response to comment 316bEFR.025.018 and 316bEFR.207.015.

Comment ID 316bEFR.338.013

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.01.02.02

Fish Population Modeling

Developments In Fisheries Science Support Inclusion Of A Site-Specific Option, Which Would Foster Appropriate Allocation Of Limited Societal Resources

To require facilities to install and operate technologies at considerable costs when no biologically meaningful AEI has been occurring and will unlikely occur in the future flies in the face of reason.<FN 13> Absent the inclusion of a truly workable site-specific option, this would be the outcome of this rule. Much more is known about fish populations and how they sustain themselves in 2003 than was known more than thirty years ago when Congress was debating the effects of steam electric facilities on fish population. <FN 14> In particular, the science of population dynamics and the understanding of how compensatory mechanisms operate have developed considerably over the last thirty years.

Any biological population that persists despite natural fluctuations in the environment must express some degree of compensatory process Le., an increase in the survival, growth, and/or fecundity with reductions in population size. The concept of compensation is known as "density-dependence" by ecologists, and is fundamental to the understanding and management of all biological populations. Different mechanisms of compensation have been well-studied in both terrestrial and aquatic systems (Krebs 1985; Hassell et al. 1989) for most animal groups (Hassell 1978) and for plants (Harper 1977). This compensatory response is the key factor that allows fish populations to maintain themselves when subjected to fishing mortality, and is a guiding principle of fishery management. If compensation did not exist, species could not sustain themselves in highly variable natural environments and in the face of long-term anthropogenic-stresses, such as mortality from fishing or power plant operations.

Identifying the operation of compensation in aquatic populations has been the focus of fisheries management over the past several decades. The prominence of the principle of compensation in the management of major fisheries by resource agencies is amply reflected in the many examples cited in Hilbom and Walters (1992). Quantitative estimates of compensation are now employed in fishery management to protect stocks from over exploitation, to define alternative criteria for optimal utilization, and to guide the course of rehabilitation of depressed stocks. Fisheries managers routinely use quantitative models to perform fish stock assessments, and these stock assessments are the foundation for the setting of fishery limits and quotas.

An example of this is evident in studies done on the Hudson estuary. Striped bass and white perch have been extensively surveyed at the egg, larval, and juvenile stages in the Hudson estuary since the 1970s. These research surveys show no decline in juvenile abundance (at about six months old) over a wide range of egg and larval abundance (Pace et al. 1993). The data on the Hudson estuary suggest strong density-dependent mortality between egg production and the winter of the first year of life.

Fisheries managers now employ biological reference points to evaluate the status of a fish stock and to guide them in setting allowable fishing rates. The role of compensation in present practices of fisheries management and regulation has recently been characterized by the following quote from the a 1998 study by the National Research Council ("NRC) Committee on Fish Stock Assessment:

Many species appear to have strongly compensatory [spawner-recruit] relationships; that is, per capita recruitment increases significantly as stock size decreases. Reference levels are now more commonly based on a % spawning stock biomass per recruit, but the percentage is often specified by analogy with other stocks or by using the results [of comparisons among other biological reference points]. A knowledge of the compensatory capacity of the stock is necessary to define the most appropriate biological reference points for a stock. Even without such knowledge, however, a conservative % spawning stock biomass per recruit still can be selected (Sissenwine and Shepherd, 1987). (NRC 1998).

As the above-referenced discussion clearly demonstrates, the level of understanding of the biological processes underlying density-dependent population regulation has increased dramatically in recent years, and databases and analytical techniques for quantifying density-dependence have become more reliable. The concept of compensation is now firmly entrenched in fisheries management practice.

The administrative record for the Proposed Phase II Rule pays lip service to these developments in fisheries science. The Proposed Rule discusses compensatory mechanisms and population dynamics as well as the models used by the National Marine Fisheries Service ("NMFS"). However EPA dismisses them from further consideration, citing too much uncertainty in these "scientific theories." There are uncertainties; EPA is correct. However, real world, long-term studies that demonstrate stable or increasing populations are more than adequate proof that the "scientific theories" do work and work, in fact, to sustain fish population.<FN 15>

USEPA must base its rulemaking on the best available information. The Agency should not ignore the body of scientific literature and the wealth of actual data that support the position that site-specific determinations of BTA have protected the resource.<FN 16> Deciding on the outcome of this rule without considering the developments in fisheries biology would be akin to seeking treatment for an illness such as cancer without considering the advances that have occurred over the past thirty years in understanding the causes of the disease and the treatments to cure it. At best, it would be highly irrational; at worst, it would not be in the patient's best interest. In this instance, relying on thirty year old data would mean that EPA is ignoring the administrative record and promulgating a rule that would result in the misallocation of limited societal resources to the ultimate detriment of the environment.

Footnotes

13 As PSEG's and WAG'S prior comments clearly set forth, the plain meaning of the statute requires no more.

14 It is worth noting that most of this debate focused on the effect of them1 discharges on fisheries and Congress's response to the debate was to craft 316(a), which established a variance provision. See Anderson & Gotbng's article, which provides a comprehensive summary of the legislative history of 316 of the Clean Water Act. William A. Anderson, II and Eric P. Gotting. Taken in Over Intake Structures? § 316(b) of the Clean Water Act 26 Col. Jour. Envtl L. - (2001). As demonstrated there, 316(b) was added without considerable debate during the House/Senate Conference. Congress was not focusing on entrainment and impingement losses and it is highly unlikely that Congress would have intended to undo what had been the subject of such intense debate, the need for site-specific regulation of power plant cooling systems, by mandating uniform technology requirements through 316(b).

15 National Marine Fisheries Service (NMFS). 30& Northeast Regional Stock Assessment Workshop (30th SAW), Public Review Workshop, April 2000. Northeast Fisheries Science Center Reference Document 00-04 and see electronic file Rider

insert for FN 5 in Chapter II.

16 While PSEG is not specifically addressing in this Response to the need for a biologically relevant definition of AEI, this body of scientific literature and the data referred to herein also providemore than ample basis for a population-based definition of AEI.

EPA Response

Please see responses to Comment 316bEFR.005.009 on fish population modeling and Comment 316bEFR.025.015 on compensation.

Comment ID 316bEFR.338.014

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

A Site-Specific Option Provides States Flexibility To Address Local Concerns While Ensuring That Federal Standards Are Met

When § 316(b) is implemented on a site-specific basis, regulatory agencies can assure that AEI is minimized through measures commensurate with the magnitude of the adverse effect, if any, as well as the nature and status of resource to be protected. NPDES permitting agencies have been making § 316(b) determinations now for almost thirty years on a case-by-case basis. These permits have required a variety of measures to address the effects of cooling water intakes, based upon the particular circumstances involved. Some of these § 316(b) determinations required a single measure such as making improvements to existing CWIS screen system;<FN 17> others required use of behavioral deterrents or other intake-related modifications."<FN 18> Other permit decisions have I required multiple measures to address the CWIS effect.<FN 19> These decisions were based upon considerations of the aquatic populations affected by the CWIS and the engineering and other site-specific factors that relate to the types of measures applicable for minimizing AEI. Time has proven the wisdom of these decisions.

Any number of §316(b) determinations from a variety of jurisdictions support these contentions. USEPA Region IV issued numerous permitting decisions based on EPA's 1977 Draft Guidance:<FN 20> including determinations for TVA's John Sevier Power Plant, Cape Canaveral, and Indian River Power Plants and TECO's Big Bend Power Plant. The New York State Department of Environmental Conservation ("NYSDEC") has likewise made decisions for numerous power plants throughout the state over the last 30 years. In the case of the Florida Power Plants, these case-by-case, site-specific determinations recognized the need to consider overall protection of the environment and not merely the reduction of entrainment and impingement numbers. In the case of the John Sevier facility, the Agency was able to offset the effects of the cooling system while enhancing the local sport fishery. In the New York power plant determinations, NYSDEC drew from a suite of measures ranging from behavioral deterrents to enhanced screen maintenance and operator training programs, based on the nature of impingement and entrainment effects occurring.

Footnotes

17 See, e.g., Dunkirk Steam Station (Niagara Mohawk Power), SPDES Permit NY002321,March 21, 1995 (ristroph type screens).

18 See, e.g., Fitzpatrick Generating Station, Draf SPDES NY0020109, March 11, 1997 (intake ensonification); John Sevier (Tennessee Valley Authority ("TVA")), USEPA (NPDES Permit No. TN0005436), 1986.

19 See, e.g., Crystal hver (Florida Power), USEPA Region IV (Findings and Determinations re: NPDES Permit No. FL0000159), Sept. 1, 1988, at 7-8; Pittsburgh (PG&E), Ca. RWQCB (NPDES Permit No. CA0004880), April 18, 1990; Hudson River Settlement Agreement (1980) and Hudson River Settlement Agreement (1993) (also included donation of public park and research funding); Chalk Point (PEPCo), MDE (NPDES P e m t No. MD0002658B Modified Perrmt), April 29, 1991; Salem (PSEG Nuclear) NPDES Permit No NJ0005622), August 1,2001; SONGS (So. Ca. Edison, San Diego Gas & Elec.), Ca. MRC (Final Report to the Coastal Comm'n.), Aug. 1989; Goudey (NYSEG), NYDEC, Bureaus of Fisheries and Environmental Protection (Region VI1 Comments on SPDES Permit No. NY0003875), Aug. 23, 1983 (also included

development of fishing access at another site).

20 U.S. Environmental Protection Agency, “Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500” at 15 (“1977 Draft 316(b) Guidance”), May 1, 1977.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Comment ID 316bEFR.338.015

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Permitting Agencies Have Made And Can Continue To Make Site-Specific § 316(b) Determinations That Are Protective Of The Environment Without Undue Administrative Burden Or Cost

Since the initial enactment of the Clean Water Act in 1972, regional EPA and state NPDES permitting agencies have implemented 316(b) on a case-by-case basis, as shown above. Section 316(b) determinations have made for a wide range of existing power plants across the country. The vast majority of these decisions have been made in the normal courses of issuing NPDES permits<FN 21> other more controversial decisions were resolved via more extensive and, in some instances, even protracted proceedings.<FN 22> It is only natural that the protracted proceedings have captured the attention of the opponents of site-specific 316(b) determinations. These are the famous (or perhaps infamous is the better descriptor) matters that generated years of administrative proceedings and the attendant decisional documents that are more readily accessible than "Fact Sheets" or "Response to Comments" documents in non-adversarial permit proceedings.

In the instant rulemaking, EPA has sought the involvement of regional offices and state agencies not only through working groups, conferences and symposia, but also through the general request for comments in connection with the Proposed Phase II Rule and the NODA. While EPA continues to express concern about continuing its long-standing practice of implementing 316(b) on a case-by-case basis due to the burden on state agencies, the vast majority of states have not been participating actively in the rulemaking. Of the states that have submitted comments, many have endorsed providing flexibility to the states in making permit decisions and/or continuing to implement 316(b) through site-specific decision-making. These include the states of Maryland, Pennsylvania, Michigan, Florida, Arkansas, Alabama, and Indiana.<FN 23>

Footnotes

21 As discussed above in Section II.C., there have been numerous site-specific determinations that have not been burdensome. This is true even in New York State outside the Hudson River, where absent public interest group intervention, the regional fisheries offices in conjunction with the central NYSDEC office (for consistency) routinely assess power plant effects and make 316(b) determinations that have been fully protective of the environment in general and aquatic resources in particular.

22 These permit proceedings include the Hudson River Power Plant Matter, In re Seabrook Power Plant, and Salem's NJPDES Permit.

23 Letter from Richard J. McLean, Energy Resource Administrator; Maryland Department of Natural Resources - Power Plant Research Program and J. James Dieter, Wastewater Permits Program Administrator - Maryland Department of the Environment - Water Management Administration to
USEPA dated August 5, 2002; letter from Christine Martin, Deputy Secretary for Water Management, Pennsylvania Department of Environmental Protection to USEPA dated August 5, 2002; letter from Russel J. harding, Director, Michigan Department of Environmental Quality ("MDEQ") on behalf of the MDEQ and the Michigan Department of Natural Resources to USEPA dated August 6,2002; letter from Allen Hubbard, P.E., Supervisor - Steam Electric Power Plant NPDES Permitting, Florida Department of Industrial Wastewater to USEPA dated August 7, 2002; letter from Mo Shafii, Acting Engineering Supervisor - NPDES Permits, Water Division, Arkansas Department of Environmental Quality to USEPA dated July 16, 2002; letter from John A. Poole, Jr., Chief - Water Division, Alabama Department of Environmental Management to USEPA dated August 6, 2002; and letter from Timothy J. Method, Deputy Commissioner for Environmental

Results, Indiana Department of Environmental Management to USEPA dated August 9,2002.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

EPA has made extensive efforts to solicit input from the states, as well as other stakeholders. Please refer to section III of the preamble to the final rule.

Comment ID 316bEFR.338.016

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Maryland’s PPRP provides a model for successful implementation of a site-specific 316(b) program.

In both its written comments on the Proposed Phase II Rule and at EPA’s CWIS Technology Symposium, the State of Maryland has fully endorsed the continued implementation of 316(b) on a site-specific basis. This endorsement does not arise out of naivete or ignorance of what is involved with making 316(b) determinations. To the contrary, Maryland has perhaps the most structured program for implementing 316(b) in the country. To its credit, Maryland has developed regulations that govern the implementation of 316(b) and has established a multi-disciplinary team that includes scientists, engineers and economists to review demonstrations. Maryland has also developed a reasonable structure to fund this process.<FN 24> With these components in place, 316(b) determinations can be made without triggering the specter that USEPA and certain states conjure up when developing the case for why 316(b) must be implemented via uniform national standards.

Maryland's program should serve as a national example not only because it is comprehensive yet efficient but also because of its success in not only minimizing AEI as required by 316(b) but also because it has resulted in the enhancement of the aquatic ecosystems in many instances. For example, the resolution of the Chalk Point NPDES permit resulted in the establishment of a hatchery. Striped bass was the initial species reared in the hatchery; with the complete recovery of the Chesapeake Bay striped bass stock, white perch and American shad have been reared and released. Mirant is also doing research at the request of MDNR on rearing sturgeon.

Footnotes

24 Maryland imposes a small annual tariff on the sale of electncity, which defrays the cost of the MDPPR.

EPA Response

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

Comment ID 316bEFR.338.017

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Other states recognize that 316 (b) requires a site-specific approach

Although their programs are not as sophisticated as the Maryland program, other states such as Florida, have supported EPA's inclusion of a site-specific option for complying with 316(b). The FDEP advocates a site-specific option so that it can continue to have the latitude to consider the totality of cooling system effects on the environment, both positive and negative, and the right to weigh them with the goal of maximizing environmental benefits. FDEP wants the flexibility to continue balancing the effects of impingement and entrainment losses with the need to provide an over-wintering area for manatees, a protected species. In other words, FDEP does not want to be forced to impose measures that would limit entertainment and impingement in 'the absence of evidence indicating harm due to these early life stage losses, if those same measures would eliminate key habitat for the manatee.

EPA Response

The final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

Comment ID 316bEFR.338.018

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

The Record For The Proposed Phase II Rule Includes Suggestions On How To Streamline Site-Specific Decision-Making

In its preamble to the Proposed Rule, USEPA sought comment on a number of proposals that would streamline the implementation of site-specific 316(b) determinations. Several states have supported these options. USEPA sought comment on whether states should be allowed to reaffirm prior 316(b) determinations and if so under what circumstance. A number of states, including Florida and Michigan, urged EPA to give full faith and credit to these prior decisions. For example, Michigan's Department of Environmental Quality (MDEQ) stated:

Michigan has implemented a 316(b) program for a number of years. Design, construction, and operation of intake structures have been evaluated on a case-by-case basis to minimize adverse environmental impacts for a majority of the intake structures for existing regulated facilities in Michigan.. .may not be necessary to require new studies or demonstrations for all those facilities with site-specific approvals.. .the regulations [should] provide flexibility for the states to exempt facilities with previously approved 316(b) demonstrations from further study, rather than require every facility to conduct new studies and demonstrations. The states should have the option to require the additional studies or demonstrations if conditions have significantly changed or if special concerns warrant a reevaluation of impacts.. .this approach will streamline the NPDES permit process and allow us to devote limited resources to facilities that need the attention. This approach will benefit permitting authorities faced with permit backlogs.

The Massachusetts Office of Coastal Zone Management offers qualified support for allowing continuations of prior decisions.<FN 25> They recommend this so long as the permittee can demonstrate no changes to the water body or the aquatic biota, since the last demonstration that formed the basis of the decision. Likewise, NJDEP supports allowing applicants to rely on information from prior determinations.

Footnotes

25 Letter from Thomas W. Skinner, Director - Massachusetts Office of Coastal Zone Management to USEPA dated June 14,2002.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details. EPA has also provided numerous efficiencies in today's final rule to streamline permitting. Please see response to comment 316bEFR.034.005 for a discussion

Comment ID 316bEFR.338.019

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

The Arguments Against A Site-Specific Option Fall Short

The arguments against including a site-specific option in EPA's Preferred Approach fall short; in fact, PSEG believes that the totality of the record would support a determination by USEPA to implement 316(b) for existing power plants solely through case-by-case decision-making. This is the case for a number of reasons. First, the plain words of 316(b) in the context of the Clean Water Act support such a determination despite the opposition's invocation of the inclusion of references to 301 and 306 in 316(b) as clearly requiring national technology or performance standards for CWISs. Second, under EPA's Preferred Approach, only a subset of existing facilities will seek to make a site-specific demonstration. Third, even states that have raised concerns about site-specific implementation of 316(b) in their comments to USEPA on the Proposed Rule recognize the inherently site-specific nature of CWIS regulation at existing power plants and have implemented the statute accordingly. Finally and most importantly, there is no data or evidence that would support a conclusion that entrainment and or impingement losses have caused any appreciable impact to populations or ecosystems at the vast majority of power plants where site-specific 316(b) determinations have been the sole means of regulating CWISs over the past thirty years.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

While EPA has rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information. Also refer to section VII of the preamble to the final rule for information on why EPA rejected a purely site-specific approach.

Comment ID 316bEFR.338.020

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 2.04.05

Implement a site-specific alternative

The Better Reading of the Statute Supports Site-Specific Implementation

Riverkeepers' and others take the opposition that 316(b) requires development of uniform technological standards for regulating CWISs. They invoke the reference to 301 and 306 in 316(b). Likewise, they argue that Congress' use of the phrase "best technology available", which is closely akin to "best available technology", must mean that this is a technology driven provision. Such a reading of the statute is clearly wrong; it ignores the critical linkage of the term BTA with the phrase "minimize AEI" in 316(b), the differences between this construction and 301 and 306, and 316(b)'s placement in the statute. When these are considered in toto, it is clear the 316(b) requires site-specific decision making or, at a minimum, the right to petition for such a determination, as in USEPA's Preferred Approach.

First and foremost, 316(b) requires the identification of BTA for "minimizing AEI." The marriage of a technology-based standard with an ecological endpoint is unique to 316(b). Sections 301 and 306, in comparison, are purely technology-driven sections. They require establishment of national uniform standards based on the technologies' capabilities to reduce pollutant loadings without any consideration of the effects of the reductions on the surface waters. The combining of the CWA's technology-forcing concepts as used in 301 and 306 together with the term "AEI" must, of necessity, be accomplished in the context of the environment within which a given CWIS operates. Hence, 316(b) requires site-specific decision-making.

Finally, as noted above, 316(b) arose out of the debate in Congress on the need for site-specific regulation of thermal discharges at power plants. This debate was resolved through the establishment of a site-specific variance proceeding based on protection of biota. Given the similar joining of technological and ecological goals in 316(b), it is logical to assume that Congress intended 316(b) to be implemented in a similar manner. USEPA's initial interpretation of the statute, as upheld by the Court of Appeals, supports this conclusion.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.338.021

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Only A Limited Number Of Facilities Are Likely To Seek To Use A Site-Specific Demonstration

If the USEPA were to adopt as its Final Rule its Preferred Approach, it is likely that the number of power plants seeking a site-specific determination under Compliance Option III would be much smaller than EPA appears to anticipate. Using the ten power plants PSEG owns and operates that are subject to the Phase II Rule as an example, only four of the ten Phase II power plants would likely petition for site-specific determinations under 316(b). Two of the plants would be deemed to be in compliance by virtue of their operating with closed cycle cooling systems and cooling towers; the other four would likely seek to demonstrate compliance with the performance standards, including PSEG's Salem facility that has been held up as one of the prime examples of all that is wrong with site-specific decision-making.

If EPA is concerned with the precedent that including a site-specific option may create for its Phase III rule, all of PSEG's ten power plants that would likely be subject to the Phase III rule operate with closed cycle cooling and PSEG presumes these would likely be deemed to be in compliance based on the Agency's positions to date in the Phase I and Phase II rulemakings. As UWAG and PSEG have indicated in prior comments, applicants would, if possible, avail themselves of Compliance Option E, conformance with the Performance Standards, to minimize regulatory burden and increase regulatory certainly.

EPA Response

EPA agrees that it is unlikely that a large percentage of facilities would seek a site-specific determination of best technology. Please refer to the response to comment 316bEFR.202.002 for more information.

The proposed Phase III regulations are due to be published on November 1, 2004. At this time, EPA cannot comment on the approach those regulations may take. EPA welcomes comment during the comment period for those regulations.

Comment ID 316bEFR.338.022

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Even States Such as New York and New Jersey Recognize that 316(b) Determinations are Inherently Site-Specific

Although the comments submitted by the NYSDEC and the NJDEP both indicate that they are opposed to site-specific implementation of 316(b), arguing that such determinations create a tremendous administrative burden although in both instances, these states have focused solely on the highly controversial and protracted proceeding and not on the burdens associated with their overall implementation of 316(b). Both, moreover, have indicated either in comments or at EPA-sponsored public meetings on the issue that the regulation of an existing CWIS requires consideration of site-specific factors.

As indicated above in section II.C, NYSDEC has applied a range of measures to address 316(b) in clear recognition of the diversity of effects at power plants located within New York. Even as recently as USEPA'S CWIS Technologies Symposium, a former NYSDEC staff person in charge of 316(b) assessments highlighted the range of measures employed and the need to balance the intricacy and cost of the technology to be employed with the type and magnitude of the harm to the aquatic ecosystem. Regardless of its definition of AEI that NYSDEC has put forward, it has not uniformly required closed cycle cooling or any other technology. This certainly appears to be an endorsement of site-specific 316(b) decision-making.

In its written comments to the USEPA on the Proposed Rule in August 2002, the NJDEP, like the NYSDEC, included a strong endorsement for application of a uniform technological approach. However, NJDEP also opposed USEPA’s suggestion of developing-a general permit for implementing 316(b), because:

By definition, a general permit prescribes a set of conditions for a number of facilities deemed eligible under those conditions. Establishment of appropriate cooling water intake technologies is dependent on numerous site-specific factors, where the regulatory authority should have oversight over any such choice.. .It could also cause a problem in prescribing a “one size fits all” mentality for intake protection technology which is simply not appropriate.<FN 26>

It is hard to reconcile the two positions the NJDEP has put forward in its comments. The position it espouses with respect to the general permits is consistent with its long-standing practices for implementing 316(b). One only has to look at the different CWIS requirements that have been required at facilities in New Jersey to see this.

Footnotes

26 See page 18 of NJDEP’s comments submitted under letter from Bradley M. Campbell, Commissioner of the NJDEP dated August 7,2002.

EPA Response

EPA is not in a position to respond to this comment. The prior implementation of 316(b) in these states and their present position on implementation are state-specific issues.

Comment ID 316bEFR.338.023

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

EPA'S DECISION TO INCORPORATE RESTORATION MEASURES IS SUPPORTED BY SOUND SCIENCE, AS THE ADMINISTRATIVE RECORD FOR THIS RULEMAKING DEMONSTRATES

EPA has very wisely determined to continue its long-standing practice of allowing permittees to propose restoration measures in lieu of or in combination with technological measures to address CWIS-related effects. (67 Fed. Reg. 17221). There is a wealth of scientific data and information that demonstrate the value of habitat restoration programs (e.g., wetlands and eelgrass restoration or installation of fish ladders) and other such measures (e.g., stocking programs). Moreover, EPA itself, its sister agencies charged with protecting the Nation's natural resources, including NMFS and the United States Fish and Wildlife Service ("USFWS"), and the Congress of the United States recognize the essential link between habitat and fisheries. Finally, the administrative record contains a substantial body of documents including scientific literature and government reports supporting restoration in general together with reports and information describing the restoration measures successfully implemented by power plants subject to the Phase II Proposed Rule.

In the NODA, EPA has sought comments on both the entire administrative record for the Phase II Rulemaking, which includes comments challenging the Agency's proposed determination to include restoration measures, and some specific proposals aimed at enhancing the likelihood that restoration projects implemented to address 316(b) would be successful (68 Fed. Reg. 13541). In this section, PSEG provides additional information demonstrating the value of restoration measures for aquatic resources to supplement the record and responds to the EPA’s request for comments on additional measures to enhance the success of wetlands.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

Comment ID 316bEFR.338.024

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Independent Scientists, EPA's Office of Wetlands and Resource Protection Agencies Recognize the Importance of Habitat Restoration to Maintenance of Fish Populations

While critics of restoration measures continue to question the merit of such programs and/or allege their experimental nature, there is an ever-growing body of peer-reviewed scientific literature authored by well-respected scientists at major universities that demonstrate the critical link between habitat and fisheries and report on the successes in developing and implementing habitat restoration programs. Recent government publications further highlight the critical importance of habitat and stress the importance of habitat restoration.

The Link between Coastal Wetlands and Estuarine and Marine fisheries is Well-Established

Healthy tidal wetlands that are linked to estuarine and coastal waters provide critical ecosystem support through direct contribution to food webs and by serving as highly favorable habitat for aquatic organisms: In particular:

- Marsh creeks are used for feeding, breeding, and shelter by a variety of fish and invertebrates, and marshes are important habitat for both estuarine resident and continental shelf species (Talbot and Able 1984; Rountree and Able 1992; Shenker and Dean 1979; Weinstein 1979; Rozas and Hackney 1984).

- Consumer fish in marshes feed on abundant bottom-dwelling invertebrates (Boesch and Turner 1984; Smith et al. 1984).

- The movement of fish in and out of wetland areas is an important energy transfer linkage between marshes and estuarine and coastal waters (Weinstein and Walters 1981; Conover and Ross 1982; Currin et al. 1984; Cadigan and Fell 1985; van Montfkans et al. 1991).

- Large carnivorous fish (including such commercially and recreationally valuable species as weakfish (Cynoscion regalis), summer flounder (Paralichthys dentatus), striped bass (Morone saltatrix), and bluefish (Pornatornus saltatrix) use the estuary on a seasonal basis and derive substantial food resources from forage fish and shellfish associated with marshes (Pennock 1988).

These findings have been confirmed, extended, and supported by recent studies and reviews. Large, carnivorous estuarine fish species have been documented to use shallow nearshore waters to a greater degree than was previously realized (Rountree and Able 1997; Salem's 1999 Application, Appendix G, Exhibits G-3-1, G-3-3, and G-3-5). Growth and survival of many species is promoted by tidal wetland habitats (Kneib 1997), and marshes are important contributors to growth of early life history stages (Ayvazian et al. 1992; Baltz et al. 1993; Kneib 1997; Salem's 1999 Application, Appendix G, Exhibits G-3-4, G-3-6, G-3-7 and G-3- 9). In addition to food, marshes provide fish and shellfish with other important habitat support (Salem's 1999 Application, Appendix G, Attachment G-3 and Exhibits

G-3-4, G-3-5, G-3-9 and G-3-10). Water on the marsh surface may shelter fish from cold winter temperatures (Smith and Able 1994) and provide optimal temperatures for growth during the active season (Brett et al. 1969; Pietrafesa et al. 1986). Marshes may shelter some fish from predation (Nixon and Oviatt 1973; Joseph 1973), but also serve as a focus for feeding by trophic generalists (Moyle and Cech 1996). Tidal wetlands provide important spawning habitat, for both marsh resident species and other estuarine species.

The United States Congress and federal regulatory agencies continue to recognize the importance of coastal wetlands and estuarine habitat to fish and wildlife. As mandated by Congress, there are a number of federal initiatives designed to promote estuary habitat restoration. USEPA should be commended for including provisions in the Proposed Phase II Rule that promote the implementation of restoration measures and support these national objectives.

As recognized by Congress in the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (the “Sustainable Fisheries Act
amendments”) See Pub. L. 104-297 (1996):

one of the greatest long-term threats to the viability of commercial and recreational fisheries is the continuing loss of marine, estuarine, and other aquatic habitats. Habitat considerations should receive increased attention for the conservation and management of fishery resources of the United States.

The U.S. Environmental Protection Agency (USEPA 1998) concurs, stating that coastal wetlands:

are extraordinarily productive habitats that offer protective shelter and abundant food to juvenile fish, shellfish, migrating waterfowl, and thousands of other species.. ..Coastal wetlands also buffer the coastline from severe storms and intercept nutrients and sediments.. ..Ecologists estimate that more than half of the [Mid- Atlantic, including Delaware Bay,] region’s wetlands have been lost because of human activities dating from pre-colonial times.

USEPA also recognizes that the value of the system depends on the multi-habitat nature of the coastal complex (USEPA 1998):

Presently, about two thirds of the coastal wetlands are salt marshes colonized by salt-tolerant grasses and bushes. Much of the balance [is] tidal mud flats, areas that are exposed at low tide and are densely packed with shellfish, invertebrates, crabs and other organisms. The remainder [is] freshwater marshes, forests, and shrublands.

Recently, fisheries biologists with the NMFS published a review article titled

Catching the Link Between Wetlands and Fisheries Management. (Stedman and Brown 2000.) The authors point out that:

Fish use wetlands as nursery areas, spawning grounds, feeding areas, and refuge from predators. The wetland vegetation, the rich detritus, and the shallow water provide unique functions that benefit many fish. Approximately three-quarters of the commercial fish landings in the United States consists of species that depend on estuaries and their wetlands.

The NMFS further emphasized the critical link between wetlands and survival of fish populations in the recent publication, “Wetlands and Fish: Catch the Link: (NMI;S 2003). As stated by these fisheries biologists:

Wetlands are vital to fish populations because fish depend on certain wetland functions. Wetlands serve as a food base, shelter, spawning and nursery areas, and for water filtration.. . . Thus, a network of abundant and healthy wetlands is vital to the survival of most fish species.

To promote the restoration of estuary habitat and develop a national strategy for creating and maintaining effective estuary habitat restoration partnerships among public agencies at all levels of government, Congress enacted the “Estuary Restoration Act of 2000” . See Pub. L. 106-457 (Nov. 7,2000). This Act created the “Estuary Habitat Restoration Council” of which USEPA is a member, in conjunction with representatives from the United States Army Corps of Engineers, the National Oceanic and Atmospheric Administration (“NOM’), the USFWS and United States Department of Agriculture.

A stated purpose of the Estuary Habitat Restoration Strategy being developed by the USEPA and other “Council” members is to:

provide incentives for the creation of new partnerships between public and private sectors, and foster coordination of Federal and non-Federal activities related to restoration of estuary habitat.

Inclusion of provisions for restoration measures in the Proposed Rule directly supports these goals and is exactly the type of initiative intended by Congress when the “Act” was enacted.

The USEPA, in partnership with other federal agencies, is responsible for restoring and maintaining the chemical, physical and biological integrity of the nation’s waters and has recognized. the important of wetlands for fish and wildlife. USEPA uses a number of non-regulatory programs to supplement efforts under Section 404 of the Clean Water Act. As stated in the USEPA publication “America’s wetlands: Our vital link between land and water:,”

Most commercial and game fish breed and raise their young in coastal marshes and estuaries. Menhaden, flounder, sea trout, spot, croaker, and striped bass are among the more familiar fish that depend on coastal wetlands. (USEPA 1995)

USEPA promotes the restoration, creation and enhancement of wetlands and aquatic resources by providing technical guidance (USEPA 2000, Interagency Workgroup on Wetland Restoration 2003). Guidance provided by the USEPA Office of Wetlands, Oceans and Watersheds (USEPA 2000) supports current Federal initiatives, such as inclusion of restoration measures in the Proposed Rule, and can facilitate implementation of restoration measures by cooling water users choosing this option for compliance with the performance standards specified in 125.94 of the Preferred Approach.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

EPA believes that restoration science continues to progress.

Comment ID 316bEFR.338.025

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The Use of Fish Ladders and Other Similar Devices is a Well-Established Means to Enhance Production of Anadromous Fish

As recognized by fishery resource management agencies throughout the northeastern United States (Atlantic States Marine Fisheries Commission ["ASMFC"] 1998), the installation of fish ladders can result in increased commercial and recreational fisheries. Since colonial times, many tributary streams and rivers utilized by river herring, as well as other species, have been dammed or otherwise blocked for industrial, irrigation, recreational, and flood control purposes, leading to a decline in anadromous fish stocks (PSEG 1993; ASMFC 1985). Additionally, estuarine water quality contributed to declines in anadromous fish stocks (ASMFC 1998). River herring have suffered from a loss of spawning habitat in tributary streams and rivers along the Atlantic coast. Blockages of the tributaries have contributed to reduced anadromous species populations including river herring. Since the 1960s, efforts have been underway to provide passages
around dams for anadromous fish and to restore these depleted fish stocks. Fish ladders are a proven technology for enabling fish to pass upstream over natural and manmade barriers in rivers and streams.

Fish restoration plans are proceeding along the entire East Coast. Connecticut has an extensive program for enhancing and restoring river herring populations; it includes activities associated with upstream and downstream fish passage, juvenile monitoring, and adult stocking (Gephard et al. 1998). There are at least 25 fishways installed on Connecticut rivers and streams for the purpose of passing anadromous fish upstream. The State of Connecticut owns and operates five of these facilities; the remaining fishways are town-or privately-owned. The CDEP considers fish ladders to be a proven technique for restoring river herring runs and supports their continued installation at dams where no upstream passages are present (Gephard et al. 1998).

In Rhode Island, steeppass ladders have been used to restore runs of river herring. In some cases, these ladders have performed so well that they had to be replaced by larger Denil ladders in order to pass the increased number of fish arriving at the ladder sites (Gibson 1993).

Alaska steeppass ladders have been installed at several locations in Maine. Information that was obtained on four steeppass ladders indicates that they are effective. (Flagg 1998). Thousands of adult alewife (more than 10,000 at one ladder) use the ladders each year.

Alaska steeppass ladders also have been constructed for passing river herring at several locations in New Jersey (Byme 1993,1999). A ladder at Shenandoah Lake (south branch of the Metedeconk River) has passed alewives into the lake since 1973. PSEG has installed a total of eight fish ladders in Delaware and New Jersey on tributaries of the Delaware Estuary in order to restore spawning runs and provide habitat for river herring. Stuhes to date show that the ladders are properly located and designed, that fish are able to pass upstream through them, that spawning is successful, and that juvenile growth is occurring. Benefits of the ladders in enhancing fish production are only beginning to be realized because the ladders have only been operational for a few years and river herring spawning does not begin until three to six years from birth.

A total of 733 acres of additional habitat have been made available by the installed ladders. In addition to producing substantial numbers of additional adult river herring that will return to the Estuary, the newly accessible impoundments will also produce substantial additional forage for the predator species in the Estuary. The estimated range of potential juvenile production is 736,665 to 4,194,959 fish; it is likely that actual juvenile production will be near the higher end of the estimated range. Bioenergetics studies using the delayed consumption estimate method found that between 5,882 and 33,498 kg of striped bass and weakfish would be produced as a result of these predators' consumption of this increase in juvenile herring production (Salem's 1999 Application, Appendix G, Attachment G-5).

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

EPA believes restoration science continues to progress.

Comment ID 316bEFR.338.026

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoring Wetlands is not an Experiment; The Science is Sufficiently Well-Developed

There is overwhelming support form the scientific community and regulatory agencies for habitat restoration programs. PSEG is supplementing its prior submission <FN 27> in this section to include additional peer-reviewed literature demonstrating the value of wetlands to fisheries.

PSEG's Wetlands Restoration Program was Based on Recognized Scientific Principles

Degraded wetlands can be successfully restored where conditions favoring restoration exist, an appropriate design properly addressing ecological considerations is implemented, and the program is monitored and managed to ensure the restoration becomes self-sustaining (Weinstein et al. 1997, Weinstein et al. 2000). PSEG has previously summarized the literature on wetlands restoration, described marsh restoration projects that offered methodological precedents, and demonstrated the effectiveness of restoration techniques (Salem's 1999 Application, Appendix G).

Recent projects that incorporate one or more of the wetland restoration principles in their design and Implementation include:

- Drakes Island Marsh (Maine) and Mill Brook Marsh (New Hampshire). These sites are formerly diked marshes with tidal flow recently restored. At Mill Brook, where full tidal exchange was effectively restored, healthy marsh structure and processes returned rapidly. At Drake's Island, tidal flow was not fully restored, and the vegetation recovery has lagged (Burdick et al. 1977).

- Tidal Wetlands, Vero Beach, FL. An impounded wetland was reconnected to the estuary. The system has matured and the restoration is considered a success, with tidal exchange supporting use of the restored area by fish, crustaceans, reptiles, and mammals, including the endangered manatee (Beeman 1992 and 1999, personal communication).

- Barn Island, Stonington, CT. Tidal flow was restored to a series of impoundments where salt marsh vegetation had been replaced by Phragmites and non-salt tolerant plants. Following restoration of full tidal exchange, establishment of desirable salt marsh grasses, and recolonization and use of the area by fish, birds, and invertebrates typical of healthy tidal marshes was rapid (Rozsa 1998; Brawley et al. 1998).

- Long Island Sound Marshes, Southern Connecticut. Restoration of tidal exchange to flow-restricted marshes resulted in a pattern of vegetation dieback (as salinity levels increased and accreted marsh plain re-established equilibrium with tide levels) and ongoing recovery of typical salt marsh mix of plants, tidal flats and open water (Rozsa 1998).

- Hammock River Marshes, Clinton, CT. Drained and dried marshes were restored to tidal flow by water management techniques,' resulting in rapid and cost-effective recovery of a typical mix of salt marsh vegetation and mud flats, including a healthy and stable upland edge of appropriately diverse shrubs and grasses (Rozsa 1997).

It is clear from the high level of activity in the wetlands restoration field and the increasing body of knowledge regarding techniques and monitoring data that wetlands restoration is a valuable and effective tool for coastal environmental management.

PSEG is successfully restoring five sites in New Jersey and two sites in Delaware using these demonstrated wetland restoration principles. These sites include three previously diked salt hay farms, located in Commercial, Dennis, and Maurice River Townships in New Jersey. The remainder of the sites are those that, prior to restoration, were dominated by the common reed, Phragmites australis ("Phragmites").

At the salt hay farms, normal daily tidal flow has been restored through a program of channel enhancement and excavation and dike breaching. Restoration construction was completed in accordance with the schedules approved in the Management Plans in October 1996 at the Dennis Township site, March 1998 at the Maurice River Township ("MRT") site, and November 1997 at the Commercial Township site. Two of the five sites have been deemed completely restored, based on their having met the NJDEP's success criteria. In 2001, the Dennis Salt Hay Farm site met both the vegetative and hydrologic criteria. In 2002, the Maurice River Township site met these success criteria. Section VI.B.4 below provides additional information on the status of PSEG's wetlands restoration sites.

The Phragmites-dominated sites are being restored by reducing monocultural stands of Phragmites, thereby minimizing the undesirable ecological conditions associated with Phragmites and fostering the growth of Spartina spp. and other desirable marsh species. In particular, the program employs a multi-phased approach that included baseline field data collection, initial Phragmites control through application of an herbicide (Rodeo (c) with a surfactant), additional field data collection, and supplemental Phragmites control using additional herbicide application and/or alternate technologies investigated as part of PSEG's test area program. Restoration activities were completed in accordance with the schedules in the approved Management Plans in September 1999 at the New Jersey Phragmites-dominated wetland restoration sites and in June 2000 at the Delaware sites.

Footnotes

27 See Attachment A for a listing of information PSEG has provided to EPA in the context of the 5 316(b) Rulemaking.

EPA Response

EPA believes restoration science continues to progress.

Comment ID 316bEFR.338.027

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

PSEG's Wetlands Program Has Achieved its Predicted Results and the Benefits are Accruing to the Estuary

PSEG has performed the most comprehensive analysis of the faunal response to salt marsh restoration ever conducted (Salem's 1999 Application, Appendix G, Attachment G-3). The analysis includes extensive information on many aspects of the fauna (fishes, crabs, and invertebrates). For the fishes, it includes a variety of life history stages and incorporates information on habitat use, food, growth, and movements of fishes at several trophic levels. As summarized in PSEG's Biological Monitoring Program 2001 Annual Report (PSEG 2002), PSEG continues to collect and analyze data on fish utilization of the restored wetland restoration sites. Focusing on the restoration sites where restoration activities were first completed, data from the three restored salt hay farms demonstrates that:

- species richness, species composition, and abundance of marsh fauna at restored salt hay farms are equivalent to that of reference marsh or on a trajectory approaching them;

- habitat for reproduction, feeding and growth are equivalent for restored salt hay farm and reference marsh; and

- movements, feeding that occurs in marsh habitats and subsequent seasonal movements provide mechanisms for transferring energy ingested from restored marshes to the bay and ocean.

In the space of only a few years, the former diked salt hay farm sites are producing benefits for fish production that are equal to or even greater than those provided by nearby natural Spartina wetlands used as reference sites (Able et al. 2000, Able et al. 2001, Able et al. In review, Smith et al. 2000). The studies show that the restored marshes are being used by the same fish, and in the same numbers, as the reference marshes, and are providing food to RIS species, including weakfish caught in the open Estuary (Able et al. 2000). Comprehensive monitoring data document extensive use of the marsh plain and rivulets by small fishes and use of larger tributaries by predator fish. The evidence dramatically refutes the claims of the critics and skeptics of the restoration program, who chimed that it was unproven and experimental and could never succeed. The evidence fully vindicates the expectations of PSEG in proposing and the NJDEP in adopting the wetlands restoration program.

At the Phragmites sites, the larger tidal creeks supported functioning fish assemblages prior to restoration and, because of the early stage of restoration, would not be expected to show a dramatic response to restoration in the near term. Notwithstanding, data indicate that the abundance of fish in small marsh creeks generally remained steady or increased as the restoration of these sites progressed. Data regarding abundance of resident fish species, which use the marsh plain indicate increased abundance of mummichog in Spartina habitats (Able and Hagan 2000, Able and Hagan 2003, Able et al. In press). As further discussed below, as restoration of the Phragmites-dominated sites progresses, Phragmites is replaced by Spartina and other desirable species, and the habitat reverts to more natural conditions, fishes will be able to use the sites more effectively for feeding, reproduction and nursery

(Grothues and Able In press, Weinstein and Balletto 1999).

PSE&G undertook several comprehensive studies to determine whether, in fact, restored marsh successfully augments the aquatic food web, and provides habitat for reproduction, feeding, growth and refuge for numerous species of fish and other estuarine fauna (Salem's 1999 Application, Appendix G-3). These studies were focused on the restored salt hay farms because they are further along in the restoration process. PSEG's studies showed that by 1998, the seasonal occurrence, abundance, and size of blue crabs in the restored marshes were similar to or greater than that of the reference marsh (Able l et al. 2000, Able et al. 2001, Jivoff and Able In review, Miller and Able 2002, Tupper and Able 2000). Studies at the Dennis and Commercial Township sites found that the abundance of several fish species, including Atlantic croaker, bay anchovy, spot, striped bass, weakfish, and white perch in large marsh creeks was greater than or equivalent to abundance at the reference site (Able et al. 2000, Able et al. 2001, Miller and Able 2002, Tupper and Able 2000). Detailed analysis of the food habits of young mummichog, bay anchovy, spot, weakfish and white perch, and of adult striped bass and white perch, indicate that individuals in the restored and reference marshes eat equivalent food in equivalent amounts (Nemerson and Able In press, Teo and Able 2003). These studies found that fish were using the restored marshes for habitat for reproduction, feeding and growth on the same basis as the reference marshes. Indices of fish survival showed similar function between restored and reference marshes.

EPA Response

EPA believes restoration science continues to progress.

Comment ID 316bEFR.338.028

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

EPA Is Wisely Considering Incorporating Certain Requirements That Would Ensure The Success Of Restoration Programs To Be Implemented Under 316(b)

USEPA is considering requiring the following practices during the development of restoration, projects (68 Fed. Reg. 13542, col. 1):

- documentation of sources and magnitude of uncertainty in expected restoration project performance;

- creation and implementation of an adaptive management plan; and

- use of an independent peer review to evaluate restoration proposals.

PSEG supports the UWAG comments on incorporation of these practices and agrees that all three factors (uncertainty analysis, adaptive management, and peer review) may be useful for designing, assessing and managing restoration projects. PSEG also recommends that the USEPA issuance guidance for Directors and permit writers to use during their review of proposals by cooling water users to implement restoration measures. Attachment B to these comments includes some suggestions for the type of guidance recommended by PSEG.

Uncertainty in expected restoration performance can be addressed by requiring the inclusion of safety margins within the restoration plans submitted by operators of cooling water intakes. The appropriate margin of safety for particular conservation measures should be determined by the Director on a site-specific basis. The margin of safety appropriate for a particular restoration measure should depend on the circumstances under which they are proposed. Factors such as those listed below should be considered in determining the appropriate margin of safety to be applied: the degree of uncertainty concerning the adverse impact of CWIS operations (e.g., whether or not the aquatic populations demonstrate long-term trends of increasing abundance); the scientific understanding of the ecological benefits of the proposed conservation measures; the ability to monitor and quantify the ecological benefits of the proposed conservation measures; and the intended lifetime duration of CWIS. The required consultation with appropriate Federal, State and Tribal fish and wildlife management agencies proposed to be required under 125.94(d) of USEPA's Preferred Approach would afford regulatory agencies sufficient input to ensure that an appropriate margin of safety is defined.

As indicated in PSEG's prior submission to the Agency, adaptive management provisions also help to ,reduce the uncertainty of restoration activities. PSEG concurs with USEPA's recommendation that restoration planners further reduce uncertainty by creating habitat that replicates as closely as possible the natural habitats in which the aquatic organisms of interest naturally occur (67 Fed. Reg. 17148, col.2,§ VI). Given the level of complexity in the ecology of tidal wetlands and other types of potential restoration projects, and the inability to completely understand the details of the functioning of these systems; adaptive management is an appropriate framework under which a successful large-scale environmental restoration can be conducted. This is exactly what PSEG did in designing and implementing its Estuary Enhancement Program (Weinstein, et al. 2000). The "adaptive management" process has been followed to monitor, guide, and respond to the temporal process of restoration for habitat restoration sites (Salem's 1999 Application, Attachment G-2).

While PSEG agrees that these practices should be incorporated during the development of restoration proposals, it is important that each be tailored to the individual project. Therefore, the Final Rule should not require that these factors be applied whenever a restoration project is proposed, but should allow the Director to apply them as necessary to ensure a successful project.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management, peer review, and uncertainty analysis is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.338.029

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

EPA'S PREFERRED APPROACH FOR DETERMINING COMPLIANCE WITH 316(b) AT EACH FACILITY IS REASONABLE IF CERTAIN KEY COMPONENTS ARE APPROPRIATELY RESOLVED IN THE FINAL RULE

Although the Proposed Rule and NODA provide considerable information regarding EPA's Preferred Approach, key details on how compliance with all requirements of 316(b) would be determined are absent from the Proposed Rule and NODA. PSEG believes that the reasonableness and workability of EPA's Preferred Approach depends on how questions regarding these details are resolved in the Final Rule. This section of PSEG's comments identifies and provides suggestions on several key details that must be addressed in the Final Rule. Specifically, this section addresses details of the metrics that would be used to measure reductions in entrainment and impingement mortality, and details of the tests of compliance with performance options.

Background

In the Proposed Rule, EPA put forward a number of regulatory approaches it had considered for implementing 316(b). The Agency's Preferred Approach is described below.

Alternatives for Establishing BTA

The Preferred Approach provides three demonstration alternatives for establishing BTA at each facility (125.94(a)):

- Demonstration that the existing design and construction technologies, operational measures, and/or restoration measures meet performance standards;

- Demonstration that selected design and construction technologies, operational measures, and/or restoration measures will, in combination with existing design and construction technologies, operational measures, and/or restoration measures, meet performance standards;

- Demonstration that a site-specific determination of BTA is appropriate.

Performance Standards

The following are central to demonstrations of BTA alternatives (1) and (2): the definitions of the performance standards, the metrics that would be used to measure compliance with performance standards, and the tests of compliance with performance standards. These topics are discussed in the following sections.

Performance Standard Definitions

Four different performance standards are defined in the Preferred Approach (5 125.94(b)), and each facility that selects BTA demonstration alternative (1) or (2) would be required to comply with one of the four performance standards. The determination of which of the four performance standards would depend on the facility's cooling system characteristics and on the source water body. The four performance standards are:

- intake capacity commensurate with the use of a closed-cycle, recirculating cooling system; or

- reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline if the facility.

-- has a capacity utilization rate less than 15 percent, or

-- has a design intake flow 5 percent or less of the mean annual flow from a freshwater river or stream; or

- reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline, and reduction of entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline if the facility

-- has a capacity utilization rate of 15 percent or greater, and withdraws cooling water from a tidal river or estuary, from an ocean, from one of the Great Lakes, or

-- has a design intake flow greater than 5 percent of the mean annual flow of a freshwater river or stream; or

- reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline if the facility withdraws cooling water from a lake (other than a Great Lake) or reservoir <FN 28>

The calculation baseline in performance standards (2), (3) and (4) is defined in the Preferred Approach (125.93) as:

an estimate of impingement mortality and entrainment that would occur at your site assuming you had a shoreline cooling water intake structure with an intake capacity commensurate with a once-through cooling water system and with no impingement and/or entrainment reduction controls."

In the NODA, EPA proposed a modification to this definition that provided additional detail (68 Fed. Reg. 13581):

an estimate of impingement mortality and entrainment that would occur at your site assuming (1) the cooling water system has been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard 3/8 inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source water body; and (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment."

Metrics for Measuring Reductions in Impingement Mortality and Entrainment

In the NODA, EPA indicated that it was evaluating several methods for determining percent reduction in impingement mortality and entrainment (68 Fed. Reg. 13582):

- consideration of all fish and shellfish species that have the potential to be impinged or entrained; or

- consideration of fish and shellfish from only a subset of species determined to be representative of all the species that have the potential to be impinged or entrained, and

-- applying the percent reduction requirements to all the representative species as a group, or

-- applying the percent reduction requirements to each and every species on the representative species list.

For each of the methods for determining percent reduction, EPA is considering two methods for measuring the species impinged or entrained (68 Fed. Reg. 13582):

- by counting the total number of individual organisms, or

- by weighing the total wet or dry biomass of organisms.

Footnotes

28 This performance standard also includes the requirement that if the facility proposes to increase its design intake flow, the increased flow must not disrupt the natural thermal stratification or turnover pattern (where present) of the source water, except in cases where the disruption is determined by any Federal, State or Tribal fish or wildlife management agency(ies) to be beneficial to the management of fisheries.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.338.030

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

Tests for Compliance with Performance Standards

The Proposed Rule and the NODA do not provide definitive statements of EPA's proposed approach for testing compliance with performance standards. Based on PSEG's review of the Proposed Rule and NODA, it appears that the best indication of EPA's proposed approach for compliance testing is provided in EPA's discussion of the Comprehensive Demonstration Study that must be submitted by all facilities (except those deemed to have met performance standard (l), above). The Comprehensive Demonstration Study would include information:

"to confirm that the technology(ies), operational measures, and/or restoration measures you have selected and/or implemented at your cooling water intake structure meet the applicable requirements of 125.94."

For facilities that select BTA demonstration alternative (1) (i. e., a demonstration that the existing design and construction technologies, operational measures, and/or restoration measures meet performance standards), the test of compliance apparently would be based on a comparison of current impingement mortality and entrainment to the Calculation Baseline impingement mortality and entrainment. The Comprehensive Demonstration Study would include an Impingement Mortality and Entrainment Characterization Study, the purpose of which would be (§125.95(b) (3)):

“to provide information to support the development of a calculation baseline for evaluating ,impingement mortality and entrainment and to characterize current impingement mortality and entrainment.”

The Impingement Mortality and Entrainment Characterization Study would include (125.95 (3) (iii)) :

“Documentation of the current impingement mortality and entrainment of all life stages of fish and shellfish at your facility and an estimate of impingement mortality and entrainment under the calculation baseline.”

For facilities that select BTA demonstration alternative (2) (I.e., a demonstration that the selected design and construction technologies, operational measures, and/or restoration measures will, in combination with existing design and construction technologies, operational measures, and/or restoration measures, meet performance standards), the test of compliance apparently would be based on a comparison of the Calculation Baseline impingement mortality and entrainment to impingement mortality and entrainment that would occur after the selected technologies and/or measures are implemented. The Comprehensive Demonstration Study would include a Design and Construction Technology Plan, which would provide (125.95(b) (4) (iii)):

“Calculations of the reduction in impingement mortality and entrainment of all life stages of fish and shellfish that would be achieved by the technologies and operational measures you have selected based on the Impingement Mortality and Entrainment Characterization Study.. .”

The Comprehensive Demonstration Study would also include a Verification Monitoring -Plan, which would be (125.95(b) (7)):

“a plan to conduct, at a minimum, two years of monitoring to verify he full-scale performance of the proposed or implemented technologies, operational measures, or restoration measures. The verification study must begin once the technologies, operational measures, and restoration measures are implemented and continue for a period of time that is sufficient to demonstrate that the facility is reducing the level of impingement and entrainment to the levels documented pursuant to paragraphs (b)(4)(iii), (b)(5)(ii), and/or (b)(6)(iii)(B) of this section.”

Some additional detail regarding EPA’s approach for testing compliance with performance standards was provided in the NODA. In its discussion of metrics of reductions in impingement mortality and entrainment (68 Fed. Reg. 13582), EPA provided the following suggested language that it might add at 0 125.95(b)(5):

“Compliance with impingement mortality and entrainment performance standards in paragraphs (b)(1) through (4) above must be determined based on a comparison of the enumeration of all fish and shellfish impinged and killed and entrained with those estimated to be impinged and killed and entrained at the calculation baseline.”

This suggested language provided the needed clarification that EPA intended “impingement mortality” to mean “the number of organisms impinged and killed”, rather than “the proportion of impinged organisms that are killed by impingement.” PSEG interprets EPA’s use of the phase “enumeration of all fish and shellfish” to indicate that the metric of interest is numbers of organisms, and assumes that EPA did not use the phase “enumeration of all fish and shellfish” to imply that a census (Le., a counting of each and every individual organism) of all organisms was needed. Clearly, estimates of impingement mortality and entrainment should be based on samples, not on a census which would be wholly unworkable.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 7.02
Performance standards

Facilities With a Low Capacity Utilization Should be Allowed to Meet the 15 Percent Criteria Through Administrative Controls

As described above, EPA proposes various performance standards against which compliance would be determined. Proposed performance standard 2 would provide that facilities having a capacity utilization rate of less than 15% would only be required to meet the entrainment reduction standards. EPA stated that the determination of whether or not a facility is meeting the 15% capacity utilization rate would be based on the facilities performance over the previous five years.

PSEG fully supports the concept of establishing an “impingement only” performance standard for facilities with a capacity utilization rate of less than 15%. PSEG, however, believes that the ability to demonstrate compliance using this performance standard should not be limited to facilities, which qualify based on historic capacity levels. PSEG proposes that EPA also allow facilities to commit to maintaining a capacity utilization rate of less than 15% in the future. This could be accomplished through administrative controls in the Special Conditions in the NPDES permit. This would achieve the same goal EPA intended to accomplish with the second performance standard while allowing facilities that have a low potential for adversely impacting the environment to avoid the additional costs of unnecessary compliance, reduce the potential for their shutdown and avoid unnecessary risks to electric supply.

EPA Response

Today's rule adopts less stringent criteria (impingement mortality only) for facilities having a capacity utilization rate of less that 15% (see § 125.94(a)(1)).

EPA believes the definition of a peaking facility as presented in the final Phase II rule is sufficient to identify those facilities that operate at an overall reduced capacity, thereby making them subject to less stringent compliance requirements as a typical base load facility (see § 125.93). To address commenter concerns, EPA has modified the capacity utilization definition to include the following language: “For the purposes of this regulation, the capacity utilization rate applies only to that portion of the facility which generates electricity for distribution and sale using a thermal cycle employing the steam water system as the thermodynamic medium.”

Peaking facilities are typically older, less efficient generating units. Because the cost of operation is higher, peaking facilities are generally employed when generating demand is greatest and economic conditions justify their use. Such usage is typically a fraction of the unit’s overall generating capacity and represents a significant reduction in the percentage of cooling water used when compared to the design intake capacity. This dramatically reduced flow would appear to obviate the need for entrainment controls for the facility.

Most peaking facilities are employed during the highest electrical demand period, typically mid-winter or mid-summer. It is generally accepted that while these seasons can sometimes be associated with a higher abundance of aquatic organisms or spawning events, mid-winter and mid-summer are not typically considered to be critical periods for aquatic communities. Given these operating conditions, entrainment controls would appear to be an unnecessary cost for these facilities.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

Comments on Metrics for Measuring Reductions in Impingement Mortality and Entrainment

In the NODA, EPA requested comments on alternative metrics that might be used in tests of compliance with performance standards. As noted above, EPA indicated it was considering numbers of organisms, biomass of organisms, all species of fish and shellfish, and a subset of species of fish and shellfish. PSEG believes that the Final Rule should provide for flexibility in the choice of metrics that takes into account site-specific considerations. Flexibility would be particularly important if a facility has implemented or plans to implement restoration measures.

In some cases, the number of organisms from a subset of species (expressed in terms of numbers at a particular age) might be the most appropriate metric. For example, if a facility has implemented, or plans to implement, the rearing of fish to be released when they reach one year of age, the number of equivalent age-1 fish would be an appropriate metric. This metric would allow for direct comparisons of entrainment and impingement losses to fish production from the restoration measure. A similar situation might arise if fish ladders were installed (as a restoration measure) with the intention of producing annual out-migrations of age-1 fish.

In other cases, the biomass of all fish and shellfish by trophic level might be the most appropriate metric. For example, if a facility has implemented, or plans to implement, restoration of wetlands, the biomass of all species of fish and shellfish, by trophic level would be an appropriate metric. This metric would facilitate comparisons of entrainment and impingement losses at the facility to production of fish and shellfish by the restoration measures. This metric would take into account the benefits of restoration measures to the fish and shellfish communities of a source water body, even if the restoration measures were not intended to offset losses numerically nor to offset losses on a species-by-species basis. This community-level approach is consistent with sections of the Preferred Approach that address the use of restoration measures (125.94(d)):

“You must demonstrate to the Director that you are maintaining the fish and shellfish within the water body, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies of operational measures to meet that portion of the requirements of paragraphs (b) or (c) of this section that you are meeting through restoration.”

For the reasons discussed above, PSEG recommends that EPA allow site-specific choices of metrics to be used in tests of compliance with performance standards. In particular, EPA should ensure that biomass of all species of fish and shellfish be allowed as the metric in cases where wetland restoration measures are used to satisfy performance standards.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

Comments on Tests for Compliance with Performance Standards

As noted above, EPA has not provided documentation, in the Proposed Rule or the NODA, of its proposed approach for testing a facility's compliance with applicable performance standards. The discussion EPA has provided in the Proposed Rule and NODA suggest that its compliance tests, in general, will calculate reductions using impingement mortality and entrainment estimates for the Calculation Baseline as the starting point. However, the following critical aspects of compliance testing have not been adequately addressed in the Proposed Rule or NODA:

- What types of estimates are to be compared to the Calculation Baseline estimates (e.g., empirical loss estimates or model-based predictions)?

- How are the Calculation Baseline estimates to be computed (e.g., empirical loss estimates from a period when the facility operated under Calculation Baseline conditions or model-based predictions)?

- How will the comparison to Calculation Baseline estimates be performed (e.g., will different test procedures be used for each BTA alternative, and if so, what will they be)?

In the following section, PSEG summarizes compliance tests that it believes would be consistent with EPA's intent, based on the limited documentation provided in the Proposed Rule and NODA, and therefore appear to be EPA's proposed approach. In the Final Rule, EPA should provide descriptions (that are at least as detailed as the summaries listed below) of the types of compliance tests that permitting agencies can consider for use with each BTA demonstration alternative.

EPA's Apparent Approach to Compliance Testing

For the purpose of providing comments in response to the NODA, PSEG assumes (based on language, as noted above, in the Proposed Rule and NODA) that EPA envisions the compliance tests described below.

For facilities that select BTA demonstration alternative (1) (i. e., a demonstration that the existing design and construction technologies, operational measures, and/or restoration measures meet performance standards), the test would consist of:

1 A comparison of:

- an empirical estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) killed by impingement under current conditions, to

- an estimate of the average annual number (or weight) of all species (or a subset of species) killed by impingement under the Calculation Baseline condition -- this estimate would be based on the empirical estimate of impingement mortality for current conditions and estimates of the effectiveness for reducing or offsetting numbers killed by impingement of the implemented technologies and/or measures; and (if required by the applicable performance standard for the facility)

2 A comparison of:

- an empirical estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) entrained under current conditions, to

- an estimate of the average annual number (or weight) of all species (or a subset of species) entrained under the Calculation Baseline condition -- this estimate would be based on the empirical estimate of entrainment for current conditions and estimates of the effectiveness, for reducing or offsetting numbers entrained, of the implemented technologies and/or measures.

Although it might be desirable to compare the empirical estimates of impingement and entrainment losses under current conditions to empirical estimates of losses under the Calculation Baseline condition, data collected under the Calculation Baseline condition may not exist. Furthermore, it would be completely unreasonable to require a facility to implement Calculation Baseline technologies and/or measures for the purpose of compliance testing. Therefore, it seems the compliance test in this case would have to be based on estimates of effectiveness of the implemented technologies and/or measures, rather than empirical estimates of losses with and without the implemented technologies and/or measures.

For facilities that select BTA demonstration alternative (2) (i. e. , a demonstration that the selected design and construction technologies, operational measures, and/or restoration measures will, in combination with existing design and construction technologies, operational measures, and/or restoration measures, meet performance standards), the test would be conducted in two steps. The first step would document the basis for the planned technologies and/or measures and consist of:

1 A comparison of:

- an estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) killed by impingement under the Calculation Baseline condition -- this estimate would be based on an empirical estimate of impingement mortality for current conditions and estimates of the effectiveness, for reducing or offsetting numbers killed by impingement, of any already implemented technologies and/or measures, to

- an estimate of the average annual number (or weight) of all species (or a subset of species) that would be killed by impingement after implementation of the selected technologies and/or measures -- this estimate would be based on an empirical estimate of impingement mortality for current conditions and estimates of the effectiveness, for reducing numbers killed by impingement, of the selected technologies and/or measures; and (if required by the applicable performance standard for the facility)

2 A comparison of:

- an estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) entrained under the Calculation Baseline condition -- this estimate would be based on an empirical estimate of entrainment for current conditions and estimates of the effectiveness, for reducing or offsetting numbers entrained, of any already implemented technologies and/or measures, to

- an estimate of the average annual number (or weight) of all species (or a subset of species) that would be entrained after implementation of the selected technologies and/or measures -- this estimate would be based on an empirical estimate of impingement mortality for current conditions and estimates of the effectiveness for reducing numbers killed by impingement of the selected technologies and/or measures.

The second step would be an empirical verification that the expected effectiveness of the implemented technologies and/or measures was realized, and would consist of

1 A comparison of:

- an estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) killed by impingement under the Calculation Baseline condition -- this estimate would be based on an empirical estimate of impingement mortality for current conditions and estimates of the effectiveness, for reducing or offsetting numbers killed by impingement, of any already implemented technologies and/or measures, to

- an empirical estimate of the average annual number (or weight) of all species (or a subset of species) that would be, killed by impingement after implementation of the selected technologies and/or measures -- this estimate would be based on monitoring of impingement mortality after the selected technologies and/or measures were implemented; and (if required by the applicable performance standard for the facility)

2 A comparison of:

- an estimate of the average annual number (or weight) of all species of fish and shellfish (or a subset of species) entrained under the Calculation Baseline condition -- this estimate would be based on an empirical estimate of entrainment for current conditions and estimates of the effectiveness, for reducing or offsetting numbers entrained, of any already implemented technologies and/or measures, to

- an empirical estimate of the average annual number (or weight) of all species (or a subset of species) that would be entrained after implementation of the selected technologies and/or measures -- this estimate would be based on monitoring of entrainment after the selected technologies and/or measures were implemented.

Like the compliance test for BTA demonstration alternative (l), the first step of the compliance test for BTA demonstration alternative (2) would be based on empirical estimates of impingement mortality and entrainment under current conditions and on estimates of the effectiveness for reducing impingement mortality and entrainment of already implemented technologies and/or measures. In addition, the first step of this compliance test would require estimates of the expected effectiveness of the technologies and/or .measures selected for implementation.

The second step of the compliance test for BTA demonstration alternative (2) would be based on two sets of empirical estimates of impingement mortality and entrainment. The first set of empirical loss estimates would be based on data collected under current conditions (the same data that would be used to compute the Calculation Baseline estimates). The second set of empirical loss estimates would be based on data collected after the selected technologies and/or measures are implemented.

The use of empirical loss estimates based on data collected during two different time periods (i. e . , before and after implementation of the selected technologies and or measures), rather than empirical loss estimates from a single time period (ie., current conditions) combined with independent estimates of effectiveness of technologies and/or measures, can lead to invalid test results. Potential problems with the second step of the apparent compliance test for BTA demonstration alternative (2) are discussed in the following section.

Potential Problems Due to Naturally-Occurring Inter-Annual Variability

Naturally-occurring inter-annual variability in the abundance of organisms vulnerable to impingement and entrainment at a facility can be great enough to mask the effects of technologies and/or measures that reduce impingement and entrainment. Naturally-occurring inter-annual variability can be due to changes in population abundance of vulnerable fish and shellfish, or due to changes in spatial distribution patterns.

PSEG conducted analyses of its entrainment and impingement loss data from Salem to examine the effects of naturally-occurring inter-annual variability in entrainment and impingement with respect to BTA demonstration alternative (2). The results of this analysis indicate that the second step of the compliance test for BTA alternative (2) is scientifically invalid. The data that were analyzed and the results of the analysis are summarized below. In addition, an algebraic description/derivation of the potential problem is presented in Attachment C. Section IV.D.4 below presents scientifically valid proposals for addressing these concerns.

Data and Analysis Methods

Entrainment and impingement loss data from 1978 through 1998 for the nine finfish RIS (i.e., alewife, American shad, Atlantic croaker, bay anchovy, blueback herring, spot, striped bass, weakfish, and white perch) <FN 29> were examined for this analysis. All entrainment and impingement loss estimates were normalized to represent losses that would have occurred if the intake flow in each yeas- had been a constant amount (referred to in Salem's 1999 Application as the Basecase Scenario). Data on the forage species (i. e., alewife, bay anchovy, and blueback herring) were analyzed separately from data on the predator species (i.e., American shad, Atlantic croaker, spot, striped bass, weakfish, and white perch). Estimates of the annual entrainment losses (i.e., number entrained and killed, summed over all life stages) are summarized in Figures IV-1 and IV-2. [see hard copy for figures] Estimates of annual impingement losses (i.e., number impinged and killed, summed over all life stages) are summarized in Figures IV-3 and IV-4. [see hard copy for figures] As indicated by these figures, substantial inter-annual variability was present in entrainment and impingement losses. In addition, the data show a general trend of increasing entrainment losses for the predator species, and general trend of decreasing entrainment losses for the forage species.<FN 30>

The data were used in a simulation to determine the probability of passing the compliance test given a known percentage reduction in impingement or entrainment losses. The test was to determine whether the observed average annual losses from the , monitoring period after implementation of (hypothetical) control technologies and or measures was at least 80% lower than the observed average annual losses from the monitoring period before implementation. Five durations for the before and after monitoring periods were simulated:

- 1 year of monitoring before and 1 year of monitoring after implementation

- 2 years of monitoring before and 2 years of monitoring after implementation

- 3 years of monitoring before and 3 years of monitoring after implementation

- 4 years of monitoring before and 4 years of monitoring after implementation

- 5 years of monitoring before and 5 years of monitoring after implementation.

For the simulation, the loss estimates for the “after” implementation period were computed as the Basecase scenario loss estimates (described above) reduced by a known percentage, and the loss estimates for the “before” implementation period were the Basecase scenario loss estimates left unchanged. Three levels of percentage reduction were simulated: 80% reduction, 40% reduction, and no reduction.

Given the five different durations of monitoring periods, and the three different levels of known reductions in entrainment and impingement losses, the analysis included fifteen different scenarios. For each of the fifteen scenarios, ten separate simulations were run, with a different year (1985 through 1994) of the (hypothetical) implementation selected for each simulation. After running all ten simulations, the number of simulations in which the test criterion (Le., at least an 80% reduction in observed losses) was satisfied was recorded. The probability of passing the compliance test was computed as the number of simulations in which the test criterion was satisfied divided by the total number of simulations (Le. , ten).

Results and Conclusions

Results of the analysis indicate that for impingement losses of predator species, even with ten years of monitoring data (five before and five after), there would only be a 60% chance of passing the compliance test (for 80% reduction in impingement losses) when in fact an 80% reduction had been achieved (Figure IV-5). [see hard copy for figure] For forage species, and with ten years of monitoring data (five before and five after), there would be a 60% chance of passing the compliance test (for 80% reduction in impingement losses) when only a 40% reduction had been achieved (Figure IV-6). [see hard copy for figure]

For entrainment, the analysis results indicate severe problems as well. For forage species, and with ten years of monitoring (five before and five after), .there would be a 10% chance of passing the compliance test (for 80% reduction in entrainment losses) when no reduction had been achieved (Figure IV-7). [see hard copy for figure] For predator species, with 10 years of monitoring data (five before and five after), there would only be a 20% chance of passing the compliance test (for 80%

reduction in entrainment losses) when in fact an 80% reduction had been achieved (Figure IV-8). [see hard copy for figure]

In general, the presence of inter-annual variability in the abundance of organisms vulnerable to entrainment and impingement caused the compliance tests to perform very badly -- failing to pass reductions that actually satisfied the performance standard, and erroneously passing reductions that did not satisfy the performance standard. In addition, trends in abundance apparently introduced biases. Forage species (which exhibited a general downward trend) tended to pass the compliance test even when the actual reductions in losses were below the performance standard. Predator species (which exhibited a general upward trend) tended to fail the compliance test even when the actual reductions in losses satisfied the performance standard.

The results from this analysis, based on entrainment and impingement loss data from Salem provide a vivid, albeit limited, illustration of the types and magnitude of problems that likely will occur if EPA relies on a compliance test for BTA demonstration alternative (2) that is based on empirical impingement mortality and entrainment data from two separate time periods (i.e., before and after implementation of control technologies and/or measures). Attachment C contains an algebraic derivation that describes the problem in general. The following section contains recommendations for alternative compliance tests that are not affected by inter-annual variability in abundance.

Footnotes

29 The RIS for the Salem were identified and agreed upon by the Technical Advisory Group ("TAG) USEPA Region I1 established in the late 1970's to oversee the development and implementation of the biological monitoring and data analyses for Salem's initial ' 316(b) Demonstration. The RIS included forage, migratory and commercially and recreationally important species, consistent with USEPA's 1977 draft 316(b) Guidance.

30 Appendix J and Appendix H of the 1999 Salem Permit Renewal Application documented significant increases in abundance of age-0 weakfish, striped bass, Atlantic croaker, ,+merican shad, alewife, white perch; decreases in abundance of spot and blueback herring, and no consistent trend in abundance of bay anchovy in Delaware estuary from the 1980s through the 1990s.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013.

For EPA's position on accounting for the natural variability of fish populations, please see EPA's response to comment 316bEFR.034.017.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Determination of compliance

Approaches to Address Potential Problems Due to Naturally-Occurring Inter-Annual Variability

PSEG has performed preliminary evaluations of three alternative approaches (which are not intended to be an exhaustive set of alternatives) for testing compliance with performance standards:

- Ratio of Ratios,

- Ratio of Mortality Rates, and

- Weighted Average Flow Reductions.

Each of the approaches could be appropriate for determining compliance, depending on the technologies and/or measures used to satisfy the performance standards. A summary of the compliance test approaches that would be appropriate for several types of technologies and operational measures is presented in Tables IV-1 and IV-2. [see hard copy for tables] An algebraic description/derivation of each approach is provided in Attachment C.

Ratio of Ratios

The Ratio of Ratios approach uses a covariate (ie., an observable quantity that is proportional to the abundance of organisms in the withdrawal zone of the facility) to account for inter-annual variability in abundance of organisms vulnerable to impingement and entrainment at a facility. Rather than simply comparing an estimate of average annual losses before implementation to an estimate of average annual losses after implementation of the technologies and/or measures, this approach is based on the comparison (before vs. after) of standardized estimates of losses.

This standardization is accomplished by dividing each year-specific estimate of annual losses by a corresponding year-specific estimate of relative abundance in the water withdrawal zone of the facility. This approach could be used to estimate reductions in entrainment due to technologies such as physical barriers, behavioral deterrents, and collection/return systems (e.g., fine mesh on traveling screens). This approach could also be used to estimate reductions in impingement mortality due to those technologies.

Ratio of Mortality Rates

The Ratio of Mortality Rates approach would be appropriate for estimating reductions in impingement mortality (i. e., impinged and killed) due to collection/return systems. In this approach, it is assumed that the reduction in impingement mortality is due entirely to a reduction in the proportion of impinged organisms that die from impingement. Therefore, the estimate of reduction in impingement mortality is based on the ratio of impingement mortality rates (rather than the ratio of numbers or weight of organisms impinged and killed). Application of this approach would require data from special studies of impingement mortality rates performed after the technologies were implemented.

Since the comparison would be to Calculation Baseline conditions, which assume 100% impingement mortality rates, data collection prior to implementation of the technologies would not be needed if the technology used 3/8" mesh screen (i. e., the same screen as the Calculation Baseline). However, if the screen of the control technology was finer than the Calculation Baseline screen, then sampling of screens with both mesh sizes would be needed to determine whether small fish not impinged on the 3/8" mesh would be impinged on the finer mesh. This situation is addressed in the Section IV.D.4, below.

Weighted Average Flow Reduction

The Weighted Average Flow Reduction approach would be appropriate for estimating reductions in entrainment due to operational measures like seasonal flow reductions. This approach is based on EPA's assumption that entrainment (all other things being equal) is proportional to intake flow (67 Fed. Reg. 17141):

"EPA believes that, absent entrainment control technologies, entrainment at a particular site is proportional to intake flow at that site."

The Weighted Average Flow Reduction approach would begin with a delineation of the percentage reduction in flow that occurred in each week of a calendar year. Next, the proportion of the average annual entrainment losses that occurred in each week would be estimated. Then a weighted average of the percentage flow reductions would be computed using the proportion of the average annual entrainment loss in each week as the weighting factors. The resulting value is an estimate of the annual percentage reduction in entrainment due to the flow reductions.

Applicability of Alternate Approaches

The Ratio of Ratios approach (which requires before and after data) would be appropriate in the second step of a compliance test, for BTA demonstration alternative (2). The Ratio of Mortality Rates approach and the Weighted Average Flow Reduction approach would be appropriate for compliance tests for BTA demonstration alternative (1) or BTA demonstration alternative (2). None of the three alternative approaches has the severe problem of potential biases present in the approach based solely on comparing losses from before and after implementation of technology and/or measures.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA’s response to comment 316bEFR.017.003. For EPA’s explanation of EPA’s monitoring requirements, please refer to EPA’s response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

For EPA's position on accounting for the natural variability of fish populations, please see EPA's responses to comments 316bEFR.034.017 and 316bEFR.335.012.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Determination of compliance

Approaches to Address Technologies That Substitute Impingement for Entrainment

As noted in the previous section, some control technologies under consideration by EPA (e.g. , fine mesh screen) could have the effect of reducing entrainment while increasing impingement. In situations like this, a separate approach for determining compliance with performance standards may be needed. EPA anticipated this issue (i.e., the application of fine mesh screens could increase overall impingement mortality by increasing the number of small, delicate organisms impinged) in its preamble to the Proposed Rule (67 Fed. Reg. 17142):

“EPA notes that screening to prevent organism entrainment may cause impingement of those organisms instead. Questions regarding impingement survival of relatively delicate fish, larvae, and eggs would need to be considered by the Director and the facility in evaluating the efficacy of the technology.”

PSEG offers the following approach for determining compliance with performance standards when technologies that would substitute impingement for entrainment (or visa versa) are being evaluated.

The first step of the approach would be to determine which length classes and taxonomic groups would be entrained under the Calculation Baseline scenario, but would be impinged if the control technology were implemented.

The second step of the approach would be to estimate both the impingement survival rate (i. e., the proportion of impinged organisms that survive being impinged) and the entrainment survival rate (i. e., the proportion of entrained organisms that survive being entrained) of organisms that would be entrained under the Calculation Baseline scenario, but would be impinged if the control technology were implemented. This assessment of survival rates would be conducted by length class and taxonomic group.

PSEG notes (but does not agree with) EPA’s position on the validity of estimates of entrainment survival rates. However, the extent of entrainment survival, in comparison to the extent of impingement survival, is the critical factor that must be addressed in any scientifically valid and ecologically relevant assessment of the efficacy of a technology that substitutes impingement for entrainment. Furthermore, estimating impingement survival rates of organisms small enough to be entrained under the Calculation Baseline scenario poses many of the same difficulties as estimating entrainment survival rates of those organisms. Therefore, any approach for addressing the substitution of impingement for entrainment that relies solely on estimates of impingement survival rates (for organisms that would be entrained under the Calculation Baseline scenario) would be faced with the same types of difficulties (with estimating survival rates) as this suggested approach. Historically, larval impingement survival studies have been conducted in laboratories. Additional impingement survival studies of early life stages could reasonably address impingement survival of organisms that were entrained prior to implementation of control technologies.

The third step would be to estimate the annual number (or weight) of organism in each length class and taxonomic group that would be entrained under the Calculation Baseline scenario, but would be impinged if the control technology were implemented.

The fourth step would be to estimate the total (summed over all length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, but impinged if the control technology were implemented) annual number (or weight) of organisms that would be killed under the following four conditions:

- by entrainment under the Calculation Baseline scenario,

- by impingement under the Calculation Baseline scenario,

- by entrainment if the control technology were implemented, and

- by impingement if the control technology were implemented.

The fifth step would be to compare the combined total (summed over all length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, but impinged if the control technology were implemented) number (or weight) killed by entrainment and impingement under the Calculation Baseline scenario to the combined total (summed over all length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, but impinged if the control technology were implemented) number (or weight) killed by entrainment and impingement if the control technology were implemented.

For the purposes of testing compliance with the entrainment performance standard, the difference between:

- the combined -- entrainment and impingement -- total (summed over all length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, but impinged if the control technology were implemented) number (or weight) killed under the Calculation Baseline, and

- the combined -- entrainment and impingement -- total (summed over all length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, but impinged if the control technology were implemented) number (or weight) killed if the control technology were implemented

would be used as the estimate of the reduction in entrainment due to the control technology. If the combined -- entrainment and impingement -- total number killed under the Calculation Baseline is less than the combined -- entrainment and impingement -- total number killed if the control technology were implemented, then the control technology should be dropped from consideration as a means for reducing adverse effects of entrainment.

Any changes in entrainment survival of length classes and taxonomic groups that would be entrained under the Calculation Baseline scenario, and would also be entrained if the control technology were implemented, would also be considered when addressing the entrainment performance standards. Any improvements (due to implementation of the control technology) in impingement survival rates of length classes and taxonomic groups that would be impinged under the Calculation Baseline scenario, and would also be impinged if the control technology were implemented, would be used towards satisfying the impingement performance standards.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02

Benefit Estimation Methodology

The Methodologies That EPA Applied To Estimate National Benefits In This Noda Are Substantially Improved Over Those Applied In Developing The Draft Regulation; However, The Nonuse Benefit Methods Discussed In The Noda Cannot Reasonably Be Applied To Site-Specific Benefit Assessments

EPA in the NODA provides updated methodologies for estimating the national benefits of the Proposed Rule in response to comments received on its initial April 2002 proposal (67 Fed. Reg. 17121). In particular, EPA made the following changes:

- developed various region-specific models to estimate recreational fishing benefits;

- refined the commercial fishery analysis; and

- developed a revised benefit transfer approach to estimate nonuse benefits and also indicated additional benefit transfer approaches it might undertake in the future, including a meta-analysis.

As EPA notes, these revisions are in response to numerous discussions with industry and environmental groups to respond to questions on the cost-benefit analysis contained in the proposal as well as the written comments EPA received on the valuation approaches (68 Fed. Reg. 13523). The first two changes-those for recreational and commercial fishing benefits-represent modifications of the basic approaches outlined in the Proposed Rule and reflect comments received from economists and others. In contrast, the nonuse benefits approaches in the NODA represent new studies that EPA acknowledges may be "problematic." (68 Fed. Reg. 13568).

Evaluating the soundness of the methodologies for estimating benefits in the NODA is important for several reasons. For one thing, the methods selected by EPA for this analysis will affect the shape of the requirements promulgated in the Final Rule. In addition, although the methods used in the rulemaking do not constitute formal guidance to permitting agencies, the methods used by EPA to evaluate the benefits and costs of the Final Rule are bound to be given considerable deference by state authorities in evaluating cost-benefit studies relating to individual CWIS sites. This will be the case especially if the Agency does not issue guidance on how states and EPA regional offices should implement the Final Rule in a timely manner. Thus, the economic methodologies that EPA selects for inclusion in its Final Rule analysis have the potential to shape major expenditures at electricity generating facilities across the United States.

EPA's changes for recreational and commercial benefit methodologies are substantial improvements over the methods in the Proposed Rule, but the methodologies discussed for nonuse benefits are not sound. Thus, EPA's skepticism over the validity of the nonuser methodologies it has presented in the NODA is well-founded, at least as currently developed. A meta-analysis could be appropriate to estimate nonuser benefits if the appropriate underlying studies were available. PSEG is relying on and incorporates by references comments on the changes in recreational and commercial benefit methodologies prepared on behalf of UWAG and EPRI (See Desvouges et al. 2003 and Strand 2003), PSEG's comments focus on the methodologies described in the NODA for estimating nonuse benefits.

In summary, with respect to the implementation of benefit-cost analysis in individual 316(b) proceedings, although specific values for recreational and commercial benefits will, of course, need to be developed, the general approaches outlined in the NODA could reasonably be applied to site-specific assessments. However, in the case of nonuse benefits, the NODA does not provide methods that can reasonably be applied to site-specific benefit-cost-analyses.

EPA Response

The comment states that: “EPA's changes for recreational and commercial benefit methodologies are substantial improvements over the methods in the Proposed Rule, but the methodologies discussed for nonuse benefits are not sound.”

The commenter correctly states that benefits analysis for the final rule is not formal guidance for site-specific decisions under this rule. It is important to note that benefits analysis at the national scale versus site-specific scale will differ as a consequence of the degree of environmental and social variability; variability and uncertainty has a significant effect on feasible methodological decisions for benefits analysis. As stated in the proposed rule analysis and in the NODA the Agency explored various alternatives to quantifying and monetizing non-use benefits. However, given the unavoidable uncertainties in estimating non-use benefits for this rule, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis. The Agency has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN #6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

EPA has responded to concerns regarding the Agency’s non-use valuation methods in responses to a number of comments. For EPA’s benefit transfer approach, please see EPA’s response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA’s meta-analysis please see EPA’s responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA’s meta-analysis. For EPA’s response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA in the NODA Presents a Specific Benefit Transfer Approach for Nonuse Benefits and Also Indicates Other Benefit-Transfer Methods That Might be Developed, Including a Meta-Analysis

For the Proposed Rule, EPA used a “50 percent rule-of-thumb” to estimate nonuse benefits; this approach estimates nonuse benefits to be 50 percent of use benefits. In response to comments critical of this approach, EPA discusses two alternative methods for estimating nonuse benefits in the NODA. The first method is a benefit transfer approach that relies primarily on a single study concerning valuation of wetlands and eelgrass to develop values for fish and shellfish populations (hereafter, the “Single Study Approach”). The second method would rely on the available evidence concerning nonuse benefits from various studies to infer nonuse values for fish and shellfish populations in 316(b) case studies; this method might include the use of a meta-analysis, another benefit transfer approach (hereafter, the “Meta Analysis Approach”). In the NODA, specific values are developed only for the first method, the Single Study Approach.

In the NODA, EPA does not define a specific approach for estimating nonuse benefits, but rather presents the Single Study Approach and the Meta Analysis Approach-as well as a more general approach that would use existing studies in some other way-and asks for comments. Indeed, as noted, EPA expresses skepticism about both the Single Study Approach and the Meta Analysis Approach. With regard to the Single Study Approach, the NODA states:

“EPA recognizes that benefits transfer of stated preference-based WTP [willingness-to-pay] estimates to a policy context that differs from the study context can be problematic, given the significant influence of context of stated-preference values. EPA is still considering whether the underlying studies in the current analysis are close enough to the policy context to warrant benefits transfer and requests comment on this issue.” (68 Fed. Reg. 13568)

With regard to the Meta Analysis Approach (as well as other uses of multiple studies), EPA notes:

“One key challenge of both of the approaches discussed in this section [general use of studies and meta-analysis] is to determine the applicability of study results to the policy case of interest (i.e., fish impacts due to impingement and entrainment in this rule) because of significant variations in study objectives and methodologies ... EPA seeks comments on appropriateness of the meta-analysis approach for calculating nonuse values for aquatic habitat improvements associated with reduced impingement and entrainment in this rule.” (68 Fed. Reg. 13576)

This section evaluates the economic methodologies for valuing nonuse benefits that are discussed by EPA in the NODA, focusing on whether EPA’s skepticisms about the validity of the Single Study Approach and the Meta Analysis Approach are justified. , The criteria for these judgments are based primarily upon recent guidelines for regulatory analyses developed by USEPA (2000), the Office of Management and Budget’s (“OMB”) current regulatory guidelines (OMB 2000), and proposed revisions to the OMB guidelines (OMB 2003).

As noted, EPA develops estimates using the Single Study Approach. These nonuse benefit estimates are very large in relation to both the nonuse estimates developed by EPA in the Proposed Rule and to the use values associated with reductions in impingement and entrainment. If application of the same methodology in individual 316(b) proceedings were to produce proportionally large benefits estimates, the results of the benefit-cost analysis would likely be very different and conclusions about the appropriate degree of investment in modifications to CWIS would change. Consequently, these new methodologies merit close scrutiny as to whether they comport with accepted and established economic practices as well as EPA and OMB guidance.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

As stated in the Notice of Data Availability (68 FR 13580), EPA is not using the rule-of-thumb approach in the cost benefit analysis for the final Section 316(b) Phase II rule.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Valuing Forage Species (incl non-use and non-landed)

EPA’s Guidelines Outline a Clear Methodology for Performing a Valid Benefit Transfer Study

EPA’s Guidelines (USEPA 2000, or “Guidelines”) provide a comprehensive set of recommendations for developing benefit-cost analysis studies for environmental regulations, including explicit discussions of the methods that should be followed to develop valid benefit transfer studies. EPA notes in the Guidelines that benefit transfer is an appropriate valuation methodology.

“The advantages to benefit transfer are clear. Original studies are time consuming and expensive; benefit transfer can reduce both the time and financial resources needed to develop benefit estimates” (EPA 2000, p. 86).

EPA (2000), however, provides guidelines for implementing the benefit transfer methodology.<FN 31> This section describes the steps called for in EPA’s Guidelines.

Describing the Policy Case and Affected Population

EPA’s Guidelines indicate that the benefit transfer approach should begin with an identification and description of the policy case and the affected population <FN 32>:

The first step in a benefit transfer is to describe the policy case so that its characteristics and consequences are understood. It is equally important to describe the population impacted by the proposed policy. As part of this step, it is important to determine whether effects of the policy will be felt by the general population or by specific subsets of individuals (e.g., users of a particular recreation site or children) (EPA 2000, p. 86). This initial step is critical in defining the nature of the benefits involved in the policy, and thus the types of studies that would be relevant for potential transfer.

Selecting studies

The next step involves selecting studies to form the basis of the benefit transfer exercise. This process involves two subparts.

- Identify existing, relevant studies. Existing, relevant studies are identified by conducting a literature search. This literature search should, ideally, include searches of published literature, reviews of survey articles, examination of databases, and consultation with researchers to identify government publications, unpublished research, works in progress, and other “gray” literature.

- Review available studies for quality and applicability. The analyst should review and assess the studies identified in the literature review for their quality and applicability to the policy case. The quality of the study case estimates will, in part, determine the quality of the benefit transfer.

Indicators of quality will generally depend on the method used. (EPA 2000, p. 86)

The EPA Guidelines further note that, "assessing studies for applicability involves determining whether available studies are comparable to the policy case." USEPA, pp. 86-87). They offer three criteria to be used in assessing which studies are applicable for use in the benefit transfer:

- the basic commodities must be essentially equivalent;

- the baseline and extent of the change should be similar; and

- the affected populations should be similar (EPA 2000, p. 86-87).

This step is critical to ensure that the results from the studies used in the transfer are relevant to the policy being considered. As noted above, EPA expresses skepticism regarding the applicability of the studies it uses in the NODA.

Transferring the benefit estimates

After the analyst has identified .appropriate studies, the values from those studies must be transferred to the policy case. The EPA Guidelines discuss four approaches that can be used for doing this (EPA 2000, p. 87):

- Point estimate. This approach involves taking the mean value (or range of values) from the study case and applying it directly to the policy case. As it is rare that a policy case and study case will be identical, this approach is not generally recommended. Rather than directly using existing values, analysts will often adjust point estimates based on judged differences between the study and policy cases.

- Benefit function. This approach is more refined but also more complex. If the study case provides a willingness-to-pay ("WTP") function, valuation estimates can be updated by substituting applicable values of key variables, such as value estimates across studies. As with the benefit function transfer approach, key variables from the policy case are inserted into the resulting benefit function.

- Meta-analytic approach. Meta-analysis is a statistical method of combining a number of valuation estimates that allows the analyst to explore systematically variations in value estimates across studies.

- Bayesian approach. This is an alternative to the meta-analytic approach. The Bayesian approach provides a systematic way of incorporating case study information with policy case information.

It is important to note that all benefit transfer approaches are not equally valid. In particular, the EPA Guidelines indicate that using results from a single study is not "generally recommended" because it is rare that a single study would provide results relevant for the wide range of policy cases.

Addressing uncertainty

Finally, the analyst should address the sources of uncertainty involved in application of the selected studies and the chosen transfer methodology.

"Benefit transfer involves judgments and assumptions. Throughout the analysis, the researcher should clearly describe all judgments and assumptions and their potential impact on final estimates, as well as any other sources of uncertainty inherent in the analysis" (EPA 200, p. 87).

This step is important in order to provide a sense of perspective about the likely accuracy of the result of the benefit transfer.

Footnotes

31 OMB (2003) provides similar guidance with respect to steps to be followed in implementing the benefits transfer method.

32 “Policy case” refers to the specific policy being evaluated-in this case, the 3 3 16(b) Proposed Rule or a specific 316(b) case study. The “affected population” is defined as the portion of the population that would be affected by the proposed policy.

EPA Response

The commenter summarizes methodology for performing a benefits transfer study based on EPA’s Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003) (September 2000). No specific comment on EPA’s 316(b) cost benefit analysis is offered. Thus, no response is necessary.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.04.01

Peconic-based approach

The Single Study Benefit Transfer Approach for Valuing Nonuse Benefits Discussed in the NODA Is Not an Appropriate Application of the Benefit Transfer Approach

This subsection evaluates the Single Study Approach, the approach that relies primarily upon a single study that estimates the value that nonuse places on changes in wetlands and eelgrass. This subsection first provides an overview of the specific calculations involved in the Single Study Approach. As noted above, EPA does not recommend this approach in the NODA and, indeed, mentions that there are reasons to doubt its applicability to 316(b) fish protection situations. As discussed below, EPA's skepticism about the validity of this study is valid. -It is not an appropriate benefit-transfer technique for valuing 316(b) benefits; this conclusion does not depend upon the validity of the underlying study, e.g., Opaluch et a1.1998.

The Single Study Approach Includes A Detailed Set Of Calculations Based Upon A Single Study Of Nonuse Benefits For Wetlands/Eelgrass Preservation To Infer Nonuse Benefits For Fish Protection

The NODA describes a revised technique that EPA has developed for valuing the nonuse benefits of fish lost due to impingement and entrainment. As EPA notes, its ,analysis conducted in support of the Proposed Rule (67 Fed. Reg. 17121) relied on a "50 percent rule of thumb" to estimate nonuse benefits. However, that methodology was considered "outdated," and the NODA provides a revised analysis that relies on a different benefits transfer technique (68 Fed. Reg. 13568).

EPA instead now relies on a stated preference study of households' WTP for preservation/restoration of eelgrass and wetlands, which provide habitat for fish and shellfish species. EPA's justification for using WTP for eelgrass/wetlands is the following:

"Because one of the results of aquatic habitat preservation/restoration is increased production of fish and shellfish, it may be appropriate to use valuation of habitat restoration as a proxy for the value of the fish and shellfish lost due to impingement and entrainment" (68 Fed. Reg. 13568). [emphasis supplied]

EPA's benefits transfer methodology follows a four-step approach in estimating the nonuse benefits provided by fish lost due to impingement and entrainment:

-estimate number of acres of habitat needed to produce fish and shellfish equivalent to those lost due to impingement and entrainment;

-develop nonuse WTP values for the "fish production services" provided per acre of habitat;

-determine the relevant geographic area over which individuals will have a nonuse value, and estimate the affected population's total WTP per acre of
habitat; and

- multiply the number of acres of habitat needed to offset impingement and entrainment losses (from step 1) by the total WTP values per acre of habitat (from steps 2 and 3).

EPA then provides an illustrative calculation for two power plants in the North Atlantic, region, the Brayton Point and Pilgrim Stations. Each of these steps is described in detail below.

Estimate habitat needed to replace fish losses due to impingement and entrainment

EPA's first step in developing estimates of nonuse benefits was to determine the amount of eelgrass and wetlands needed to replace the fish and shellfish lost due to impingement and entrainment at each of these stations. These estimates are based on abundance data for eelgrass and wetlands habitats, which were estimated by counting species in sub-sampling areas of each habitat (1 00 square meters) and scaling the values to generate a per acre estimate of abundance.

To develop the estimates, EPA determined the species that would require the maximum amount of acreage to replace impingement and entrainment losses. EPA bases its "lower bound" estimate for wetlands on the estimated wetlands acreage it estimated was necessary to replace winter flounder lost due to impingement and entrainment at Brayton Point and its equivalent "upper bound" estimate on winter flounder at Pilgrim.<FN 33> The lower bound estimate for eelgrass restoration is based on the acreage needed for northern pipefish at Pilgrim and the upper bound estimate is based on the acreage EPA estimated was necessary to replace the amount of scup lost due to impingement and entrainment at Brayton Point (68 Fed. Reg. 13568). The values are reported in Table V-1.

EPA notes that the estimates presented in Table V-1 [see hard copy for table] for winter flounder may be problematic as they "significantly overstate" the acreage needed for other species. That is, using other species to develop estimates of necessary acreage would have generated significantly lower estimates. EPA requests comment on this point and all aspects of these calculations.

Develop WTP values for habitat

To estimate WTP values for fish and shellfish habitat in the North Atlantic region, EPA relied on a 1995 study conducted for the Peconic Estuary on the eastern end of Long Island that examined stated preference for eelgrass and wetlands (Opaluch et al. 1998). At the time the survey was conducted, the Peconic Estuary was experiencing high levels of "brown tide" (ie., brown algae) that reduced the area's annual scallop harvest from 500,000 pounds a year to just over 50 pounds a year between 1982 and 1996 (Environmental News Network 2001). This heightened attention concerning the marine resources in the Peconic Estuary led to the study used by EPA (Opaluch, et al. 1998). The implications of this context are discussed later in this section.

EPA justifies its use of the study by noting that the eelgrass and wetlands in the Peconic Estuary support species found throughout the North Atlantic that are likely to be affected by impingement and entrainment: "The Peconic Estuary study thus provides values for eelgrass and wetlands that may be representative of habitat needed to produce many of the species affected by impingement and entrainment at power plants" (68 Fed. Reg. 13569). As a result, EPA assumes that individuals' valuations of eelgrass and wetlands habitat are transferable to valuations of fish and shellfish species.

The Peconic study relied on a contingent choice survey technique to provide individuals' WTP values for of wetlands and eelgrass (Opaluch et al. 1998).<FN 34> In order to develop specific estimates of the nonuse value of the habitat, EPA re-estimated the values in the Peconic study, separating out the values for users and nonusers. For the re-estimation procedure, EPA defined users as only those individuals who harvest fish or shellfish, treating the remainder of the population as nonusers. Table V-2 [see hard copy for table] provides the WTP values for users and nonusers that EPA estimated from the Peconic study.

EPA interprets the results to suggest that for wetlands, 94.4 percent of the total value for users is due to nonuse value, while 77.7 percent of user value is due to nonuse value for eelgrass. As the table shows, EPA reports that nonuser households have a WTP value of $0.054 per acre per year for wetlands and value of $0.052 per acre per year for eelgrass. EPA notes that the similarity of these values is surprising, considering that the survey specifically identified eelgrass as fish and shellfish habitat:

"It is difficult to determine ex post why the values for eelgrass and wetlands are similar for nonusers. However, the fact that nonusers assigned similar values to both types of habitat may indicate that they did not significantly differentiate the two habitat types on dimensions affecting valuation or, alternatively, they differentiated among habitat types, but assigned similar values. Since [eelgrass] was explicitly identified as fish and shellfish habitat and wetlands was not, this may mean that fish and shellfish services were not a significant attribute affecting respondents' valuation, or, alternatively that they were aware that wetlands also provide habitat for fish and shellfish based on knowledge external to the survey" (68 Fed. Reg. 13569).

Despite this skepticism, EPA fails to consider the implications of this finding any further in the NODA. EPA's omission is discussed further below.

As EPA notes, wetlands provide direct uses (e.g., birdwatching) other than fishing and shellfishing. In order to separate out nonuse values related to fish and shellfish, EPA relies on a different study from Narragansett Bay, Rhode Island that uses a survey technique to estimate the percentage of the value due to various wetland services (Johnston et al. 2002). Johnston et al. estimated that fish and shellfish habitat each account for approximately one-fourth (25.64 percent and 27.78 percent, respectively) of the total value individuals placed on wetland habitats in the Narragansett Bay study. EPA applied these values to the WTP estimates for wetlands provided in Table V-2 to separate out the nonuse (i.e., serving as shellfish and fish habitat) value. Table V-3 presents the results of these EPA calculations. [see hard copy for table]

In the NODA, EPA indicates that it is not aware of use benefits from eelgrass other than fishing and shellfishing. In addition, EPA notes that the survey in the Peconic study specifically identified the eelgrass as fish and shellfish habitat. Thus, EPA assumes that all of the value that respondents placed on eelgrass (shown in Table V-2) is due to nonuse value.

Determine appropriate geographic area and affected population's total WTP per acre of habitat

Tables V-2 and V-3 in the section above give estimates of the households' WTP per acre of eelgrass and wetland restoration/preservation in the Peconic Estuary. In order to develop estimates of the total benefits of eelgrass or submerged aquatic vegetation ("SAV") restoration/preservation, it is necessary to determine which households are willing to pay to restore or preserve these habitats (Le., which households have positive WTP values). These households are generally called the “affected population.” The Peconic Estuary study surveyed households in towns bordering the Estuary. This, EPA states, is consistent with EPA’s general approach to defining the affected population, which EPA defines as households in the counties that abut the relevant water body.

EPA also uses the Narragansett Bay study (Johnston et al. 2002) study to develop information about the size of the affected population. EPA determined that the surveys from Johnston et al. (2002) showed that respondents from throughout Rhode Island placed at least some value on salt marsh restoration. EPA took this result-which applied to salt marsh restoration at a specific site in Rhode Island-and assumed that it was applicable to nonuse value for eelgrass and wetlands throughout the North Atlantic. Based on this assumption, EPA calculated the average distance from Narragansett Bay (the site of the restoration) to the edge of Rhode Island (32.43 miles), and assumed that households within this radius should be included as part of the affected population.

EPA cites another study (Pate and Loomis 1997) that seeks to estimate the relationship between distance and WTP for preservation of natural resources. The study estimated individuals’ WTP values for natural resources in the San Joaquin Valley, comparing values of Valley residents to those of non-Valley California residents and residents of Washington State, Oregon, and Nevada. The Pate and Loomis (1997) study found that California residents had WTP values that were 97.7 percent of Valley residents’ values, while Oregon residents had WTP values that were 27 percent of Valley residents’ values.

EPA assumes that this study is applicable to nonuse values for fish protection in the North Atlantic and combines the findings from the Johnston et al. (2002) study with the findings from the Pate and Loomis (1997) study and the WTP values presented above in Tables V-2 and V-3 to estimate the affected population’s total WTP per acre of restore habitat. EPA calculates the total WTP using three separate metrics:

- including only the households in the abutting counties (210,357) with full WTP values;

- including all households within a 32.4 mile radius (737,711) with full WTP values for those in abutting counties and 97.7 percent of WTP-values for the remainder; and

- including all households within a 32.4 mile radius (737,711) with full WTP values for those in abutting counties and 27 percent of WTP values for the remainder.<FN 35>

The results of these calculations for wetlands and eelgrass are presented in Tables V-4 and V-5. [see hard copy for tables]

As the tables show, EPA estimates of total WTP per acre of eelgrass habitat range from $10,993 when metric (1) is used to $37,863 when metric (2) is used. The values EPA estimated for wetlands are substantially lower-approximately $3,000 under metric (1) and approximately $10,000 under metric (2). (In the wetlands case, the values vary for fish and shellfish for reasons described in section two above.

Step 4: Multiply the estimate of habitat needed to replace fish losses by the WTP values per acre of habitat

Based on the calculations explained above, EPA develops estimates of the total nonuse values of restoring the required amount of SAV and wetlands. EPA multiplied the estimates of the necessary acreage (developed in section one above) by the affected population's total nonuse value per acre (developed in section three above) to estimate the total nonuse value. These estimates are presented in Tables V-6 and V-7. [see hard copy for tables]

As these tables show, EPA's estimates for total fish restoration from eelgrass range from just under $1.7 million to over $22 million. EPA's estimates for fish restoration from wetlands range from slightly under $74 million to over $212 million.

Footnotes

33 These estimates are based on EPA's estimates of impingement and entrainment losses at these facilities, divided by the number of species produced per acre of habitat.

34 The contingent choice methodology gives survey respondents various policy/cost combinations from which to choose, including, in this case, a "no action" option.

35 Number of households is based on average number of households within the noted distance of "affected water bodies" (68 Fed. Reg. 13572).

EPA Response

The comment states that the single study approach is not an appropriate benefit transfer technique for 316(b) analysis. For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Peconic-based approach

The Single Study Used In The Single Study Approach Does Not Meet EPA's Criteria For Benefit Transfer

As noted above, the EPA 'Guidelines set out three essential criteria that must be met before studies can be determined to be applicable for use in the benefit transfer:

- the basic commodities must be essentially equivalent;

- the baseline and extent of the change should be similar; and

- the affected populations should be similar.

The study EPA used in its Single Study Approach for the NODA does not meet any of the three basic criteria laid out in the Guidelines.

The basic commodity in the single study is not "essentially equivalent" to the commodity in 316(b) cases

The first criterion set out in the Guidelines for appropriate benefits transfer indicates that the commodity in the policy case (i.e., the fish lost due to impingement and entrainment) must be "essentially equivalent" to the commodity in the study case (ie., the eelgrass and wetlands). As noted, the NODA recognizes the importance of this basic requirement:

"EPA recognizes that benefits transfer of stated preference-based WTP estimates to a policy context that differs from the study context can be problematic, given the significant influence of context on stated-value preferences. EPA is still considering whether the underlying studies in the current analysis are close enough to the policy case to warrant benefits transfer and requests comment on this issue" (68 Fed. Reg. 13568).

OMB's recently released draft guidelines (2003) provide further support for this criterion:

The good, and the magnitude of change in that good, should be similar in the study and policy contexts.

Notwithstanding EPA's recognition of this criteria, the NODA's study case fails to meet this criterion for at least two reasons:

- neither wetlands nor eelgrass habitat are "essentially equivalent" or "similar" to fish and shellfish; and

- the fish and shellfish populations in the Peconic Estuary at the time of the Opaluch (1998) study were a challenged resource, unlike most, if not all, of the fish populations affected by impingement and entrainment.

Each of these points is discussed in detail below.

Neither wetlands nor eelgrass habitat are “essentially equivalent” to fish and shellfish

As discussed above, the Opaluch et al. (1998) study estimates households’ willingness to pay for habitat restoration, including the willingness to pay of nonusers. EPA uses the nonuse results from the habitat restoration study to estimate willingness to pay for fish or shellfish preservation. EPA provides a brief justification for this application:

“Because one of the results of aquatic habitat preservation/restoration is increased production of fish and shellfish, it may be appropriate to use valuation of habitat restoration as a proxy for the value of the fish and shellfish lost due to impingement and entrainment.” (68 Fed. Reg. 13568) [emphasis added]

EPA provides no evidence or further discussion of this point, but goes on to solicit comment about the appropriateness of this transfer, noting a reason why it may not be valid:

“EPA requests comment on using estimates of fish production per acre as the basis for benefits transfer, given that respondents were likely not aware of the quantitative relationship between habitat and fish production when they provided valuation information.” (68 Fed. Reg. 13569)

Indeed, EPA goes on to note that the results of the study suggest that respondents may not have been aware of this relationship:

“The fact that nonusers assigned similar values to both types of habitat . . . may mean that fish and shellfish services were not a significant attribute affecting respondents’ valuation” (68 Fed. Reg. 13569).

Although EPA’s approach is admittedly resourceful, it is clear on its face that the study case does not meet the “essentially equivalent” requirement put forth in the Guidelines or the “similarity” criterion set out in OMB (2003). Although it is plausible that respondents to the Peconic Estuary survey may have been aware that eelgrass and wetlands support fish and shellfish populations, the survey clearly was not designed to measure this relationship.<FN 36>

Absent a specific model known to the survey respondents relating fish and shellfish population to eelgrass and wetlands habitat, there is no reason to believe that the values developed by the Opaluch et al. (1998) survey and EPA’s subsequent re-estimates convey any specific quantitative information about nonuse values associated with changes in fish and shellfish populations in the Peconic Estuary. All that one can infer from these results is the general speculation that some of the nonuse value attributed to preservation of eelgrass and wetlands habitat may be related to their role in supporting fish and shellfish populations.

Fish and shellfish in the Peconic Estuary at the time of the Opaluch et al. (1998) study were a much more challenged resource than most species affected impingement and entrainment

Another reason to question the similarity of the policy and study cases is the health or status of the resource in the Peconic Estuary at the time of the Opaluch et al. study, compared to policy cases in the North Atlantic region and elsewhere in the United States. At the time of the Peconic Estuary study, the Estuary's ecosystem had suffered significant damage, from years of "brown tide" (brown algae). As the Peconic Estuary study itself points out, "much of the Estuary's eelgrass was destroyed by the brown tide [prior to the survey]'' (Opaluch et al. 1998, p. 100). Peconic Estuary fish and shellfish populations were also declining significantly in the 1980s and 1990s. For example, at the time the survey was conducted, the Peconic Estuary was experiencing levels of brown tide so high that the area's annual scallop harvest had been reduced from 500,000 pounds a year to just over 50 pounds a year between 1982 and 1996 (Environmental News Network 2001). Fish, shellfish, and their habitats in the Peconic Estuary were clearly in substantial danger in the years leading up to the survey. This is a materially different scenario than the scenario at issue in the 316(b) rulemaking. Fisheries resources at the age classes likely to be the best indicators of CWIS effects (ie., age-one recruits to the Fishery) in many affected water bodies in the North Atlantic region are, on the whole, relatively stable populations. <FN 37>

This information provides further reason to question the "essential equivalency" of the policy and study cases. This is of particular concern given the significant effect of a resource's stability on its nonuse value. Indeed, nonuse values are only likely to be significant when the resource in question is unique and/or the loss or injury is irreversible: <FN 38>

"Another important question is, when are nonuse values likely to be important? The long literature on nonuse values emphasizes the uniqueness or specialness of the resource in question and the irreversibility of the loss or injury. For example, economists have suggested that there are important nonuse values in preserving the Grand Canyon in its natural state and in preventing the global or local extinction of species and the destruction of unique ecological communities. In contrast, resources such as ordinary streams and lakes or a subpopulation of a widely dispersed wildlife species are not likely to generate significant nonuse values because of the availability of close substitutes. Moreover, the literature does not suggest that nonuse values are likely to be important where recovery from an injury is quick and complete, either through natural processes or restoration" (Freeman 1993, p. 162).

Given that the resources (i. e. wetlands and eelgrass)-and commercially important species that were known to be dependent on the resource-were in substantial danger at the time of the Peconic study (Opaluch et al. 1998), these nonuse values are likely to exceed the WTP values in cases where the resource is not danger (as in the relevant policy cases for many 316(b) determinations).

Footnotes

36 Indeed, the Opaluch et al survey itself appears designed not to measure the absolute value of WTP for habitat changes but rather the relative values of various policy changes. The authors note: "The survey may be more effective at capturing the relative importance of various policy options than placing specific values on the natural resources in question" (Opaluch et al. 1998).

37See, e.g., Barnthouse et al. (2002).

38 See AKRF, Inc. and LWB Environmental Consulting, Inc. (2003), included as Attachment D and Harrison and Haxthausen (2003), included as Attachment E.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Peconic-based approach

The baseline and the extent of the change are not similar

The second criterion in the Guidelines is that the scope of the change in the study case must be similar to the scope of change in the policy case. As discussed below, this can be particularly important when using contingent valuation ("CV") methods such as contingent choice, which was used in the Peconic study.<FN 39>

CV is widely accepted to be the only valid method of measuring nonuse benefits. As EPA notes, "Currently, contingent valuation is the only established method capable of estimating nonuse values" (EPA 2000, p. 83). However, the Guidelines indicate that there has been substantial debate surrounding the use of CV, and that is important to be particularly careful in its implementation. The Guidelines cite the NOAA (1993) study as providing "best practices" recommendations for the use of CV. The NOAA report (993, p. 4604) cites numerous concerns about the CV methodology that should be carefully avoided.

Ignoring, for the moment, the conclusion that the use of a nonuse value derived for wetlands or eelgrass is not relevant and applicable to the policy question at hand-as described above-the methodology described in the NODA fails to meet the second criterion articulated in EPA's Guidelines for use of a benefits transfer approach in at least two ways:

- EPA assumes that benefits estimates can be applied linearly, regardless of the magnitude of the change; and

- EPA ignores a commonly acknowledged problem with CV, known as "embedding."

Each of these points is discussed in detail below.

EPA applies the Peconic estimate to contexts with unknown baselines and different changes

The Peconic Estuary study asked survey respondents to choose among various policies. In the survey, the policies were explained in terms of the baseline acres of habitat and the number of acres that would be preserved/restored for various costs. The Peconic Estuary study then translated these responses into a WTP per acre per household, using a nested logic model. The value per acre per household is assumed to be linear, i.e. the same regardless of the baseline or change.

In the NODA, EPA extrapolates the results from the Peconic Estuary study to two specific example cases, related to fish losses at Pilgrim and Brayton Point.<FN 40> Table V-8 [see hard copy for table] shows the baselines and changes in the Peconic Estuary study and compares them to EPA's two example cases. As the table shows, the changes in the two EPA cases differ significantly from the changes in the Peconic Estuary study. With the exception of the Brayton Point example for eelgrass replacement, the changes in the Peconic Estuary study are not comparable to EPA's example cases.

Moreover, it would be pure chance if the Peconic Estuary study changes matched changes for other policy cases.

Contingent valuation studies must avoid common pitfalls such as embedding

One of the most significant concerns about the CV approach is the tendency for respondents to “embed” their valuations, which results in similar WTP estimates regardless of the quantity of the resource. The NOAA report cites two studies that have particularly striking results on this point:

- Kahneman (1986) found that WTP for the cleanup of all the lakes in Ontario was only slightly higher than the WTP for cleaning up just one lake.

- Desvousges (1992) found that people expressed the same WTP for measures that would prevent 2,000 migratory birds from dying in oil-filled ponds as measures that would prevent 20,000 or 200,000 birds from dying in the same way.

Results such as these are markedly inconsistent with standard assumptions about rational choice. For example, the Desvouges (1992) results suggest that individuals place a positive value on the lives of the first 2,000 migratory birds, but no value on the lives of any birds thereafter. As Desvousges (1 992) points out, this result is clearly not reasonable.

To deal with this concern, OMB’s guidelines (2000) indicate that studies should ‘‘Satisfy checks on their internal consistency”-that is, they should conform to standard assumptions about rational choice. In particular, the OMB guidelines recommend that users of such studies “apply a ‘scope’ test to show that individuals are willing to pay more for incrementally greater amounts of goods.” There is no evidence that EPA or the authors of the Peconic study have addressed this concern.

Footnotes

39 The Peconic study (Opaluch et al. 1998) that EPA relies on in its NODA analysis us a ‘‘contingent choice” method, which is a type of stated preference or contingent valuation approach to determine households’ WTP for various natural resources. Contingent choice allows respondents to make choices between actions that are explained in terms of the natural resources that would be restored or protected and the associated cost.

40 As explained above, EPA calculates acres of habitat it estimates would be required to compensate for estimated impingement and entrainment losses at Pilgrim and Brayton Point based upon calculations for various species.

EPA Response

The commenter argues that changes in Peconic Estuary case are not comparable to EPA’s case studies “with the exception of the Brayton Point example for eelgrass replacement.” The Agency agrees that changes in the attributes of resource improvements or policy will directly influence willingness-to-pay values. The Peconic study estimates marginal WTP for wetland and eelgrass restoration. Hence, as the extent of environmental improvements changes, total WTP values will change.

The commenter further argues that EPA ignores the “embedding” problem, that studies should satisfy tests of internal consistency. The Peconic study did apply a scope test. Although the scope test had mixed results, overall, based on most criteria applied, the study provided logically consistent results. Please see EPA’s reply to comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Peconic-based approach

The affected populations are not similar

The third criterion that the EPA Guidelines identify for benefits transfer specifies that the affected population in the study case should be similar to the policy case. In this case, the “affected population” should include all those individuals who have a positive nonuse value for the resource in question. In Opaluch et al. (1998), the affected population includes individuals in towns bordering the Peconic Estuary. As noted above, EPA has two definitions of the affected population-all people residing in counties abutting the affected water body and all people residing within 32.43 miles of the affected water body.

There are at least two ways in which the population in the study case differs from the policy case:

- habitat restoration was an extremely salient issue in the Peconic population at the time the study was completed; and

- local residents were in a position to suffer economically from damage to the Estuary.

Each of these points is discussed in detail below.

The population in the study case was particularly concerned about environmental issues at the time of the study

As we have discussed, when the 1995 study was performed, the Peconic Estuary was experiencing a dramatic decline in fish population and habitats as a result of “brown tide.” Residents of the Peconic area were highly sensitive to this issue, as the Opaluch et al. (1998) study notes. Indeed, the study found that 90 percent of respondents had heard of brown tide, and 97 percent of those who had heard of it were “concerned” or “very concerned” about the phenomenon. It is unlikely that minimization of impingement and entrainment losses will be as salient an issue in the other cases to which the NODA proposes to apply these values. Unlike the fish populations of the Peconic, relevant life stages of fish populations in relevant 316(b) situations are relatively sound.<FN 41>

The Local Economy in the Peconic Estuary Region is Dependent on the Environmental Health of the Estuary

In addition to general heightened concern about the environmental health of the Estuary among residents of the Peconic Estuary region, local residents also had more to ‘lose from environmental problems at the Estuary than the typical affected population. Peconic Estuary area residents expressed particular concern about the potential impact of environmental problems on the local economy. Indeed, this is one of the findings of the Peconic study itself: “Most people interviewed were very concerned about water quality, declines in fish populations over the years, and the impacts on business if water quality continues to decline” (Opaluch et al. 1998, p. 93). The Opaluch et al. study also notes the “historical significance of shellfishing to the local economy.” (p. 100)

This information suggests that fishermen were not the only residents who had something to lose from damage to local fish and shellfish habitat. Thus, a web of economic considerations probably influenced many residents as they valued their WTP for habitat restoration. There is no reason to believe that populations throughout the North Atlantic region are as economically dependent on the resource as they clearly were in the study case relied upon the NODA.

Footnotes

41 See, e.g, Barnthouse et al. (2002).

EPA Response

EPA agrees that the affected population should be similar for the study case and policy case. Please see the response to comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region.

The comment states that habitat restoration was extremely salient issue for the Peconic population at the time the survey was conducted, and that local residents were in a position to suffer economically from damage to the estuary. From these points, the comment concludes that the study population and policy population differ. However, empirical evidence suggests that habitat restoration is salient for the population residing in the vicinity of water resources affected by power plants, and that residents of the area stand to suffer economically from damage to the affected water resources. For example, the Rhode Island/Massachusetts population in the region at issue is quite similar to that of the Peconic Estuary region in terms of their reliance on and values for the estuarine resources. Numerous articles in local newspapers about the sharp declines of flounder and other fish populations in the area; the fact that a local environmental organization, Save the Bay, spends significant resources to address issues related to fish habitat restoration in the area; and the results of the Johnston, et al. study used in EPA’s analysis are just a few of the indicators of the salience and value of estuarine resources to the local population. In terms of economic dependence on the estuary, Pacheco and Tyrell (2003, The Economic Value of Narragansett Bay, Department of Environmental and Natural Resource Economics, University of Rhode Island) found that the total value added to the Rhode Island economy from resources of Narragansett Bay is $2.3 billion per year, and that consumer surplus from recreational activities is $6.7 billion per year.

The comment states that the Peconic study found that people were very concerned about water quality, declines in fish populations and impacts on business. It concludes that “there is no reason to believe that populations throughout the North Atlantic region are as economically dependent on the resource” as those in the Peconic region. As noted above, these are important issues in the Rhode Island/Massachusetts areas as well, and these populations have significant economic dependence on their marine and estuarine resources.

EPA notes that the habitat-based approach is not used in the cost-benefit analysis for the final section 316(b) rule.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Valuing Forage Species (incl non-use and non-landed)

With Regard to the Future Steps Outlined by EPA for Nonuse Analysis, a Rule-of-Thumb Approach Has No Conceptual Basis, While Meta-Analysis Has the Potential to Be a Useful Technique If Appropriate Studies Are Used

This section discusses the two additional methodological approaches that are described in the NODA, which EPA states it is also considering as a means of estimating nonuse benefits for the Final Rule (68 Fed. Reg. 13575). Both involve using multiple studies, in contrast to the Single Study Approach. The first methodology involves conducting a literature review to develop a "rule-of-thumb" relationship between use and nonuse values. The second methodology-meta-analysis-is one of the four benefit transfer methods described above. The following provides a brief outline of these two possible future steps.

Overview Of EPA's Proposed Future Steps To Evaluate Nonuse Benefits

Both of EPA's proposed future steps would rely on a review of the existing literature. EPA describes a literature review it has undertaken, in which it has identified eighteen "surface water valuation studies that meet a set of criteria for suitability and reliability" These criteria include that:

- the resource amenities valued in the study must be water bodies that provide recreational fishing;

- United States populations are surveyed in the study; and

- research methods in the study are supported by literature.

These studies are described further in Tudor et al. (2003)

Developing a "Rule of Thumb"

One approach that EPA is considering is using the available literature to estimate a general relationship between use and nonuse benefits. EPA does not provide much detail on the specific methodology it would employ, but the methodology would presumably be similar to the rule-of-thumb analysis that EPA used in the original analyses used to support the 316(b) Phase II Proposed Rule.<FN 42> EPA recognizes that the application of a rule-of-thumb methodology "requires careful accounting of factors that are likely to affect nonuse values of aquatic resources" (68 Fed. Reg. 13576). In particular, EPA notes that special attention must be paid to the following factors:

- the geographic scale of environmental improvements;

- regional or national importance of the affected resources; and

- the magnitude of environmental quality changes.

EPA notes two potential approaches within this framework on which it is seeking comment:

- a percent or fraction of use values per household; and

- specific user and nonuser populations.

Performing a meta-analysis

In the NODA, EPA states that it is also considering "regression-based meta-analysis of nonuse WTP for water resources" (68 Fed. Reg. 13576). EPA notes that:

"Economic literature characterize[s] meta analysis as a rigorous alternative to the more casual, narrative discussion of research studies which typify many attempts to summarize available information about environmental values. The primary advantage of a regression-based approach is that it may account for differences among study sites that may contribute to changes in nonuse values, to the extent permitted by available data." (68 Fed. Reg. 13576)

EPA describes an approach in which either the total value or the nonuse value of "aquatic habitat improvements" could be modeled as a function of explanatory variables that include "core economic variables" (such as the type of resource, scope of resource improvement, estimated use values, quantitative or categorical measures of environmental quality improvements, and survey respondent characteristics such as income) and "study design effects variables" (such as the year, elicitation format, and elicitation method of the survey).

EPA goes on to note that:

"One key challenge of both of the approaches discussed in this section is to determine the applicability of study results to the policy case of interest (i.e., fish impacts due to impingement and entrainment in this rule) because of significant variations in study objectives and methodologies. The use (and interpretation) of the value estimates to predict WTP in specific cases will follow the methodologies from the benefits transfer literature (e.g., Vandenberg et al. 2001; Desvousges et al., 1998)."

"EPA seeks comments on appropriateness of the meta-analysis approach for calculating nonuse values for aquatic habitat improvements associated with reduced impingement and entrainment in this rule." (68 Fed. Reg. 13 576)

The next two sub-sections discuss conceptual considerations associated with use of a meta-analytic approach, and identify specific issues with respect to the methodology EPA describes.

Footnotes

42 For a discussion of this approach, see Harrison et al.(2002).

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment 316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment 316bEFR303.020 regarding the definition of users vs. nonusers; and comment 316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

The Agency did not include "the rule of thumb" approach to estimating non-use benefits in the final 316(b) analysis.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA Guidelines Provide Clear Criteria For Selecting Literature For Benefit Transfer And Meta-Analysis In General

The EPA Guidelines (2000) provide specific guidance on the correct procedures for performing an appropriate meta-analysis. Prior to evaluating the potential methodologies EPA has described in the NODA, it is important to review the conceptual foundation provided in the Guidelines.

Meta-analysis is a form of benefit transfer and as such, should adhere to the same guidelines

EPA's Guidelines identify meta-analysis as one of four types of methods for transferring the benefits estimates obtained from earlier studies:

"Meta-analysis is a statistical method of combining a number of valuation estimates that allows the analyst to systematically explore variation in existing value estimates across studies. As with the benefit function transfer approach, key variables from the policy case are inserted into the resulting benefit function." (EPA 2000, p. 87)

Of course, as a benefit transfer method, the meta-analytic approach should adhere to the guidelines identified for such studies.

The criteria for conducting an appropriate meta-analysis are clear

As described above, EPA's Guidelines (2000) provide clear guidance for how to conduct an appropriate benefit transfer study. The critical steps are selecting appropriate studies in order to obtain the values to be used in the meta-analysis and specifying the estimated relationship appropriately.

Selecting studies

As described above, the economic analyst must first identify and describe the policy case and the affected population. Once this is complete, the next two steps involve selecting studies to form the basis of the benefit transfer exercise:

- identify existing, relevant studies, (all potentially relevant studies should be identified by a means of a literature search); and

- review available studies for quality and applicability. (The quality of the study case estimates will, in part, determine the quality of the benefit transfer. Assessing studies for applicability involves determining whether available studies are comparable to the policy case.) (EPA 2000, p. 86)

As noted above, the EPA Guidelines offer three criteria to be used in assessing which studies are applicable for use in the benefit transfer:

- the basic commodities must be essentially equivalent;

- the baseline and extent of the change should be similar; and

- the affected populations should be similar (EPA 2000, p. 86-87).

As discussed above, the selection of appropriate studies is critical to the development of any correct benefit transfer.

When performed correctly, meta-analysis can be a more accurate method of benefits transfer than the single study approach

Because it does not rely on a simple point estimate, meta-analysis can be a more reliable method of benefit transfer than other methods. EPA's Guidelines note this explicitly: "The most rigorous benefit transfer exercise uses meta-analysis" (EPA 2000, p. 87). Thus, this method has been used successfully to value benefits in other related contexts where appropriate and applicable studies are available.<FN 43>

Footnotes

43 See, e.g., Salem's 1999 Application, Appendix F and relevant attachments, which used a statistical metalanalysis of marginal value of increased catch.

EPA Response

EPA agrees that meta-analysis has considerable promise in benefits transfer and that meta-analysis can produce more reliable results than other benefit transfer methods. Meta-analysis has a long history in fields such as epidemiology and education, with typical applications to sets of studies conducted under controlled conditions with standardized experimental designs. Recently economists have increasingly explored meta-analysis techniques as a potential basis of policy analysis conducted by various government agencies charged with the stewardship of natural resources. For the final 316b rule analysis, the Agency, has explored several measures that indicate the potential magnitude of non-use values, including peer-reviewed meta-analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN #6-0003). However, EPA has not included quantitative measures of nonuse values in the final 316b rule benefit cost analysis due to unavoidable uncertainty in monetizing non-use values for this rule.

EPA has responded to concerns regarding the appropriateness of the selected studies in Agency's response to comment #316bEFR.338.046.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Valuing Forage Species (incl non-use and non-landed)

A Rule-Of-Thumb Approach Has No Conceptual Basis, While Meta-Analysis Has The Potential To Be A Useful Technique

This section evaluates the two proposals that EPA outlines in the NODA for potential future steps in estimating nonuse benefits. While there is no conceptual basis for using a rule-of-thumb approach, a meta-analysis can be a useful methodology when certain guidelines are followed.

A rule-of-thumb approach has no conceptual basis

EPA's proposed use of a nonuse rule-of-thumb is questionable for at least two reasons. First, it does not appear in EPA's Guidelines. Second, as a benefit transfer approach, it fails to meet the criteria outlined in EPA's own guidance document.

There is no basis for a rule of thumb approach in EPA's guidelines

EPA's Guidelines (2000) provide a thorough discussion of appropriate methods for valuing the effects of environmental policies. They make no mention of the rule-of- thumb for estimating nonuse values.

The rule-of-thumb approach does not conform to 'EPA guidelines for benefit transfer

This approach to estimating nonuse values would rely on a crude form of benefits transfer, in which use values would be multiplied by a rule-of-thumb to estimate nonuse values. As discussed above, EPA's Guidelines lay out specific criteria for selecting studies to be used to perform benefit transfer analysis.

The NODA lists eighteen studies that EPA is considering in using to develop a rule-of-thumb or in a meta-analysis. The appropriateness of these studies is discussed below in the context of evaluating the potential meta-analysis. As noted below, these studies do not conform to the basic criteria for benefits transfer.

EPA Response

In the cost-benefit analyses for the NODA and for the final Section 316(b) Phase II rule, EPA did not use the 50% rule-of-thumb to estimate non-use benefits.

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values due to unavoidable uncertainty in monetizing non-use values for this rule. The Agency, however, has provided several measures that indicate the potential magnitude of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Valuing Forage Species (incl non-use and non-landed)

Meta-analysis has the potential to be a useful technique but the studies used must be relevant to the policy case

As indicated by EPA's Guidelines, a meta-analytic approach to benefits transfer clearly has the potential to be a useful technique for assessing benefits. However, the studies on which it relies must be relevant to the policy case, in this case the impingement and entrainment of aquatic organisms in affected waterbodies.

The criteria identified above can be used as the basis for an evaluation and identification of potential issues with the approach EPA discusses.

Will the "commodities" be equivalent?

One issue that is apparent from EPA's description of the eighteen studies it has preliminarily selected for review is that the "commodities" valued in the selected studies are not the same as the "commodity" at stake in the policy context.<FN 44> A review of the descriptions of the studies <FN 45> in Appendices A and B of Tudor et al. (2003) reveals that many of the studies described measure general changes in water quality rather than specific reductions in the mortality of individual fish and shellfish species-which is the policy context for the 316(b) rulemaking. Indeed, EPA itself characterizes the eighteen studies identified by its literature review in the NODA as eliciting values associated with "aquatic habitat improvements.

The amenities valued in many, if not all, of the studies that EPA has selected appear to be much broader in scope and more general than the relatively specific type of environmental effects that are relevant in the context of 316(b), namely decreased mortality of specific aquatic organisms as a consequence of complying with 316(b). Table V-9 [see hard copy for table] lists the eighteen studies identified by EPA in the NODA and in Tudor et al. (2003). Of these, only three identify specific changes in the fish or shellfish population as the amenity (or part of the amenity) that the respondents are asked to value. A fourth study, Kaoru (1993) identifies increased seasonal availability of shellfish beds as a benefit to be valued. The other fourteen studies attempt to measure respondents' values for generic improvements in water quality, generic values such as "protecting fish and wildlife habitat," or preservation of specific local resources (e.g., Mud Lake in Minnesota and South Dakota). These studies do not measure specific changes in fish populations.

Will the baseline and extent of change be similar?

Another important question is whether the baseline and extent of change are similar. Of course, this question will only be relevant for those studies that are valuing the same amenity or resource-namely changes in local fish populations. Table V-10 [see hard copy for table] shows the three studies identified in Table V-9 as valuing specific changes in fish or shellfish populations. As the table shows, these studies value large changes in population rather than the incremental changes at issue in the 316(b) rule and in individual 316(b) decisions.

Will the affected population be similar?

EPA notes correctly that income and other variables describing the affected population will be relevant to its selection of the studies (68 Fed. Reg. 13576). A review of the mean household income of each of the studies presented in Appendix A of Tudor et al. (2003) suggests that at least one study (Kaoru 1993) may not be appropriate for inclusion on this basis, as the respondents' mean household annual income of more than $137,000 makes them unlike the affected population in almost any area that would be relevant to the policy case.

Footnotes

44 Note that the use of the word "commodity" in the context of non-use valuation is somewhat problematic, since by definition the good is not marketed. Nevertheless, the basic principle--that what is valued in the study context and the policy context should be fundamentally the same-is what is important here, and so we use the term "commodity" somewhat loosely.

45 NERA and PSEG are relying on these descriptions since the Agency has not made the hll studies available as part of the Record and PSEG; despite its and NERA's best efforts, could not obtain copies of all of the studies.

EPA Response

The commenter states that meta-analysis has the potential to be " a useful technique", if the underlying studies are relevant to the policy case. The commenter then identifies three major issues with the 18 studies preliminary selected for meta-analysis and discussed in the NODA. First, the commenter states that the resources examined in the 18 studies included in the NODA are not similar enough to reductions in I&E to serve as a sound basis for such a transfer. Second, the commenter argues that specific environmental quality changes valued in the studies preliminary selected for the meta-analysis are much larger than those expected from the 316b regulation. Finally, the commenter questions similarity between the affected population considered in the 18 studies and the population affected by the 316 rule. Responses to these three issues are provided below.

1. Appropriateness of the selected studies

EPA agrees that the available primary studies included in the NODA do not (in general) value fish directly. The selected studies estimate willingness-to-pay for improvements to aquatic habitat that directly benefit fish populations. The policy context, however, calls for willingness-to-pay to prevent the loss of fish directly. The two are strongly correlated, but not identical. This divergence is imposed by the available meta-data: the original studies do not (in general) value fish directly. EPA, however, disagrees that the resources examined in these studies are not similar enough to reductions in impingement and entrainment to serve as a sound basis for a benefits transfer analysis.

In selecting studies to be used for the 316(b) rule meta-analysis EPA followed criteria outlined in EPA's Guidelines for Preparing Economic Analyses (U.S. EPA, 2000). Specific criteria used in study selection are also outlined in Chapter A12 of the Regional Case Study report (see DCN #6-0003). Only surface water quality studies that mentioned habitat improvements for fish were selected. Although meta-data include studies that estimated the willingness to pay for water quality improvements, these studies indicated that these improvements would lead to an increase in the commercial and recreational fishery and other aquatic species. It is not unusual in meta-analysis that some of these studies are a better match for the policy setting than others.

Benefit transfers are by definition characterized by a difference between the context in which resource values are estimated and that in which benefit estimates are desired. The ability of meta-analysis to adjust for the influence of study, economic, and resource characteristics on willingness-to-pay can reduce or minimize potential biases stemming from divergence of the original study and policy contexts. The meta-data compiled by EPA for the 316b rule meta-analysis provides a close but not perfect match to the context in which values are desired.

Finally, commenters should note that impingement and entrainment affects a large number of aquatic organisms directly and indirectly through the food chain and thus is likely to affect a wide range of ecosystem services in the affected waterbodies. See also EPA's response to comment # 316bEFR.206.047 regarding ecosystem services affected by impingement and entrainment.

The Agency conducted an external peer review of its meta-analysis developed for the final 316 (b) rule. Four peer-reviewers (Dr. John Loomis, Dr. John Whitehead, Dr. Katherine Kling, and Dr. Frank Lupi) were asked to assess appropriateness of the selected studies used in the 316(b) rule meta analysis. The peer reviewers concluded that the meta-data was compiled using accepted practices and that EPA's thorough consideration of studies resulted in a solid foundation of meta-analysis. For detail on results of EPA's external peer review of its meta-analysis, see DCN # 6-2500.

2. Will the baseline and extent of change be similar?

The key purpose of meta-analysis is to establish an adjustable link between willingness to pay values for habitat improvements and the attributes of resource improvements, including the extent of environmental quality change. Changes in the attributes of resource improvements or policy will directly influence willingness-to-pay values. EPA's model used the extent of environmental improvements as a systematic indicator of WTP values. Hence, as the extent of environmental improvements changes, WTP values will change. The model also allows for additional effects related to such factors as region and the type of water body in question. Therefore, the model will predict changes in WTP values for different types of policies, based on the predicted link between the extent of environmental change and WTP values and the characteristics of the water body in question.

3. Will the affected population be similar?

EPA notes that the variables that account for differences in population characteristics (e.g., income) between the policy sites and the sites considered in the other studies are included in the meta-analysis. Therefore, EPA's meta-model adjustment of adjust WTP values to account for characteristics (including income) of the population affected by the 316b rule.

4. Concluding Remarks

EPA considered the results of several different approaches to quantifying non-use values for the final Phase II rule due to unavoidable uncertainties in monetizing non-use values for the ecological resources that would be protected by the final 316(b) rule. EPA responded in several ways to these uncertainties. First, as explained in the preamble to the 316(b) rule, EPA engaged in a qualitative assessment of the benefits of the environmental protections at issue. Second, EPA developed lower and upper bound estimates of non-use benefits based on the Robb and Krinsky simulation technique and conducted sensitivity analysis with respect to various parameters (e.g., the size of the affected population) used in the analysis of non-use benefits. However, given the degree of uncertainty associated with the estimated national non-use benefits of the final 316b rule, monetized estimates of non-use benefits are not included in the benefit cost analysis for this rule.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

EPA Should Only Include Nonuse Benefit Values If The Estimates Are Based Upon Sound Technical And Economic Methodologies

The EPA NODA provides an effort to develop methods that can be used to assess nonuse benefits from the proposed 316(b) rule and alternatives under consideration. As emphasized above, EPA itself expresses considerable skepticism about the validity of the specific studies. In conclusion, PSEG believes:

- benefit transfer can be a reasonable technique, but EPA's Single Study Approach is not an appropriate application;

- a rule-of-thumb approach has no conceptual basis; and

- meta-analysis has the potential to be a useful technique, but the studies used must be relevant to the policy case.

These findings suggest that the only benefit transfer methodology presented in the NODA that EPA should consider pursuing for its analysis of the Final Rule is the meta-analysis approach. However, in performing a meta-analysis, it is critical to adhere to the criteria set out in the EPA Guidelines for selecting appropriate studies. If the studies are not carefully selected, even an otherwise well-conducted meta-analysis will generate erroneous results. A review of the studies cited in the NODA reveals that none of the studies are applicable to the policy case for the purposes of a meta-analysis. Thus, a useful meta-analysis will require a new set of studies that meet the criteria outlined in the Guidelines. However, the apparent lack of studies that meet the basic criteria for meta-analysis makes the prospects of a useful meta-analysis problematic.

The potential implications of incorrect methodologies can be significant and are discussed below.

Incorrect Benefits Estimates Can Lead To A 316(B) Rule That Is Not In Society's Best Interest

Benefit-cost analyses provide a means of weighing the costs and benefits of alternative policies and thus provide guidance on policies that maximize net social benefits (Le., benefits minus costs). Inaccurate methodologies could lead to a 316(b) rule that does not maximize social welfare. (see, e.g., Harrison et al. 2000.) Overestimating compliance costs, for example, could cause regulators to implement a less stringent policy than that would maximize social welfare. Similarly, overestimating nonuse benefits could cause regulators to implement a more stringent policy than that which would maximize social welfare.

Incorrect EPA Methodologies Would Set Precedents And Lead To Inaccurate Site-Specific Benefit-Cost Analysis

The implications of inaccurate benefit assessments go beyond the 316(b) rule itself. Many of the critical 316(b) decisions will be made in the context of individual power plants. Inaccurate methodologies developed for the 316(b) rule can set precedents for these site-specific studies. The use of inaccurate nonuse benefit estimates could lead to inaccurate estimates for individual power plants, leading to individual 316(b) decisions that are not in society's interest.

EPA Response

For the final 316b rule analysis, EPA has changed its assessment of non-use values. As stated in the NODA, EPA agrees with the commenters that the 50% rule of thumb relies on outdated studies. In response to public comments, EPA agreed to undertake an improvement to the benefits transfer used in the analysis of non-use benefits of the 316b rule presented at proposal. Specifically, EPA developed a more rigorous regression-based meta-analysis that allows for estimation of the relative influence of various study, economic, and natural resource characteristics on willingness to pay (WTP) for non-use benefits. The results of such a regression-based meta-analysis make it possible to predict non-use WTP for aquatic resource changes as a function of site characteristics, the magnitude of environmental improvements, and study design attributes. Chapter A12, Non-Use Meta-Analysis Methodology, in the regional study document prepared for the analysis for the final Phase II rule provides detail on the meta-analysis approach to estimating non-use benefits of the 316b rule (see DCN #6-0003). Results of EPA's external peer review of its meta-analysis are provided in DCN #6-2500.

The Agency, however, recognizes that there are unavoidable uncertainties in monetizing non-use values for the ecological resources that would be protected by the final 316 (b) rule. EPA responded in several ways to the unavoidable uncertainties in monetizing non-use values. First, as explained in the preamble to the 316(b) rule, EPA engaged in a qualitative assessment of the benefits of the environmental protections at issue. Second, EPA developed lower and upper bound estimates of non-use benefits based on the Robb and Krinsky simulation technique and conducted sensitivity analysis with respect to various parameters (e.g., the size of the affected population) used in the analysis of non-use benefits. EPA considered the results of several different approaches to quantifying non-use values. However, given the degree of uncertainty associated with the estimated national non-use benefits of the final 316b rule, monetized estimates of non-use benefits are not included in the benefit cost analysis for this rule.

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Subject Matter Code 10.03.01.01

Salem

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

The Delaware Riverkeepers' Comments Mischaracterize PSEG's Estimates of I & E Losses at Salem

In its comments on the Proposed Rule, the Delaware Riverkeeper claimed that PSEG had underestimated entrainment and impingement losses at Salem (Delaware Riverkeeper comments, page 15), and that the underestimates were due to "assumptions, bias, errors and misstatements made by PSEG and its scientists." The Delaware Riverkeeper supported these allegations with references to reviews of Salem's 1999 Application. These reviews were prepared by ESSA Technologies <FN 46> ("ESSA Report"), Philip Goodyear<FN 47> ("Goodyear Report"), and Desmond Kahn<FN 48> ("Kahn 3/30/2000 Report", and "Kahn 9/26/2000 Memorandum") (Delaware Riverkeeper comments, page 18). PSEG categorically rejects these allegations and the purported bases for the allegations. Furthermore, PSEG prepared and submitted written responses to the ESSA Report, Goodyear Report, Kahn 3/30/2000 Report, and Kahn 9/26/2000 Memorandum, which have all been available from NJDEP as part of the administrative record for Salem's 2001 NJPDES Permit

The Delaware Riverkeeper cited the ESSA Report as concluding that PSEG underestimated biomass lost from the ecosystem by a factor greater than 2. In fact, PSEG did not present any estimates of biomass lost from the ecosystem in its 1999 Application. This baseless claim was completely refuted in PSEG's response to the ESSA Report<FN 49>, a copy of which is included as a reference to these comments. The Delaware Riverkeeper also cited the ESSA Report as concluding that PSEG overestimated natural mortality rates of young fish, which biased PSEG's cost-benefit assessments. As clearly documented in PSEG's response to the ESSA Report, ESSA's conclusion was erroneous and largely based on ESSA's misinterpretation of information presented in Salem's 1999 Application, and erroneous assumptions used in ESSA's analyses.

The Delaware Riverkeeper implied that the ESSA Report concluded PSEG's methods for estimating entrainment and impingement losses were unsound (Delaware Riverkeeper comments, page 16). In fact, ESSA commended PSEG for its efforts to avoid biases that could have been introduced by some sampling procedures:

"In order to complete the analysis of the loss of fish due to entrainment and impingement at the [S]tation, the investigators made a careful and substantial effort to fill gaps in the data and to adjust for known biases. Significant data engineering for entrainment losses had to occur before analyses could proceed. They should be commended for their efforts." (ESSA Report, page 6.)

The Delaware Riverkeeper also cited ESSA's concern regarding PSEG's use of multipliers to adjust upwards its estimates of entrainment. ESSA's concern on this matter was unfounded. PSEG's response to the ESSA Report identifies the flaws in ESSA's logic regarding PSEG's adjustment methods and demonstrates that ESSA's concern is completely unfounded.

It is important to recognize that all issues raised in the ESSA Report, which was commissioned by NJDEP, were fully addressed and resolved prior to the issuance by NJDEP of the 2001 NJPDES

Permit for Salem. The Delaware Riverkeeper participated actively in the administrative proceeding leading up to the issuance of the final permit, having testified at both hearing and having filed written comments on the Draft Permit. The Delaware Riverkeeper, however, did not file a challenge to the final NJPDES permit for Salem for an adjudication of the very issues being raised in its comments on the Proposed Rule.

The Delaware Riverkeeper alleged that PSEG's estimates of reductions in weakfish landings due to Salem operations were biased low because PSEG incorrectly assumed weakfish were subject to bycatch mortality in the south Atlantic shrimp fishery. The Delaware Riverkeeper cited the Kahn 9/26/2000 Memorandum as the basis for this claim. PSEG's response to the Kahn 9/26/2000 Memorandum <FN 50> addressed this issue, noting that Kahn's assertion regarding weakfish bycatch was not supported by any scientific data, and demonstrated that PSEG did not understate potential losses to the fishery. The Delaware Riverkeeper also erroneously claimed that PSEG's 12% overestimate of yield per recruit (in comparison to ASMFC's estimate of weakfish yield per recruit)<FN 51> would not translate into an overestimate of the number of fish caught by the recreational fishery. This claim is erroneous because yield per recruit is a function of mortality and weight at age, and mortality at age would affect the number of fish caught as well as the total weight of landings.

The Delaware Riverkeeper noted that PSEG did not estimate a conditional mortality rate ("CMR") for striped bass, and then erroneously concluded that this lack of an estimate of CMR biased PSEG's cost-benefit analysis. In fact, PSEG's cost-benefit analysis did not require estimates of CMRs as inputs, rather it relied directly on estimates of entrainment and impingement losses. Therefore, PSEG's cost-benefit analysis was in no way biased by the lack of a CMR estimate for striped bass.

The Delaware Riverkeeper cited the Kahn 3/30/2000 Report for its conclusion that the average CMR for striped bass was 32%, and was over 50% in some years. As fully documented in PSEG's response to the Kahn 3/30/2000 Report<FN 52>, this conclusion is wholly without scientific merit. PSEG's response to the Kahn 3/30/2000 Report demonstrates that the CMR for Delaware Bay striped bass is more likely to be less than 1%. Accordingly, all of the Delaware Riverkeeper's assertions (based on the CMR estimates from the Kahn 3/30/2000 Report) regarding the ecological and economic effects of Salem operations on the Delaware Bay striped bass are unfounded.

The Delaware Riverkeeper also briefly referred to the Goodyear Report, claiming that the Goodyear Report "joined in Dr. Kahn's concern about PSEG's failure to more vigorously attempt to obtain entrainment estimates for striped bass." However, the Goodyear Report was submitted prior to the Kahn reports, and therefore could not have --and did not -- offer any comments on the Kahn reports. PSEG's response to the Goodyear Report<FN 53> clearly explained the life history considerations and limitations of historical data that precluded development of CMR estimates for striped bass. Also, contrary to the Delaware Riverkeeper's assertion, PSEG did estimate entrainment losses for striped bass, and in fact, the Goodyear Report refers to those entrainment estimates for striped bass.

Footnotes

46 ESSA Technologies Ltd. Review of Portions of New Jersey Polluta& Discharge Elimination System (NJPDES) Renewal Application for the Public Service Electric & Gas' (PSEG) Salem Generating Station. June 14,2000.

47 Goodyear, C.P. Comments on Appendix F of the PSEG Permit Application for Salem 4 March 1999. Kahn, D. Mortality of Delaware River Striped Bass fiom Entrainment and Impingement by the Salem

48 Kahn, D. Mortality of Delaware River Striped Bass from Entrainment and Impingement by the Salem Nuclear Generating Station. March 30, 2000.
Kahn, D.M. Memorandum from D. Kahn, DNREC to A. Manus, DNREC. September 26, 2000.

49 PSEG's Response to the ESSA Report. ,Part Three to PSEG's Comments on Draft NJPDES Permit No. NJ0005622 dated March 14,2001.

50 Anthony, V.C., L.W. Barnthouse and D.G. Heimbuch. Response to Memorandum dated September 26, 2000 fi-om Desmond Kahn to Andrew Manus December 7, 2000. Transmitted to Debra Hammond, NJDEP from Maureen F. Vaskis, PSEG Services, Cop. December 15,2000.

51 A comparison of PSEG's yield per recruit estimate for weakfish (from the 1999 Application) and an estimate of yield per recruit for weakfish fiom ASMFC was presented in PSEG's response to the Kahn 9/26/2000 Report.

52 Anthony, V.C., L.W. Barnthouse and D.G. Heimbuch. Response to the DNREC's Assessment of the Impact of Entrainment and Impingement by the Salem Nuclear Generating Station on Delaware River Striped Bass. August 25, 2000. Transmitted to Debra Hammond, NJDEP fiom John H. Balletto, PSEG Services, Corp. August 25,2000.

53 Anthony, V.C., L.W. Barnthouse and D.G. Heimbuch. Rebuttal to Accusations and Response to Technical Criticisms Raised in "Comments on Appendix F of the PSEG Permit Application ofr Salem 4 March 1999" February 18, 2000. Transmitted to Dennis Hart, NJDEP from R. Edwin Selover, PSEG, February 18,2000.

EPA Response

EPA has reviewed all of the comments provided by PSEG, and EPA stands by its analysis for the final rule. For this analysis, EPA averaged data from multiple facilities in the mid-Atlantic region, in addition to Salem, to develop a regional estimate of impingement and entrainment. EPA stands by this analysis.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.03.01.01

Salem

Riverkeepers and Pisces Report Mischaracterize the Science Supporting the EEP and its Accomplishments

In its comments on the EPA's Proposed Phase II Rule, the Hudson and Delaware Riverkeepers (collectively referred to as the "Riverkeepers") level several objections to the use of restoration measures as a means to offset potential adverse effects of CWIS intake structures on fish and invertebrate populations. The Riverkeepers present many specific objections to restoration measures, using inaccurate or misleading references to the EEP. These objections include the following assertions: (1) that food and habitat are not limiting to fish populations in the Delaware Estuary,<FN 54> (2) that the success criteria used to evaluate the restoration project are flawed, (3) that Phragmites-dominated marshes are functionally identical or better than Spartina-dominated marshes for creating fish, (4) that PSEG's wetland restoration has failed, (5) that the restoration efforts only converted existing freshwater wetlands to saltwater wetlands, (6) that PSEG is unable to quantify the number of fish produced, and (7) PSEG's restoration has adversely affected horseshoe crabs.

Before responding to each of the above-listed criticisms, it is important to understand the regulatory background in which the EEP evolved and the regulatory concern it was designed to address. In 1993, PSEG formally proposed the EEP to address the NJDEP's concern about potential adverse effects of the operation of the CWIS at Salem on four fish species.<FN 55> The EEP was an innovative solution to an environmental issue, which was based on good science, sound ecological principles and good public policy. Through the EEP, PSEG has demonstrated a willingness and ability to drive not only technological developments but also environmental stewardship. The EEP incorporates short-term, near-field benefits of innovative fish protection technology with an estuary-wide habitat improvement project that will continue to provide ecological benefits far beyond the expected life of the Salem CWIS. PSEG maintains that the benefits associated with successful restoration and/or preservation of more than 10,000 acres of degraded wetlands far outweigh the benefits of other technology-based measures not required for installation under Salem's NJPDES permit.

Riverkeepers' Argument for Limiting Factors Is Flawed

The Riverkeepers allege that PSEG failed to provide scientific data indicating that food or habitat were limiting factors for the fish populations in the Delaware Estuary. Furthermore, their objections claim that there exists no data or information that would indicate such. The Riverkeepers' objections maintain that altering wetlands to increase food and habitat availability for fish is unlikely to have any effect on fish populations within in the estuary. This objection clearly indicates an insufficient understanding of estuarine ecology. Furthermore, and perhaps more significantly, it highlights faulty logic that is further biased by the Riverkeepers' fundamental position that 316(b) requires installation of closed cycle cooling systems at all power plants. Their assessment of EEP and their interpretation of the statute are equally flawed.

Contrary to the question that the availability of wetlands and the nutrients they provide is not a critical limiting factor for fish abundance, living space and food are demonstrably interrelated. In the wetlands, the risk of being eaten while obtaining food is likely to be lower than in other estuarine habitats. Furthermore, it is likely that the wetlands produce more fish than other habitats in the Estuary, as follows.

Aquatic populations may be limited by many environmental factors. A single factor usually operates as the critical limiting factor, but single factors do not limit populations for more than short periods of time over more than small areas. All of the parameters are simultaneously “critical limiting factors,” and any one can be limiting at a particular moment or in a particular place.

Because fish maximize their fitness (Mittleback 1981, Werner et al. 1983, Crowder 1984), factors which lower fitness can affect the success (or productivity) of a species. Critical limiting factors can take many forms, both abiotic and biotic. Abiotic factors include physical/chemical parameters such as temperature, salinity, nutrients and substrate composition. Biotic factors include competition for food and space, disease, and predation. In an estuary, limiting factors constantly vary over space and time. The physical/chemical factors set broad limits as to where a species may be found (Sanders 1968). Competition, disease, parasites, and predation set narrower limits on the whereabouts and physiological well-being of individuals.

The relationship of these factors produces predictable patterns in habitat selection, utilization and survival in estuarine fishes. However, habitat selection is also strongly influenced by .two biotic factors that control survival: foraging profitability and risk of predation. For a fish to grow, it must find food and, while doing so, not be eaten. Put another way, starvation and predation are sources of mortality which compete for fish (Werner 1986).

The stress from these sources of mortality is minimized in the marsh. The risk of an early life stage fish’s being eaten while obtaining food is likely to be lower in a tidal marsh than in many other areas of an estuary because the marshes and associated tidal creeks provide abundant food while serving as predation refugia for these early life stages (Boesh and Turner 1984). Although food supplies may be locally limiting in estuaries (Peters and Kjelson 1975, Laurence 1977, Bahr et al. 1982), the contrary is indicated in estuarine marshes (Deegan and Day 1984, Peters and Lewis 1984). Moreover, the seasonally warmer waters of the marsh creeks promote rapid growth rates in fish which reside there.

The presence of the dikes on the former diked salt hay farms precluded the exchange of fish .from the estuary and the vegetation on the former salt hay farms. The removal of these dikes and the reestablishment of appropriate hydrology increase the available aquatic habitat and increase available primary production.

Increasing available food will increase fishes’ growth rates, and increasing the growth rate will increase the survival rate of young fish. During the time that young-of-year occupy tidal creeks, they are likely to survive at higher rates than in open waters of an estuary (Weinstein 1985). For many species, this may result in greater contributions to the population of fall migrants than from other habitats in an estuary. In addition, rapid growth will result in larger individuals; combined with lower predation intensities, a very high rate of secondary production will be realized in the marsh ecosystem.

Thus, the critical limiting factors in the marsh may differ from the open estuary and the difference produces a more benign environment in the marsh, promoting rapid growth and enhanced survival. When the fish move to the estuary and coastal waters as larger individuals, they will benefit from the export of detritus and living biomass from the marsh. For some species, this food source will produce healthier adult fish prior to seasonal migrations and overwintering.

Footnotes

54 The Hudson Riverkeeper's specific objections to PSEG's restoration measures completed under the auspices of the EEP include:

"PSE&G's wetland experiment involves restoring, enhancing andlor preserving 10,000 acres of what PSE&G characterizes as degraded wetlands. The majority of those wetlands are dominated by the phragmites [sic] plant; restoration efforts include herbicide application, mowing and rescribed burning in order to remove phragrnites [sic] and replace it with spartina [sic] grasses. Some freshwater diked wetland are also being converted to salt marshes. The original argument supporting this program was that enhancement of these wetlands will increase fish production in the Delaware Estuary."

54 A consultant, Versar, Inc., hired by the NJDEP to review Salem's 1984 ' 316(b) Demonstration concluded based on two years of operational data and highly conservative, predictive models that Salem had the potential to cause long-term declines in four of the nine finfish RIS.

55 PSEG's Supplement to the Application for Renewal of Salem's NJPDES Permit No. NJ0005622, March 4, 1993.

EPA Response

EPA believes that removal of dikes from diked salt hay farms can result in a renewal of the hydrological connection between the marsh and the surrounding estuary. This connection renewal can result in an increase of salt marsh habitat for a variety of organisms. EPA believes that fish and other aquatic organisms in the estuary benefit to differing amounts from increases in salt marsh habitat, depending on the limiting factors acting upon the organisms and their particular habitat needs.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

PSEG's Success Criteria Are Valid

With respect to the success of wetland restoration, the Riverkeepers assert that PSEG's evaluation methodologies and success criteria for the wetland restoration efforts do not include a determination of whether or not the fish populations of the River are benefiting from the wetland restoration efforts. The Riverkeepers highlight established restoration success criteria that focus on such parameters as change in vegetation coverage, algal productivity, and macrophyte productivity.

This statement is only partially true. PSEG's wetland restoration success criteria, as defined by site-specific management plans, are based on vegetative cover and hydrological conditions. Since the restoration project bases its premise on the creation of desirable intertidal habitat, the quantification of these factors is not only desirable, but also a logical necessity. The vegetative and hydrological success criteria developed for the restoration sites were established as measures to compare the form of the restored sites to nearby control sites as an overall measure of success. Furthermore, the success criteria and their supporting bases were reviewed by the Management Plan Advisory Committee prior to approval by NJDEP.<FN 56> Articles describing the success criteria and their bases were accepted and published in scientific peer reviewed journals<FN 57>.

Furthermore, the vegetative community and the stream morphology within a marsh system have a direct bearing on the quality of the habitat within the system. A marsh historically dominated by Phragmites can differ substantially from a marsh dominated by Spartina with respect to creek bank morphology, channelization, marsh plain hydroperiod and topography. Understanding these differences are vitally importantly in understanding how fish utilize marsh habitat and the relative contribution such utilization makes to the overall production of fish<FN 58>.

If vegetation were the only metric employed by PSEG in evaluating the success of wetland restoration, the Riverkeepers' objections might be justified. Beyond the vegetative and hydrological success criteria required by the NJDEP-approved management plans, however, PSEG has undertaken substantial efforts to understand, I characterize and quantify the success of the wetland restoration activities in producing fish. Much of this information is available in peer-reviewed literature (e.g. Able 1999, Able et al 2003, Smith et al 2003, Currin 2002, Teo & Able 2002).

These publications, as well as many others, document how scientists, including scientists conducting primary research at the PSEG sites, are making tremendous strides in describing the mechanisms by which primary production occurring in the marsh is transported first to tidal creeks and subsequently into the estuarine system. The processes involved are admittedly complex, and much work remains to be done; however, much has already been learned about the contribution to the forage and habitat base that healthy marshes provide (see Section III.A above). Fish abundance monitoring, food habits and habitat utilization research conducted at PSEG's formerly diked salt-hay farm restoration sites clearly demonstrate that the restored sites are performing as well as, or better than, relatively undisturbed reference marshes with respect to fish production. In particular, formerly diked salt-hay farms represent entirely new habitat to estuarine organisms and, as such, any fisheries production attributable to these sites is necessarily new production (see Section III.B, above).

Footnotes

56 The Management Plan Advisory Committee ("MPAC") was established as a requirement of Salem's 1994 NJPDES Permit. MPAC included representatives of USEPA Region II's Office of Wetlands, DNREC, NJDEP, the Delaware River Basin Commission and municipalities hosting restoration sites. It also included academicslindependent scientists with recognized expertise in marshes, marsh restoration andfor coastal processes, including a scientist nominated by the Delaware River.

57 Weinstein, M.P, J.H. Balletto, J.M Teal and D.F. Ludwig. Success criteria and adaptive management for a large-scale wetland restoration project. Wetlands Ecology and Management. 4(2): 1 11-127. 1997.

Weinstein, M.P. What begats success. In: D.F. Hayes (ed.) Wetlands engineering and river restoration. Proceedings of the American Society of Civil Engineering Conference. March 1998.

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58 Able, K.W. and S.M Hagan. Effects of Common Reed (Phragmites australis) invasion on marsh surface macrofauna: response of fishes and decapod crustaceans. Estuaries 23(5):633-646. 2000.

Able, K.W., S.M. Hagan and S.A. Brown. Responses of young-of-the-year mummichog (Fundulus heteroclitus) to treatment for Phragnzites removal: Insights into mechanisms for marsh habitat alteration due to Phragmites. Estuaries. In press.

EPA Response

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.338.051

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Phragmites Sites Are Not Equivalent to Spartina Sites

With respect to Phragmites-dominated restoration sites, the Riverkeepers make multiple assertions in the following vein:

“PSE&G has failed to conduct the baseline data on the contributions of the phragmites [sic] stands to the food chain in order to make the necessary comparisons. It is very possible that the fish used the phragmites-dominated [sic] marshes in the same way and to the same degree as they would spartina-dominated [sic] marshes and therefore nothing has been truly gained by their efforts.” and:

“. . .PSE&G’s own data confirms.. .that phragmites-dominated [sic] marshes on the Delaware Bay contribute just as much basic nutrient material to into the food web as spartina-dominated [sic] marshes. As new data are generated, the general perception that regularly flooded phragmites [sic] marshes are less functional than the spartina [sic] marshes they replace does not appear to be upheld.” Clearly, these arguments are based upon the notion that marshes are merely a nutrient source, providing organic material for consumption within the estuarine system. At such a grossly simplistic level, the Riverkeepers’ argument could be persuasive; however, it misses the point. As previously stated, one of the fundamental differences between Phragmites-dominated and Spartina-dominated marshes is the value of these environments as nursery and refuge habitat<FN 59>

The significant effects that Phragmites colonization has on marsh habitat, particularly with respect to loss of intertidal habitat from marsh plain siltation, reduced reproductive capacity for marsh resident species (e.g., the mummichog, Fundulus heteroclitus) and loss of tidal tributaries is well-documented <FN 60>. To express marsh ecology as simply a process by which nutrient material is provided to the food web is to demonstrate a clear misunderstanding of habitat value and production potential.

The Riverkeeper acknowledges the potential differences in habitat quality between a healthy Spartina marsh and a Phragmites marsh, even when highlighting the supposed nutritive value of Phragmites. In footnote 119, the Riverkeeper quotes Rooth and Windham: "In comparison to a Spartina community, Phragmites enhances both mineral and organic decomposition, basically doubling the accretion potential of the marsh". In referencing such a statement, the Riverkeeper acknowledges that a Phragmites marsh accretes sediment at twice the rate of a Spartina marsh. The end result of this accretion, however, is the elimination of fish habitat. The accreting sediments fill the rivulets on the marsh plain, creating the table-top surface characteristics of Phragmites sites. Further, the accretion associated with Phragmites eventually reduces tidal exchange to the point where the very nutrients the Riverkeeper claim are beneficial are inhibited from being exchanged with the tidal tributaries. Thus, a long-term effect of sediment accretion in Phragmites -dominated marshes is the trapping of the nutrients necessary for aquatic production at the same time as intertidal habitat is being lost to sedimentation<FN 61>.

Footnotes

59 Able and Hagan 2000, and Able et al. In press

60 Rooth, J. and C. Stevenson. 1998. Vertical accretion in Phragmites autralis and Spartina spp. Communities in mid-Atlantic marshes: implications for coastal areas threatened by rising sea level (Abstract). In. Concepts and Controversies in Tidal Marsh Ecology; Cumberland Community College, Vineland, NJ. April 1998.

61 Rooth and Stevenson 1998.

EPA Response

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.338.052

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

PSEG Marsh Restoration is Successful

Despite statements by the Riverkeepers, monitoring data indicate that PSEG's marsh restoration program is successful. As described in Salem's 1999 Application, Appendix G, Attachment G-2-4, PSEG has conducted extensive vegetation, hydrologic and biological monitoring programs. These monitoring programs are conducted, as is required by a biological monitoring plan ("BMP"). The BMP is reviewed by the Estuary Enhancement Program Advisory Committee <FN 62> ("EEPAC"), prior to approval by the NJDEP. EEPAC also reviews the results of these monitoring programs annually. The most recent data from the marsh sites indicate that the desired vegetation is being restored. The Dennis Township site met the Final Success criteria in 2000 and the Maurice River Township site reached success criteria in 2001. The remaining five marsh restoration sites are on a trajectory for success.

Footnotes

62 Salem's 2001 NJPDES Permit established a single advisory committee, EEPAC, which essentially combined the MPAC with the Monitoring Advisory Committee ("MAC"). The composition of the EEPAC includes the MPAC along with the governmental agency representatives with expertise in fisheries and academics/scientists with expertise in fisheries and population dynamics.

EPA Response

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.338.053

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

PSEG Marsh Restoration Has Not Replaced Diked Freshwater Wetlands with Salt Marsh

The Riverkeepers' contention that PSEG's marsh restoration program has merely converted diked freshwater wetlands into saltmarsh is untrue. As documented in Salem's 1999 Application (Attachment G, previously submitted to USEPA), all diked areas subject to restoration were salt-hay farms prior to the initiation of restoration, predominantly vegetated by salt hay (Spartina patens). Salt hay is not a freshwater wetland species. These areas, which were formerly open to the tides, historically were vegetated with smooth cordgrass (S. alterniflora) and salt hay. Dikes were constructed by agricultural interests to change the areas into predominantly high salt marsh for the agriculturally desirable salt hay. Prior to diking, these sites were subjected to twice-daily tidal inundation and were in direct hydrologic connection with Delaware Bay, experiencing a flux of nutrients and organisms that utilized the sites. The removal of the dikes has reestablished the twice-daily tidal inundation and reestablished the nutrient/organism fluxes.

Furthermore, to address areas of freshwater wetlands adjacent to the formerly diked salt hay farms that may have been impacted by restoration activity, PSEG was required to mitigate on a three-to-one basis for certain losses of freshwater wetlands pursuant to permits to allow restoration activities, issued by NJDEP.

At the Commercial Township Salt Hay Farm Wetland Restoration Site, PSEG proposed a freshwater wetland mitigation program consisting of 82.1 acres to offset the 24.8 acres of freshwater wetlands impacted by restoration activities. The 82.1 acres of mitigation included 67 acres of tidal wetlands that were to be converted to freshwater wetlands and 15.1 acres of upland area converted to freshwater wetland areas resulting from the landward movement of the tidal/upland interface <FN 63>. The freshwater wetland mitigation program was included as a condition in the NJDEP's Land Use Regulation Permit No. 0602-95-0002.3,.4,.5,.6,.7; dated September 11, 1996 and the U.S. Army Corps of Engineers Section 404 permit, CENAP-OP-R-199601947-24; dated September 14, 1996, issued for the restoration activities at the Commercial site.

At the Dennis Township Salt Hay Farm Wetland Restoration Site, PSEG was required by the NJDEP's Land Use Regulation Permit No. 0504-95-08.2,.3,.4.,.5; dated February 15,1996 and U.S. Army Corps of Engineers Section 404 permit, CENAP-OP-R-199500676-24; dated February 16,1996 to compensate for the loss of two acres of freshwater wetlands with the restoration of seven acres of former freshwater wetlands that were converted to coastal wetlands by previous salt hay farming activities. PSEG provides annual reports to NJDEP and the U.S. Army Corps of Engineers on an annual basis to document the progress of the freshwater wetland mitigation program.

Footnotes

63 Letter from Gary Bickle, PSEG, to Audrey Wendolowski, NJDEP dated July 25, 1996

EPA Response

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.338.054

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

PSEG Estimated the Fish Production in the Marshes

Based upon monitoring of fish utilization of the marshes (Salem's 1999 Application, Appendix G, Attachment G-3, previously submitted to USEPA), there is scientific data on the species of fish, numbers of individuals, and their spatial and temporal occurrence in the marshes. These data were collected in both restored as well as reference marshes. Reference marshes are natural marshes or marshes that had been fully restored, which were located in proximity to the restoration sites (Salem's 1999 Application, Attachment G-2, Exhibit G-2-2.) Based on these data, PSEG demonstrated that the species, number of individuals, and spatial and temporal occurrence of these fish were equivalent (or in some instances greater in the restored marshes) in both the reference and restored marshes.

In addition, PSEG used the data to estimate total fish production on the restored salt hay marshes using bioenergetics modeling (Salem's 1999 Application, Appendix G, Attachment G-4). Bioenergetics modeling uses actual biological and physical data to estimate increased biomass for all fish in the marsh. This modeling did not address the primary production that is transported out of the marsh into the estuary. This includes particulate organic matter, dissolved organic matter, micro- and macro-invertebrates and fish too small or too large to collect in the sampling equipment employed. This production is utilized by organisms residing in the estuary.

EPA Response

EPA believes that there are uncertainties associated with the design, implementation, performance, and assessment of restoration measures. For a discussion of these uncertainties, see EPA's responses to comments 316bEFR.206.055 and 316bEFR.077.013. The requirements in the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their overall performance.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant in determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

All restoration measures used to comply with the performance requirements of the final rule must meet the requirements described in sections 125.94 and 125.95 of the final rule.

Comment ID 316bEFR.338.055

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Peg's Restoration Has Not Adversely Affected Horseshoe Crabs

The Hudson Riverkeeper cites the Pisces Report, which claims that Peg's marsh restoration program is having a negative impact on horseshoe crabs. Concern has been raised that the horseshoe crab population has declined. In addition a number of shorebird species rely on horseshoe crab eggs for food during their migration from South America to Canadian breeding grounds. The basis for this objection is early reports that horseshoe crabs were being stranded on Peg's Maurice River Township wetland restoration site ("MRT Site"), a formerly diced salt hay farm. Prior to Peg's commencement of any restoration activities, horseshoe crabs were indeed accessing the impounded area through breaches in the bay-front dikes that had occurred naturally prior to Peg's acquiring the MRT Site. These dike breaches resulted in higher than natural water velocities and the loss of vegetation on the site, which became dominated by mudflats. Many of these crabs were swept in on the flooding tide and were subsequently stranded on the acres of bare mudflat present in the area.

In 1996 and 1997, large numbers of horseshoe crabs were observed as being stranded on the MRT site (approximately 200,000 crabs were estimated to have died). In order to address allegations that the MRT Site was causing significant mortality to horseshoe crabs, PSEG retained nationally recognized experts<FN 64> in horseshoe crabs to evaluate the conditions at the MRT Site with respect to horseshoe crabs and to develop and implement a monitoring program to assess the effects of the MRT Site restoration on the horseshoe crabs.

PSEG began marsh restoration activities on the MRT site in 1997 outside of the horseshoe crab spawning season. Construction was completed in March 1998, prior to the 1998 horseshoe crab spawning season. During the 1998 spawning season only hundreds to a few thousand crabs were observed to be stranded. This number is modest in comparison to 240,000 crabs collected by hand-harvesters that year. The construction of tributaries within the site has resulted in water velocities within the site that are in the range of those in natural tributaries and is evidenced by the fact that stranding were reduced and crabs were using the constructed tributaries as they would natural tributaries (Salem's 1999 Application, Appendix G, Attachment G-2, Exhibit 12).

The successful restoration of the MRT site actually eliminated a condition detrimental to horseshoe crabs. Following restoration, horseshoe crabs were documented successfully reproducing on the banks of the constructed tributaries within the site <FN 65>. As a result, the NJDEP has declared the MRT Site area as a horseshoe crab sanctuary, and has prohibited the commercial harvest of these organisms within its boundaries.

The PSEG marsh restoration program has not resulted in a negative impact on horseshoe crabs. In fact, the restoration of the MRT site has eliminated a problem and resulted in newly expanded spawning habitat for an ecologically important species whose population is believed to be declining.

Footnotes

64 PSEG retained Drs. Carl Shuster retired from USFWS and professor at the Virginia Institute of Marine Science, Rober Loveland of Rutgers University and Mark Bottom of Fordham University in this regard.

65 Bottom, M. and R. Loveland. Horshoe habitat use at the Maurice River Township salt hay farm restoration site in Delaware Bay, New Jersey. 2000.

EPA Response

EPA believes restoration science continues to progress. Permitting authorities and permit applicants should consider net environmental benefit when assessing a particular restoration measure.

Comment ID 316bEFR.338.056

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.03.01.01

Salem

Salem Has Not Adversely Affected Threatened and Endangered Species

In their comments, the Riverkeepers criticize PSEG's record of threatened and endangered species encounters at the Salem facility. The Riverkeepers maintain that endangered and threatened shortnose sturgeon and sea turtles are killed at Salem and that data on these encounters have not been provided. With respect to endangered shortnose sturgeon, the Riverkeepers suggest that there must be unreported entrainment losses of this species if adult sturgeon are "getting caught on trash racks".

In 1990, NMFS held a formal consultation under Section 7 of the Endangered Species Act ("Consultation"). This Consultation addressed shortnose sturgeon, loggerhead turtle, Kemp's Ridley turtle and the green turtle. Based on the data and information provided in the Consultation, NMFS made a no jeopardy determination and issued incidental take numbers for the sturgeon and turtles. Subsequent Consultations have occurred to the present.

In accordance with the Consultation, PSEG reports any encounter with the endangered shortnose sturgeon at the Salem facility. These encounters are largely attributable to the impingement of already dead and/or decomposing organisms, often the result of gillnet by-catch or disease. Furthermore, the entrainment of a shortnose sturgeon has never been documented due to its reproductive strategy. Shortnose sturgeon spawn almost one hundred miles upstream of Salem and entrainable life stages of shortnose sturgeon occur far upriver from the influence of the Salem station. Only the substantially larger juvenile and adult shortnose sturgeon would be expected in the tidal portion of the estuary near the Salem Station.

Moreover, the comment that entrainable lifestages must be present if larger adult fish are being impinged demonstrates Riverkeepers complete lack of understanding of the most rudimentary concepts of fisheries biology; i.e., that different life stages of a given fish species utilize different water bodies and/or different habitats within a water body than other life stages of the same species. Likewise, it demonstrates a serious lack of understanding of the life history of the shortnose sturgeon. These fish spawn in primarily freshwater portions of tidal rivers; their eggs are demersal and adhesive, which limits their susceptibility to entrainment.

Although the death or injury of a shortnose sturgeon directly attributable to the CWIS is highly unlikely, any encounter with this species is nevertheless reported to NMFS and counts against the "incidental take" limits established by NMFS, even if the reported mortality was obviously not attributable to the Station's operations (e.g. due to the presence of gill net scars, propeller damage, skin lesions, or the deteriorated condition of the specimen).<FN 66>

The Riverkeeper states that endangered and/or threatened sea turtles have also been injured and killed at Salem. For example, the Hudson Riverkeeper states:

"The New Jersey permit record has information about the impacts to the federally 'threatened turtle populations injured and killed at Salem, and at one time required a turtle resuscitation program at that site.”

Since the Station began commercial operation in 1977 (Unit l), PSEG has had a program to report to the federal and state regulatory agencies of the collection of a sea turtle (or sturgeon). This program also included a sea turtle resuscitation program and a sea turtle and sturgeon recovery program (for either dead or live specimens). In the early 1990s' Salem's record of impingement of threatened and endangered sea turtles documented significantly increased numbers of encounters each year (approximately 40 turtles were encountered in 1990 and 199 1 combined). A satellite-tracking program for turtles recovered alive was also conducted during this period. Subsequent observations by Salem fisheries scientists led to a fundamental change in the summer configuration of the Salem CWIS. Historically, turtles sounding (diving) near the CWIS often surfaced behind the permanently installed ice barriers. Once behind these barriers, the turtles apparently had difficulty escaping.

After the mechanism by which turtles became trapped was understood, the ice barriers were removed during summer months.<FN 67> Subsequent to this change, sea turtle encounters dropped significantly (i.e., 0 - 1 encounters per year). Furthermore, the turtle encounters following the change in the deployment of the ice barrier are often the result of the impingement of turtles dead due to other sources of mortality (e.g., propeller strikes, disease).

Even though there has been a dramatic reduction in the number of turtles that are encountered at the Salem CWIS, Salem still must comply with its incidental take permit issued by NMFS. This permit limits the number of sea turtles (live or dead) taken each year. Contrary to the erroneous claims of the Riverkeepers, the sea turtle resuscitation program, the sea turtle and sturgeon recovery program and the obligation to report any incidental takes of these species to NMFS are still in effect at Salem, as mandated by NMFS under the 7 ESA consultation. In fact, resuscitation and identification guides are prominently displayed throughout the CWIS, and operators continue to receive training in these procedures. It is likely that the perception that this program was discontinued stems from the dramatic reduction in reportable turtle encounters since the change in ice barrier deployment.

Footnotes

66 It is worthwhile to note that Salem's incidental take permit limitation for the Salem Station also extends to PSEG's estuary-wide biological monitoring activities such as research trawling and seining for impace assessment purposes. Any collection of a T&E species during the conduct of these studies invokes the same handling and reporting requirements as an encounter at the CWIS, and counts toward the annual "take" limit.

67 The summertime removal of the ice barriers has subsequently become a condition of Salem's operation, as required by the United States Nuclear Regulatory Commissions consultation with the National Marine Fisheries Service under Section 7 of the Endangered Species Act. The observations of turtle behavior by Salem personnel led directly to the favorable modification to operating practices; thus, PSEG took a proactie and effective step in protecting the threatened and endangered sea turtles seasonally present in the Delaware Estuary.

EPA Response

EPA notes this information provided by PSEG on the impingement and entrainment of threatened and endangered species at Salem. Although the commenter acknowledges that some threatened and endangered species are impinged and entrained at Salem, EPA did not have access to any impingement and entrainment estimates for such species. Therefore, EPA did not include these species in its analysis.

Comment ID 316bEFR.338.101

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 1.01

Comment period

PSEG submitted with its comments (OW-2002-0049, 5-1.38 in the docket or 316bEFR.338 in this database) Attachment A: "PSEG Submittals to USEPA in Connection with USEPA's Phase II 316(b) Rulemaking."

EPA Response

EPA is in receipt of the attachment.

Comment ID 316bEFR.338.201

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Suggestions for Permit Writer Guidance on Proposals to Implement Restoration Measures

Introduction

USEPA is considering requiring the following practices during the development of restoration projects (68 Fed. Reg. 13542, col. 1):

1. documentation of sources and magnitude of uncertainty in expected restoration project performance;
2. creation and implementation of an adaptive management plan; and
3. use of an independent peer review to evaluate restoration proposals.

PSEG agrees that all three factors (uncertainty analysis, adaptive management, and peer review) may be useful for designing, assessing and managing restoration projects. PSEG recommends that the USEPA develop and issue guidance for Directors and permit writers to use during their review of proposals by cooling water users to implement restoration measures.

Based on its considerable experience with large-scale marsh restoration programs, PSEG offers the suggested guidance language presented below as an illustration of the types of information and levels of detail that would be helpful to include in a USEPA prepared guidance document.

II. Evaluation of Applicant Proposals

A. Application Contents

Applicants who propose to use restoration measures to meet the performance standards in § 125.94, must submit the following information as defined in § 125.95(b)(5) with their Comprehensive Demonstration Study for review and approval by the Director:

i. A list and narrative description of the restoration measures proposed for implementation;

ii. A quantification of the combined benefits from implementing design and construction technologies, operational measures and/or restoration measures and the proportion of the benefits that can be attributed to each;

iii. A plan for implementing and maintaining the efficacy of the restoration measures;

iv. A summary of any past, ongoing, or voluntary consultation with appropriate Federal, State, and Tribal fish and wildlife agencies regarding the proposed restoration measures; and

v. Design and engineering calculations, drawings, and maps documenting that the proposed restoration measures will meet the restoration performance standard at § 125.94td).

USEPA recognizes that it may not always be possible for Applicants to demonstrate quantitatively that restoration measures will achieve comparable performance; however, the Applicant must make a qualitative demonstration that such measures will maintain fish and shellfish in the waterbody at a level substantially similar to that which would be achieved under 5 125.94. Demonstrating "substantially similar performance" for habitat restoration measures where it is not scientifically possible to fully quantify the number or biomass of aquatic organisms expected to be produced through implementation of the restoration measures, can be difficult, but should not preclude a Permit Writer from accepting restoration measures when proposed by an Applicant. Fully quantifying the increased aquatic production from habitat restoration measures that result in water quality improvements, provide new aquatic habitat (e.g. opening impounded tidal marsh), or improve existing aquatic habitat (e.g. wetland restoration, artificial reef construction, re-establishment of submerged aquatic vegetation, wetland buffer conservation, and etc.) may not be possible, but suitable techniques are available to demonstrate "substantially similar performance." USEPA provides the following guidance to Permit Writers who may be reviewing a Comprehensive Demonstration Study that includes restoration measures as a component.

B. Evaluation Criteria

An Applicant may propose the implementation of restoration measures either, in lieu of, or in combination with, reductions in impingement mortality and entrainment. In addition, an Applicant may propose restoration measures to address only impingement and/or entrainment losses in excess of those acceptable under the Performance Standards defined by § 125.94. <FN 1>

The Comprehensive Demonstration Study must, at a minimum, include information and data on the following topics:

i. The percent reduction in impingement mortality and entrainment that would be achieved through the use of any design and construction technologies or operational measures that have been proposed;

ii. A demonstration of the benefits that will be achieved by implementation of the proposed restoration measures; and

iii. A demonstration that the combined benefits of the design and construction technology(ies), operational measures, and/or restoration measures will maintain fish and shellfish at a level comparable to that which would be achieved under § 125.94.

Whenever possible, an applicant 's Comprehensive Demonstration Study should include quantification of at least a portion of the benefits to be achieved by implementation of the proposed restoration measures. USEPA recognizes the difficulties in quantifying benefits associated with restoration measures; however, there are a number of methods of varying sophistication that can be applied, including, but not limited to: estimates of production from peer-reviewed scientific literature, production foregone calculations, bio-energetics modeling and ECOPATH modeling.

Mathematical modeling techniques can be used to quantify a portion of the fishery benefits that will result from implementation of most restoration measures. For restoration measures involving the stocking of hatchery-reared species, numbers or biomass of CWIS losses can be compared to the numbers or biomass of hatchery-reared organisms to be stocked. If the primary concern relates to the potential secondary effects on predator species of recreational or commercial fishery importance due to CWIS losses of a forage species; the level of stocking of predator species required can be determined through bio-energetic models which calculate the predator biomass that would be expected to result from consumption of the lost forage. <FN 2>

Similarly, the increased biomass of predator species of recreational or commercial importance attributable to the production of forage fish that results from restoration measures can be quantified through use of bio-energetic modeling. This approach has been applied to estimate the increased biomass of striped bass and weakfish from the production of river herring in the new habitat created through the installation of fish ladders on impoundments within the Delaware Estuary. <FN 3>

Mathematical modeling techniques such as bio-energetics modeling can be used for most restoration measures for which the number or biomass of forage or predator species expected to result from implementation of the restoration measures can be estimated. It is not necessary to conduct extensive monitoring to determine precisely the number of organisms or biomass produced as a result of the restoration measures. In most instances, sufficient scientific literature exists upon which to base credible estimates. The appropriate margin of safety for particular restoration measures can be determined by the Director on a case-by-case basis; and the required consultation with appropriate Federal, State and Tribal fish and wildlife management agencies specified by § 125.94(d) of the Preferred Option should provide sufficient input to the regulatory authority to ensure that an appropriate safety margin is applied.

Comprehensive ecosystem modeling using ECOPATH, or a similar type of model that tracks energy flow through an ecosystem is an approach that may be available in some instances (Christensen and Pauly, 1992; 1993; ECOPATH 2000). The ECOPATH model presents a mass balance of trophic exchanges for an entire ecosystem. It works by using estimates of biomass for each major species or their aggregation in functional groups representing trophic levels, then uses principles of energetics and trophic transfer to estimate the flux of energy from one level to another. This creates a steady-state solution that requires an input-output budget to balance for the ecosystem as a whole, and then calculates the rate of energy transfer required to balance that budget. ECOPATH has been used to describe the structure of food webs in 56 different ecosystems (Pauly and Christensen, 1995), and its applications have grown rapidly in the recent past to the point that there are now ECOPATH models for more than 90 different ecosystems (ECOPATH , 2000).

Biomass should be the common metric of assessment because biomass can be directly measured and compared across all levels of the food chain. Biomass can also be aggregated by trophic level for comparison to CWIS losses to capture the habitat-based benefits to multiple species resulting from restoration measures. Biomass is also the most suitable metric when the age or length-class of organisms lost at a CWIS are different than the age or length-class of organisms benefiting from a habitat restoration effort.

Regulatory agencies can further assure the performance of conservation measures by requiring the inclusion of safety margins within the restoration plans. The appropriate margin of safety for particular conservation measures should be determined by the Director on a site-specific basis. The margin of safety appropriate for a particular restoration measure should depend on the circumstances under which they are proposed. Factors such as: the degree of uncertainty concerning the adverse impact of CWIS operations (e.g., whether or not the aquatic populations demonstrate long-term trends of increasing abundance); the scientific understanding of the ecological benefits of the proposed conservation measures; the ability to monitor and quantify the ecological benefits of the proposed conservation measures; and the intended lifetime duration of CWIS should all be factored into decisions concerning the appropriate margin of safety to be applied. The required consultation <FN 4> with appropriate Federal, State and Tribal fish and wildlife management agencies specified by § 125.94(d) should provide sufficient input to the regulatory authority to ensure that an appropriate margin of safety is defined.

In circumstances when complete quantification of the benefits is not possible, the Comprehensive Demonstration Study should provide sufficient information and data to demonstrate "substantially similar performance." Restoration measures that can provide tangible results toward restoring and protecting the chemical, physical and biological integrity of the source water body can be demonstrated to provide "substantially similar performance" by expanding the analysis to focus on the ecosystem, community, and/or the population level benefits that will result from the proposed restoration measures. An analysis of ecosystem, community and/or population level benefits that will result from proposed restoration measures can be based on historical information relating to the source water body, scientific literature documenting the effects of restoration measures in other locations, or scientific information on the value of the particular type of habit proposed for restoration.

Restoration measures that are designed to restore water quality or habitat to the more productive state that previously existed, may be evaluated based on documented evidence concerning the ecosystem, community or population levels that were present under the prior conditions. If historical data and information is unavailable for the specific location, scientific literature documenting the ecological benefits provided by the environment conditions to be restored can be used to demonstrate "substantially similar performance".

For restoration measures that will result in the creation of new habitat, or where no data is available to document ecosystem, community and/or population characteristics prior to the adverse impacts being addressed by the proposed measures, the Comprehensive Demonstration Study will similarly have to rely on scientific literature documenting either the value of the habitat being restored or the overall ecosystem, community, or population level benefits to demonstrate "substantially similar performance."

An applicant 's Comprehensive Demonstration Study should also include a detailed plan for implementing and maintaining the efficacy of the restoration measures. The detailed implementation plan should contain sufficient information to fully evaluate an Applicant's proposal. In most cases, details concerning implementation will have already been worked out through consultation with the appropriate Federal, State and Tribal fish and wildlife agencies, and the Director should encourage all applicants to pursue such consultations before including restoration measures in any Comprehensive Demonstration Study.

Dependent on the type of restoration measures proposed, the Applicant may be unable to commit to a specific location or activity for the proposed restoration measures, Committing to a specific location prior to receipt of the Director's approval may be particularly difficult if the restoration measures require the purchase of land or the procurement of facilities. None-the-less, the Applicant should fully describe the proposed measures; provide details as to how the proposed measures will meet the Performance Standards; provide scientific justification concerning any calculations used to demonstrate compliance with the Performance Standards; provide schedules and time-frames for implementation of the proposed measures; and provide design and engineering calculations, drawings, and maps documenting the proposed measures.

The Comprehensive Demonstration Study should also contain details concerning the maintenance activities required during the term of the NPDES Permit to ensure that the efficacy of the restoration measures will continue. Whenever possible, the maintenance plan should include performance/success criteria that the Director can incorporate into the NPDES Permit as enforceable permit conditions. Applicants are encouraged to also work out these details through consultation with the appropriate Federal, State and Tribal fish and wildlife agencies. The Director or his designee can and should participate in these consultations to ensure that the restoration measures proposed will satisfy all interested parties.

Many of these details concerning proposed restoration measures will depend on the particularly type of measures proposed and the Director is encouraged to remain flexible as long as the proposed measures can be demonstrated to satisfy the Performance Standards specified in 125.94.

To assist the Director in evaluating proposed restoration measures, the USEPA suggests use of the checklist provided in Table 1. Dependent on the particular type of restoration measures proposed, specific items listed in Table 1 may or may not apply, but the list can be used to ensure that the Applicant's proposal includes the necessary critical elements.

Table 1. Factors to consider in evaluation of proposed restoration measures to ensure compliance with the Performance Standards specified in 125.94.
[see hard copy for table]

Footnotes

1 For example, an Applicant may be able to meet the § 125.94 Performance Standards for reduction of impingement mortality, but propose restoration measures to reduce entrainment losses.

2 For example, see PSEG 1999, Attachment G-4.

3 Id.

4 The conservation measures proposed by operators of the C WIS may also likely require the issuance of permits involving these same Federal, State and Tribal fish and wildlife management agencies. The Director or NPDES permitting authority can facilitate the necessary dialog between the interested regulatory parties who all become stakeholders in any proposed conservation measures to ensure that the outcome satisfies the differing objectives and requirements of all involved parties.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management, peer review, and uncertainty analysis is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the usefulness of quantitative analysis, see EPA's response to comment 316bEFR.202.035.

EPA has incorporated many of the principles mentioned by the commenter in the requirements for restoration described in the final rule in sections 125.94 and 125.95.

EPA believes there are many methodologies available to permit applicants and permitting authorities for assessing and implementing restoration measures. For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.338.301

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 21.04

Determination of compliance

Introduction

PSEG Services Corporation ("PSEG") commissioned the preparation of this report which describe alternate approaches for compliance tests that would be required under USEPA's Proposed 316(b) Phase II rule for existing power plants [68 Fed. Reg. 17122-17225, April 9,2002] ("Proposed Rule"). On March 19, 2003, USEPA published a Notice of Data Availability ("NODA") requesting comments on new analyses the agency conducted since the close of the comment period on the proposed Phase II Rule as well as the entire record for this rulemaking. USEPA's Preferred Approach proposes to include national performance standards.

Four different performance standards are defined in the Preferred Approach (125.94(b)). The determination of which of the four performance standards would apply to each facility would depend on the facility's cooling system characteristics and on the source water body. The four performance standards are:

1. Intake capacity commensurate with the use of a closed-cycle, recirculating cooling system; or

2. Reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline if the facility.
a. has a capacity utilization rate less than 15 percent, or
b. has a design intake flow 5 percent or less of the mean annual flow from a freshwater river or stream; or

3. Reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline, and reduction of entrainment of all life stages of fish and shellfish by 60 to 90 percent from the calculation baseline if the facility
a. has a capacity utilization rate of 15 percent or greater, and withdraws cooling water from a tidal river or estuary, from an ocean, from one of the Great Lakes, or
b. has a design intake flow greater than 5 percent of the mean annual flow of a freshwater river or stream; or

4. Reduction of impingement mortality of all life stages of fish and shellfish by 80 to 95 percent from the calculation baseline if the facility withdraws cooling water from a lake (other than a Great Lake) or reservoir <FN 1>

This report addresses the issue of how the percent reduction in entrainment and/or impingement mortality, that would be required by performance standards 2, 3 and 4, would be estimated. Specifically, four alternative approaches for estimating percent reductions in entrainment and/or impingement mortality are described.

Compliance Tests Based on Percent Reduction in Entrainment and Impingement Mortality

Tests of compliance with the national performance standards appear to require estimates of the percent reduction in losses, although the Proposed Rule and the NODA do not provide specific details on how compliance with the performance standards would be determined. Algebraically, percent reduction in losses can be expressed as:

[see hard copy for equations]

Footnotes

1 This performance standard also includes the requirement that if the facility proposes to increase its design intake flow, the increased flow must not disrupt the natural thermal stratification or turnover pattern (where present) of the source water. except in cases where the disruption is determined by any Federal, State or Tribal fish or wildlife management agency(ies) to be beneficial to the management of fisheries.

EPA Response

Today's final rule offers five different compliance alternatives. However, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Alternate Approaches for Estimating Percent Reduction

The four alternate approaches for estimating percent reduction that are described in this report are:

1. Ratio of Losses: Before vs. After
2. Ratio of Ratios
3. Ratio of Mortality Rates
4. Weighted Average Flow Reductions

Each of these approaches is described in the following sections. <FN 2>

For each approach, separate estimates could be made for each taxonomic group (i.e., species with similar properties, with respect to the assumptions of each estimator), and a weighted average of all taxonomic-specific estimates computed as the final result.

A. Ratio of Losses: Before vs. After

This approach would be to estimate P based on an empirical estimate of losses for a period after the technology or operational measure was in place and an empirical estimate of losses for a period prior to putting the technology or operational measure in place:

[see hard copy for equation]

This method is flawed because interannual variability in the abundance of vulnerable organisms can introduce large biases. All other things being equal, the magnitude of losses depends on the abundance of vulnerable organisms in the withdrawal zone of the facility:

[see hard copy for equation]

Therefore, equation (3) would produce estimates that could be seriously biased, depending on the difference in abundance of vulnerable organisms in the two time periods (before and after):

[see hard copy for equations]

B. Ratio of Ratios

This approach relies on a covariate (i.e., an observable quantity that is proportional to the abundance of organisms in the withdrawal zone of the facility):

[see hard copy for equations]

C. Ratio of Mortality Rates

For technologies or operational measures that reduce the mortality rate of fish collected at the intake, the percent reduction in losses can be estimated without a direct estimate of losses. Because the reduction in losses is due to the reduction in mortality rate, the estimate of percent reduction in losses can be based on estimates of percent reduction in mortality rate:

[see hard copy for equations]

D. Weighted Average Flow Reductions

If for the purposes of demonstrating compliance with the national performance standards, it can be assumed (as stated in the Proposed Rule) that entrainment and impingement numbers at a facility are proportionate to intake flows (all other things being equal), then the percent reduction in losses can be estimated based on the schedule of flow reductions.

The annual losses can be viewed as a sum of weekly losses (the subscript, w, indicates calendar week):

[see hard copy for equations]

Applicability of Alternative Approaches

Due to the problem of potential biases, the Ratio of Losses approach should be evaluated carefully on a case-by-case basis before being used to test for compliance with performance standards. The remaining three approaches do not have the same potential for bias, and each would be an appropriate approach depending on the type of technology and/or measure under consideration. Table 1 contains a summary of the approaches that likely would be appropriate for testing compliance with performance standards for entrainment reductions; and Table 2 contains a summary of the approaches that likely would be appropriate for testing compliance with performance standards for reductions in impingement mortality.

Table 1.
Table 2.
[see hard copy for tables]

Footnotes

2 Letters (English and Greek) refer to parameters, hats (^) indicate estimates, and the notation, E[], indicates expectation.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.338.401

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Introduction

PSEG Services Corporation ("PSEG") commissioned the preparation of this report to respond to issues raised concerning the site-specific option included in the United States Environmental Protection Agency's ("USEPA," "EPA," or the "Agency") 316(b) Phase II rule for existing power plants [68 Fed. Reg. 17122-17225, April 9, 2002]. On March ,2003, USEPA published a Notice of Data Availability ("NODA") requesting comments on new analyses the agency conducted since the close of the comment period on the proposed Phase II Rule as well as the entire record for this rulemaking. USEPA's preferred approach proposes to include three compliance options, Compliance Option ID would allow for a site-specific determination of best technology available ("BTA") for minimizing adverse environmental impact ("AEI"). The ability to utilize the site-specific option is not automatic; an applicant must satisfy one of two prerequisites: the cost-cost test or the cost-benefit test.

Regarding the cost-benefit test, the following two key issues have been raised:

1) Are methods available for valuing all of the identified benefits?
2) How can the Agency be assured that all benefits of reducing entrainment and impingement mortality are identified and considered?

In response to the first issue, PSEG and Entergy commissioned National Economic Research Associates ("NERA") to prepare a white paper entitled white paper on the Use of Benefit-Cost Analysis in Site-Specific 316(b) Decisions Under the Clean Water Act. The NERA white paper discusses the economic methodologies available for assessing ecological benefits and demonstrates that valid methods are available for valuing all benefits that might result from reductions in entrainment and impingement mortality. It also provides a more detailed discussion on non-use values, in response to the NODA.

In response to the second issue, PSEG offers the approach suggested in the following sections of this report as a means to ensure that all benefits from reducing entrainment and impingement mortality would be considered in cost-benefit tests applied by facilities that request Compliance Option III.

Suggested Approach

PSEG believes that a comprehensive but tractable site-specific option can be implemented using the benefits analysis process documented in EPA's Guidelines for Preparing Economic Analyses (U.S. EPA 2000) ("Guidelines for Economic Analyses") when used in conjunction with a benefits identification process based on EPA's draft Generic Assessment Endpoints for Ecological Risk Assessments (US. EPA 2002). This approach can be applied successfully with EPA's Preferred Approach and does not hinge upon a determination of AEI.

Background

According to 125.94(a)(3) of the Proposed Rule, an applicant may demonstrate to the Director that a site-specific determination of best technology available for minimizing adverse environmental impact is appropriate for a site. According to 125.94(c) of the Proposed Rule, if the site-specific alternative is chosen, an applicant must demonstrate to the Director either that the cost of compliance with the applicable performance standards would be significantly greater than the costs considered by the Administrator when establishing the standards, or that the cost would be significantly greater than the benefits of complying with the performance standards.

The requirements for calculating the benefits of compliance with the standards are defined in 125.95(b)(6)(ii) of the Proposed Rule. These requirements state that the applicant must use a "comprehensive methodology" to ''fully value" the impacts of impingement mortality and entrainment and the benefits achievable by compliance with the applicable requirement of 125.94.

EPA's Guidelines for Economic Analyses describes types of ecological benefits typically addressed in environmental policy analyses and identifies valuation methods that can be used to monetize these benefits. Both use and non-use values are included in the guidance. To apply the guidance to a site-specific 316(b) determination, it is necessary to identify and quantify improvements in the quantity or quality of ecological resources that provide the benefits. According to EPA's Guidelines for Economic Analyses, this task should be performed by ecologists, using methods found in EPA's Ecological Risk Assessment Guidelines (US. EPA 1998) and other similar documents.

The Ecological Risk Assessment Guidelines ("ERA Guidelines") describe a process for designing, implementing, and documenting ecological risk assessments. This process begins with the identification of specific ecological entities and attributes, termed "assessment endpoints" by EPA, that are the focus of management action. To aid Agency risk assessors in using the guidelines, EPA has prepared a new draft document entitled Generic Assessment Endpoints for Ecological Risk Assessments. The intent of this document, which' was recently released for public review, is to provide Agency risk assessors with a list of assessment endpoints that are consistent with the Agency's programmatic goals, supported by legislative mandates, applicable to a wide array of environmental issues, and quantifiable using existing ecological assessment tools. This report shows how comprehensive benefits studies for site-specific 316(b) determinations could be designed by linking the assessment endpoints described in the Generic Assessment Endpoints for Ecological Risk Assessment to the benefits categories described in the Guidelines for Economic Analyses.

Rationale

The Guidelines for Economic Analyses are intended to establish a sound scientific framework for economic analyses of environmental regulations and policies, applicable to all agency programs. These guidelines have been reviewed by the EPA Science Advisory Board to ensure that they are scientifically sound and consistent with mainstream practices in environmental economics. The benefits and valuation methods discussed in Chapter 7 of the guidance should be adequate to support a comprehensive analyses of benefits associated with reductions in entrainment and impingement losses.

Although it has not yet completed agency review, the report on Generic Assessment Endpoints for Ecological Risk Assessments is similarly intended to establish a sound scientific framework for selecting ecological assessment endpoints that capture all relevant and significant environmental values that could be affected by a risk management action. The document is a product of several years of work by an EPA Technical Panel composed of experts drawn from across the agency, including the Office of Water. Although the document was not intended to provide a final, exhaustive list of all possible endpoints relevant to ecological risk assessment or benefits analysis, it should provide a reasonable starting point for identifying environmental values that could be affected by a reduction in entrainment and impingement losses.

Appendix B of the Generic Assessment Endpoints for Ecological Risk Assessments identifies correspondences between the generic assessment endpoints developed in the report and benefits categories drawn from a variety of published sources. The following table identifies similar correspondences between the generic assessment endpoints and the benefits categories shown in Exhibit 7-1 of the Guidelines for Economic Analyses. Because the four categories in Exhibit 7-1 are intended to be exhaustive of all possible types of ecological values, all of the assessment endpoints and associated benefits can be accommodated.

[see hard copy for table]

Summary of Suggested Approach for Identifying Ecological Benefits

The suggested approach begins with consideration of a full list of ecological endpoints and a full list of categories of ecological benefits. The approach then identifies a subset of endpoints and categories of benefits that are relevant to a specific CWIS through a sequential process of elimination.

The first step of the approach is the identification of relevant generic ecological endpoints, i.e., the types of endpoints that potentially could be affected by the CWIS. The second step is to identify site-specific ecological endpoints for each relevant generic ecological endpoints. The third step is to identify data and information sources that can be used to assess each site-specific endpoint. The fourth step is the determination of which site-specific ecological endpoints are adversely affected by CWIS, based on the data and information identified in Step 3. In the fifth step, the categories of ecological benefits that would be affected by each relevant site-specific ecological endpoint are identified. The final step is the quantification of effects of reductions in impingement and entrainment on the final site-specific ecological endpoints.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 18.0

Discussion of Site-Specific Approaches

Illustrative Example of Implementing the Suggested Approach

This section demonstrates, through an example, how the suggested approach can be implemented. The example, which is based on conditions at the Salem Generating Station ("SGS") on Delaware Estuary, is for illustrative purposes only. Accordingly, details are omitted to keep the example simpler and easier to understand.

As noted above, the suggested approach would begin by initially considering a full list of generic ecological endpoints and a full list of categories of ecological benefits. For this example, the list of generic ecological endpoints is taken from EPA's Generic Assessment Endpoints for Ecological Risk Assessments - External Review Draft (EPA/630/P-02/004A), and the list of categories of ecological benefits is taken from EPA's Guidelines for Preparing Economic Analyses (EPA 240-R-00-003). The following table depicts the initial set of endpoints and benefits categories that would be considered:

[see hard copy for table]

Step 1 - Identification of Relevant Generic Ecological Endpoints

This step would be conducted as a process of elimination, with all generic ecological endpoints initially included. For the SGS example, the following generic ecological endpoints would be eliminated from consideration for the reasons listed in the following table:

[see hard copy for tables]

Step 2 - Identification of Site-Specific Ecological Endpoints

For each generic ecological endpoint not eliminated from consideration in Step 1, site-specific endpoints would be identified in Step 2. This step includes identification of species of organisms and geographic areas potentially affected by the CWIS. For the SGS example, three categories of potentially affected species have been identified: (1) commercially and recreationally valuable fish and shellfish species, (2) forage fish and shellfish species, and (3) threatened and endangered species. Also for the SGS example, the geographic area under consideration is the Delaware Estuary. Accordingly, the following site-specific ecological endpoints are identified:

[see hard copy for table]

Step 3 - Identification of Information Sources

In this step, data and information requirements for determining whether the CWIS adversely affects each identified site-specific ecological endpoint are identified. Because the SGS has for many years been conducting environmental assessments to address environmental regulations, it already has compiled a wealth of information to address the effects of its CWIS on the relevant site-specific ecological endpoints. However, in general, some new data collection and analysis might be required. Sources of information to address the relevant site-specific ecological endpoints are listed in the following table:

[see hard copy for table]

Step 4 - Determination of Which Site-Specific Ecological Endpoints Are Adversely Affected by CWIS

This step, like Step 1, removes ecological endpoints from consideration by a process of elimination. An ecological endpoint would be removed from consideration only if positive evidence were available to support the contention that the CWIS did not adversely affect the endpoint. Data and information identified in Step 3 would be used in this step to determine whether the CWIS adversely affected each of the relevant site-specific ecological endpoints. This Step is not intended to be an assessment of the presence or absence of AEI. Rather, this step is intended simply to determine whether the operation of the CWIS would cause a negative effect on the endpoints. Accordingly, no definition of AEI is required.

For the SGS example, the data and information identified in Step 3 were collected and analyzed as part of assessments of the ecological effects of the SGS on the Delaware Estuary. Therefore, analyses needed to support determinations of the type and extent of effects of the SGS CWIS on the identified ecological endpoints have already been conducted, and the results of those analyses have been reviewed by regulatory agencies. The results of those determinations are summarized in the following table:

[see hard copy for table]

Based on the determinations summarized in above, the final list of site-specific ecological endpoints that would have to be included in the benefits assessment for SGS would be the following:

[see hard copy for table]

Step 5 - Identification of Categories of Benefits That Are Affected by Final Site-Specific Ecological Endpoints

As discussed in EPA's Guidelines for Economic Analyses, and in the NERA white paper, not all categories of ecological benefits would be affected by changes in each ecological endpoint. For example, an increase in the production of forage fish due to a reduction in entrainment would not affect market benefits because forage fish are not harvested by fisheries. However, an increase in the production of forage fish would affect the ecosystem service of trophic transfer by making more food available to predator and scavenger species of fish and shellfish. The purpose of this step is to identify which categories of ecological benefits would be affected by the final site-specific ecological endpoints.

For the SGS example, the following table lists the ecological benefit categories that would be affected by the final site-specific ecological endpoints (ie., the endpoints remaining after the elimination process of Step 5):

[see hard copy for table]

For commercially and recreationally valuable fish and shellfish, the market benefit that would be affected by an increase in population-level production (resulting from a decrease in kills of organisms) would be an increase in harvests. The non-market benefit that would be affected would be an increase in the catch rate in the recreational fishery. For forage fish and shellfish species, the indirect benefit that would be affected by an increase in population-level production (resulting from a decrease in killed organisms) would be an increase in the food available to predator and scavenger species of fish and shellfish.

It should be noted that if other ecological endpoints had been retained through the process of elimination, then additional categories of ecological benefits might have to be considered. For example, if the extirpation of a species could not be eliminated from consideration (e.g., based on analysis of empirical data on long-term trends in abundance), then non-use benefits related to the existence value of those species would have to be assessed.

Step 6 - Quantification of Effects of Reducing, Impingement and Entrainment

The final step of the suggested approach is to quantify the effects on the final site-specific ecological endpoints that would result from reducing impingement and entrainment.

For the SGS example, the effects of reduced impingement and entrainment on commercial harvests and recreational catch rates would be estimated using fisheries models and estimates of age-0 natural mortality rates for the affected species of fish and shellfish. The effects of reduced impingement and entrainment on trophic transfers by forage species would be estimated using production foregone models and estimates of trophic transfer efficiencies.

EPA Response

While EPA rejected a purely site-specific approach, EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

While a risk-based approach may be useful to a facility seeking a site-specific determination of best technology, EPA disagrees that a determination of whether an adverse environmental impact is occurring is a preliminary step in implementing 316(b). Please refer to the response to comment 316BEFR.313.001 for more information on EPA's position on minimum impacts at existing facilities.

Comment ID 316bEFR.338.501

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Introduction and Overview

The United States Environmental Protection Agency ("EPA", or "the Agency") is engaged in the development of rules to guide decisions regarding implementation of §316(b) of the Clean Water Act. The Agency has developed a Proposed Rule that includes the option of making site-specific demonstration of the best technology available ("BTA").

This White Paper develops general conclusions and recommendations regarding the use of benefit-cost analyses in §316(b) decisions. Specifically, we come to the following four major conclusions:

1. Benefit-cost analysis provides a sound methodological basis for informing decision-makers about §316(b) alternatives for individual sites.

2. Sound methodologies are available to quantify the dollar values of the principal benefits components that arise in individual cases.

3. Benefit-cost analysis can be implemented effectively.

4. The complexity (and cost) of the benefit-cost analysis can be tailored to the size of the potential environmental risks in each case.

Benefit-Cost Methodology Provides a Sound Conceptual Basis for Evaluating BTA Alternatives for Individual §316(b) Decisions

Although the French engineer Jules Dupuit developed the basic elements of benefit-cost analysis more than 150 years ago, the first major applications were developed in the 1930s to evaluate water resource projects (Portney 2002). The technique has been in widespread use for the half century since World War II as the principal analytical framework used to evaluate public decisions (Stokey and Zeckhauser 1978). The extensive experience with benefit-cost studies—as well as the decades of research on the conceptual and empirical underpinnings of specific applications—indicates that the benefit-cost methodology provides a sound basis for evaluating public policy alternatives, including those related to site-specific §316(b) BTA alternatives.

Benefit-Cost Analysis Helps to Organize Information on the Effects of §316(b) Alternatives

One of the fundamental contributions of a benefit-cost analysis is to ensure a reasoned, responsible accounting of all relevant positive and negative effects of alternative policy choices. The basic steps can be summarized as follows (adapted from Stokey and Zeckhauser 1978 and U.S. EPA 2000):

1. Identify §316(b) alternatives. Identify the technical alternatives, in this case, the possible methods of reducing fish losses at a given cooling water intake structure.

2. Determine the effects of alternatives. Use sound scientific and technical methodologies to determine the effects on society, both favorable and unfavorable, of the various alternatives. The favorable effects are considered benefits and the unfavorable effects are considered costs.

3. Value the effects to the extent feasible in dollar terms. Use sound economic methodologies to assess the social value of the various benefits and the social costs due to the technical alternatives, to the extent practicable. For effects that cannot practically be valued, provide quantitative or qualitative information.

4. Calculate net benefits and identify other effects of alternatives. Calculate the net benefits (i.e., benefits minus costs) of each alternative. Provide the additional quantitative and qualitative information for the alternatives as well.

5. Consider the sensitivity of the results to major parameters and uncertainties. Determine whether changes in basic parameters—such as the discount rate used to translate benefits and costs over time into present values—affect the results.

This organization of information provides decision makers with a careful sorting out of the various effects that alternatives have on social welfare, as measured by the values that households place on benefits and costs. In contrast, alternatives such as the use of various ad hoc criteria (e.g., required application of a certain technology) tend to obscure, rather than illuminate, the effects of alternative policies; requiring a specific control technology, for example, provides no information on whether the benefits of applying the technology in a specific situation would outweigh the costs, and, therefore, whether the technology installation is appropriate.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

EPA Comprehensive Guidelines for Benefit-Cost Studies Should Apply to §316(b) Decisions

The assessment of costs, benefits, and economic impacts of rules is mandated by Executive Order 12866, which also establishes a formal review process under which the federal Office of Management and Budget ("OMB") reviews regulatory impact assessments developed to support significant rulemakings. Under Executive Order 12866, OMB ordinarily has required complete benefit-cost analyses for any proposed or final rule with projected annual benefits or costs of $100 million or more. Thus, for many years, EPA has prepared a benefit-cost analysis for virtually every major regulatory action. Indeed, an economic analysis was a key part of EPA's 316(b) Phase II Existing Facility Proposed Rule (U.S. EPA 2002a, 2002b).

EPA also has provided important guidelines for conducting Benefit-Cost Analysis, first in 1983 (U.S. EPA 1983) and more recently in 2000 (U.S. EPA 2000). EPA's Guidelines for Preparing Economic Analyses (2000) (hereafter, EPA Guidelines or Guidelines) is a comprehensive document that provides detailed guidance on the key concepts involved in developing a benefit-cost analysis. The EPA Guidelines were thoroughly reviewed by the Environmental Economics Advisory Committee of EPA's Science Advisory Board, comprised of thirteen well-recognized economists

EPA Response

EPA agrees that EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003) are relevant. The Agency points out that the approach to benefit cost analysis of the final Section 316(b) Phase II rule is consistent with principles outlined in the EPA's Guidelines for Preparing Economic Analyses, United States EPA (EPA 240-R-00-003). For detail see the final Phase II Regional Studies Document (DCN #6-0003) and the final Phase II EBA document (DCN #6-0002).

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

EPA Guidelines for Benefit-Cost Analysis Offer Useful Categories of Benefits and Costs That Can Readily Be Applied to §316(b) Decisions

Although developed for federal agency regulations, the EPA Guidelines provide a framework that can be applied to §316(b) decisions. As explained in the EPA Guidelines, a Benefit-Cost Analysis is constructed by considering the categories of benefits and costs that are applicable to the issue at hand, in this instance a §316(b) decision.

Benefits

The EPA Guidelines provide a framework for assessing benefits that emphasizes an "effect-by-effect" approach for valuing the benefits of an environmental program, such as the issuance of a §316(b) determination. (U.S. EPA 2000, pp. 62-66) As described in the Guidelines, this approach consists of three sequential stages: (1) identifying the physical effects of a prospective policy or possible decision; (2) quantifying the significant physical effects; and (3) estimating the values of these effects.

The Guidelines provide a convenient taxonomy of physical effects, separating them into human health benefits, amenities, ecological benefits, and materials damage. Figure 1 provides the detailed lists for the various categories.

Table 1. Benefit Categories in EPA Guidelines
[see hard copy for table]

The Guidelines provide a summary of the benefit categories relevant to an assessment of ecological benefits, the general category that is relevant for §316(b) decisions. As noted in Table 1, the ecological benefits that could potentially result from reductions in entrainment and impingement losses due to application of BTA to a cooling water intake structure can be divided into four categories:

1. market benefits associated with catching and consuming fish and other marine life;

2. non-market benefits associated with recreational fishing and other activities;

3. indirect benefits that feed into other activities valued by humans; and

4. nonuse benefits that include those benefits not associated with any direct human use; in concept, this category could encompass a general concern about the fate of marine life or ecosystems that would be affected by choices of BTA, apart from any direct or indirect effects on individual humans.

Figure 1, taken from the Guidelines, provides another way of organizing these categories based on how they are experienced and where they fall along a private good/public good continuum.

Figure 1. Summary of Classification Scheme from EPA Guidelines
[see hard copy for figure]

Social Costs

The other side of the ledger is represented by the costs to society of adopting a proposed program. The EPA Guidelines identifies five basic components of social costs:

1. real-resource compliance costs, which comprise the real resource cost to the entities that would have to undertake actions as a result of the policy in question;

2. government regulatory costs, which are costs to the government of monitoring, administering and enforcing compliance with the proposed policy;

3. social welfare losses, which are losses in producer and consumer surplus that can be attributed to the proposed policy's effects on prices and production of goods and services;

4. transitional costs, which include the value of resources displaced as a result of a new policy and the costs of reallocating these resources and could include the cost to society of the dislocation caused by unemployment, for example; and

5. indirect costs, which include any adverse effects on product quality, productivity, and innovation, and include changes in markets indirectly affected by the policy in question (U.S. EPA 2000).

The most significant component of the total costs for regulatory requirements typically is the value of the real-resource compliance costs. The EPA Guidelines, for example, state:

The largest fraction of direct social costs arises from the real-resource costs due to the new regulation. These new compliance costs arise from the installation, operation, and maintenance of new capital equipment, or are a result of changes in the production process that raise the price of producing the good. (U.S. EPA
2000, p.119)

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

Comment ID 316bEFR.338.504

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

In Short, Benefit-Cost Analysis Is Well-Suited to Developing the Benefit and Cost Information That should Be Considered as Part of a 316(b) Permit Process

Benefit-cost analysis is a sound methodology that has been developed over many decades to provide information on the effects of alternative public decisions, both for general rules and individual decisions. This sound methodology is well suited to BTA determinations for individual sites.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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RFC: Test: benefits should justify the costs

REVIEW OF ALL POTENTIAL BENEFIT CATEGORIES REVEALS THAT ONLY A RELATIVELY SMALL NUMBER OF CATEGORIES GENERALLY APPLY TO §316(b) BTA ALTERNATIVES

One of the major potential concerns with the application of benefit-cost analyses relates to completeness—how can we be sure that all relevant benefits and costs are included in the analysis? Indeed, this issue of completeness was raised by EPA in its overall national benefit assessment (U.S. EPA 2002a) and has been noted by various commenters critical of the use of benefit-cost analysis in §316(b) contexts (see, e.g., Ackerman 2002). These concerns tend to focus on the completeness of the benefit estimates rather than the completeness of the costs, and thus these comments address benefits rather than costs. (The roadmaps provided in the next section provide guidance for developing complete cost assessments.)

It is of course neither possible nor appropriate to establish a "perfection standard" for when a specific empirical assessment of benefits and costs is complete. Rather, the appropriate question is whether the analysis is sufficiently comprehensive to ensure that significant benefits or costs are not omitted in a particular application of a §316(b) benefit-cost assessment. With respect to benefits, this issue devolves into two questions:

1. Does the list of endpoints included in the benefit-cost assessment identify the vast majority of the potential benefits?

2. Do the specific methodologies that are used to value benefits account for the vast majority of the relevant benefits?

This section addresses the first of these questions both through reference to the EPA Guidelines—which provide an exhaustive list of potential benefit categories—as well as other economic literature. The next section addresses the second question, also using information in the EPA Guidelines supplemented by other economic literature.

The EPA Guidelines for Preparing Economic Analyses Provide an Exhaustive List of Potential Ecological Benefit Categories That Are Relevant for §316(b) Decisions

As noted above, EPA developed a broad classification of the potential benefits from environmental policies, including the categories that are involved, examples of each of the categories, and methods that are used to develop dollar values of benefits for each category. This classification is consistent with those that have been developed by economists in similar contexts (see, e.g., Freeman 1993). The benefits are divided into four major categories: (1) human health; (2) amenities; (3) ecological benefits; and (4) materials damage. The third category is the one relevant for §316(b) benefit-cost analyses.

Table 2 reproduces the classes of ecological benefits from the EPA Guidelines. Four subcategories of ecological benefits are identified:

1. market products;

2. non-market recreation and aesthetic effects;

3. indirect ecosystem effects; and

4. nonuse existence and bequest values.

Table 2. Benefit Categories Relevant for Projects Such as §316(b) Permits that Provide Ecological Benefits
[see hard copy for table]

Since the four categories are exhaustive—covering all possible ecological benefits—the next step is to determine which specific service flows are relevant for §316(b) investigations. As emphasized in the EPA Guidelines, this function is performed by environmental scientists (U.S. EPA 2000, p. 71).

The framework developed by EPA provides a process for sorting through the factors that are likely to be relevant in §316(b) decisions. Below, we offer general conclusions regarding each of the four EPA categories based upon the nature of the potential §316(b) effects and experience of scientists in performing the biological assessments of the effects of cooling water intake structures (AKRF, mc, and LWB Environmental Consulting, Inc., 2003, hereafter "AKRF-LWB 2003" and Barnthouse et al. 2002).

EPA Response

The commenter summarizes the classes of ecological benefits from the EPA Guidelines and states that "the framework developed by EPA provides a process for sorting through the factors that are likely to be relevant in section 316(b) decisions." EPA agrees with this statement.

For EPA's response to comments on the use of benefit cost analysis in the context of the section 316(b) regulation, please see comment #316bEFR.005.020.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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RFC: Test: benefits should justify the costs

Commercial Fishing Benefits Are the Only "Market Benefits" Relevant for §316(b) Evaluations

The EPA Guidelines note that market benefits consist of primary products that are bought and sold as factors of production or final consumption products. Increases in the numbers of fish, the adults of which are caught by commercial fishermen and wind up being sold in various fish markets throughout the United States, if demonstrated, would constitute potential market benefits.

Thus, §316(b) evaluations should consider potential commercial fishing benefits. But this is the only plausible "market benefit" affected by 316(b) alternatives. The other service flows mentioned in the EPA Guidelines—fuel, fiber, timber, and fur— would not be affected by 316(b) alternatives and, thus, no other commercial categories would be relevant. Reducing impingement and entrainment would not increase fuel, fiber, timber, fur or other marketed goods and services

EPA Response

In the cost-benefit analysis for the final Section 316(b) Phase II rule, EPA only considers market impacts in the commercial fishing sector.

For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits please see the response to comment 316bEFR.005.029.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Recreational Fishing Benefits

Recreational Fishing Benefits Generally Are the Only "Non-Market Benefits" Relevant for §316(b) Evaluations

The EPA Guidelines note that recreational opportunities and aesthetic qualities provided by ecosystems also are experienced directly by individuals, albeit in a non-market setting. The Guidelines distinguish between two subcategories of benefits for consideration in Benefit-Cost

Analysis:

1. consumptive uses, such as recreational fishing and hunting; and

2. non-consumptive uses, such as wildlife viewing or boating.

Increases in the number of fish, including many species whose adults are valued by recreational anglers, if demonstrated, could yield potential recreational benefits. Thus, the consumptive use of recreational fishing will be relevant for §316(b) evaluations. In contrast, non-consumptive uses—such as wildlife viewing or boating—are not likely to be positively affected by §316(b) alternatives. There may be some rare exceptions if the increased fish populations affected households' wildlife viewing or boating experiences. Based upon the assessments in AKRF-LWB(2003) and Barnthouse et al. (2002), such non-consumptive uses are not likely to be affected by §316(b) alternatives.

Thus, §316(b) evaluations should consider recreational fishing benefits. The other non-market service flows mentioned in the EPA Guidelines—swimming, hiking, and scenic vistas—either would not be affected by §316(b) alternatives and thus would not be relevant or likely would be insignificant or even negative. It is possible, for example, that reducing the amount of heated water by installing a closed cycle system could decrease swimming enjoyment, in which case the change would constitute a cost rather than a benefit.

EPA Response

EPA disagrees that the 316(b) regulation will have no impact on non-consumptive uses such as wildlife viewing (including scuba diving) or boating. Improvements in aquatic habitat and the resulting increase in the number of fish are likely to enhance the recreational experience of recreational users other than fishers. For example, scuba divers prefer to visit locations with more abundant aquatic life; boaters often engage in secondary activities such as fishing; recreational experience of beach goers is likely to be enhanced by wildlife observation. The Agency, however, was unable to quantify or monetize these benefits due insufficient data. Instead, EPA discussed benefits associated with enhanced non-consumptive uses of the affected fishery resources qualitatively. See Chapter A9, Economic Benefit Categories in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003).

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Ecological Evaluation Methodology

If Non-Adult Commercial and Recreational Fish Are Incorporated in Those Other Categories, Forage Fish Benefits Generally Would Be the Only "Indirect Ecosystem Service" Relevant for §316(b) Evaluations

The EPA Guidelines note that ecosystem benefits to users can include indirect benefits in the form of ecosystem services. The Guidelines provide examples of these indirect benefits for different types of ecosystems. For example, the EPA Guidelines note that estuaries provide nursery habitat for early life stage or juvenile fish and a refuge that indirectly provides benefits because the early life stage fish eventually yield adult fish that are valued for their commercial and/or recreational uses.

Biological modeling indicates that cooling water intake structure modifications can, in theory, lead to two general types of ecosystem services that provide indirect benefits, i.e., benefits beyond the adults valued as commercial or recreational species (AKRF-LWB 2003, Barnthouse et al. 2002):

1. Increases in the numbers of early life stages ("pre-adult") fish, some of which will grow to become adult fish valued for their commercial and/or recreational uses. The "preadult" group is the one noted specifically in the EPA Guidelines.

2. Increases in the numbers of forage fish, which provide additional food available to predator and scavenger species of fish and shellfish that are valued for their commercial and recreational values.

Thus, a complete benefit-cost analysis of §316(b) alternatives would develop estimates of any indirect benefits due to changes in the numbers of early life stage fish (for species valued for commercial and/or recreational values) as well as due to any changes in the numbers of various forage fishes. If, however, the calculations of commercial and recreational catch include estimates of the numbers of adults linked to the change in early life stage fish, the first of these sub-categories would be included in the "direct" benefit categories. In that case, only forage fish changes would be included as an indirect ecosystem effect in a §316(b) evaluation. Note that the many other indirect ecosystem services identified in the EPA Guidelines—climate moderation, flood moderation, groundwater recharge, sediment trapping, soil retention, nutrient cycling, pollination by wild species, biodiversity/genetic library, water filtration, soil fertilization, and pest control—do not seem relevant for §316(b) determinations.

EPA Response

As the commenter observes, EPA's estimates of foregone commercial and recreational yield resulting from impingement and entrainment implicitly include the early life stage fish that are ultimately recruited to the fishery. Fishery yield is the one direct use benefit category in EPA's analysis.

EPA evaluates indirect use benefits by estimating the contribution of forage species to yield as a result of the consumption of forage fish by harvested species using a simple trophic transfer model, as described in Chapter A5 of Part A of the Phase II Regional Analysis Document (DCN #6-0003).

Chapter A9 of the Regional Analysis Document (DCN # 6-0003) provides information on EPA's benefits methods for the final 316b Phase II rule. EPA disagrees with the commenter that recreational and commercial fishing are the only services of value that are provided by fish. In addition to their importance in providing food and other goods of direct use to humans, the organisms lost to I&E are critical to the continued functioning of the ecosystems of which they are a part. Fish are essential for energy transfer in aquatic food webs, regulation of food web structure, nutrient cycling, maintenance of sediment processes, redistribution of bottom substrates, the regulation of carbon fluxes from water to the atmosphere, and the maintenance of aquatic biodiversity (Peterson and Lubchenco, 1997 ,DCN #4-1899; Postel and Carpenter, 1997, DCN #4-1912; Holmund and Hammer, 1999, DCN # 4-1612; Wilson and Carpenter, 1999 DCN #6-2020). Examples of ecological and public services potentially disrupted by I&E include:

- decreased numbers of ecological keystone, rare, or sensitive species;
- decreased numbers of popular species that are not fished, perhaps because the fishery is closed;
- decreased numbers of special status (e.g., threatened or endangered) species;
- increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;
- disruption of ecological niches and ecological strategies used by aquatic species;
- disruption of organic carbon and nutrient transfer through the food web;
- disruption of energy transfer through the food web;
- decreased local biodiversity;
- disruption of predator-prey relationships;
- disruption of age class structures of species;
- disruption of natural succession processes;
- disruption of public uses other than fishing, such as diving, boating, and nature viewing; and
- disruption of public satisfaction with a healthy ecosystem.

These services are not captured by a simple analysis of commercial and recreational fishing benefits. This is a significant concern in the context of the 316b rulemaking because some 98% of the species lost to I&E are not commercial or recreational fishery species.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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General Comments on Valuation Approaches

Whether Nonuse Values Are Relevant Is Highly Site-Specific

The EPA Guidelines note that some benefit categories are not associated with any direct use by either individuals or mankind. These nonuse benefits may arise if individuals value an ecological resource without using it or even enjoying the option to use it in the future. The Guidelines note various circumstances in which nonuse benefits might arise.

-knowledge that the resource exists in an improved state;

-bequest values for future generations;

-altruistic values for others' enjoyment of the resource; and

-commitment to environmental stewardship.

Although these provide some sense of the circumstances that might give rise to nonuse values, they do not provide much guidance on when such values are likely to be significant. Indeed, because such values can be empirically estimated only with the use of "stated preference" (sometimes referred to as "contingent valuation") surveys—which are complicated and relatively expensive to develop and implement—it is important to determine the factors that lead to significant nonuse values.

The literature on nonuse valuation provides some guidance on the situations in which nonuse values may be significant. In his still-definitive text on measuring environmental and resource values, Freeman (1993) reviews the literature on nonuse values, considering the situations in which nonuse values are likely to be important. He notes that there is an important distinction between degradation of a natural resource and the risk of its destruction. Freeman establishes that nonuse values are not necessarily significant. He concludes by noting that, while the literature is unresolved on this issue, nonuse values are likely to be important when the resource in question is special or unique and the loss or injury is irreversible (or subject to a prolonged recovery):

Another important question is, when are nonuse values likely to be important? The long literature on nonuse values emphasizes the uniqueness or specialness of the resource in question and the irreversibility of the loss or injury. For example, economists have suggested that there are important nonuse values in preserving the Grand Canyon in its natural state and in preventing the global or local extinction of species and the destruction of unique ecological communities. In contrast, resources such as ordinary streams and lakes or a subpopulation of a widely dispersed wildlife species are not likely to generate significant nonuse values because of the availability of close substitutes. Moreover the literature does not suggest that nonuse values are likely to be important where recovery from an injury is quick and complete, either through natural processes or restoration (Freeman 1993, p. 162, emphasis added).

Thus, Freeman's (1993) review of this literature suggests two operative criteria for evaluating whether nonuse value for fish protection is likely to be important:

1. the resource is unique; and

2. the fish protection would prevent losses to the resource that would be irreversible or subject to a long recovery period.

If both of these criteria are not met, Freeman (1993) suggests that the nonuse values are likely not to be important. (Note that the issue of when nonuse benefits are likely to be significant is not addressed in the EPA Guidelines.)

With regard to §316(b) evaluations, these two factors clearly are empirical questions that would need to be assessed in individual circumstances. Recent biological assessments related to individual §316(b) assessments (AKRF-LWB 2003 and Barnthouse et al. 2002) indicate that fish protection alternatives would not lead to a given species being viable that otherwise would not be viable. Thus, in these cases, nonuse benefits would be unlikely to be significant.

Although there may be a temptation to include nonuse benefits as a category in §316(b) evaluations—because of the possibility that such benefits may be significant—it is important also to consider the costs and other difficulties of developing reliable information. As the EPA Guidelines indicate, in applying the benefit-cost framework, it is important to focus on key issues:

Focus on key issues. Resources should be focused on benefit categories that are likely to influence policy decisions. To use time and resources effectively, analysts must weigh the costs of conducting additional analysis against the usefulness of the additional information provided for decision-making. The analysis should devote significant time and resources to carefully assessing those benefit categories that are likely to influence the selection among policy options…[S]ome benefit categories may not be assessed either because they are expected to be small or because the costs or time needed to quantify them far exceed the time or resource levels appropriate for analysis of the particular policy. (U.S. EPA 2000, p. 65)

These considerations mean that it may not be necessary to evaluate nonuse benefits in many §316(b) benefit cost analyses, although there may be some specific situations in which nonuse benefits should be considered. Combining the Freeman (1993) criteria described earlier and the EPA Guidelines suggests that nonuse benefits should be assessed when two conditions are met:

1. information indicates that fish protection alternatives (a) affect a unique or special resource and (b) would remove an irreversible impact on the resource (or one subject to a long recovery period); and

2. the likely value of the information on nonuse benefits would be greater than the costs of developing the information.

In sum, it would be sensible to attempt to value nonuse benefits only if there is a strong reason to believe the benefits would be significant and that their inclusion would affect policy decisions, i.e., the choice of BTA in a particular case.

EPA Response

For the final 316b rule analysis, EPA has not included quantitative measures of nonuse values. The Agency, however, has explored several methods that indicate the potential significance of non-use values, including meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer; comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Benefit Estimation Methodology

Sound Methodologies are Available to Develop Dollar Values for the Relevant §316(b) Benefit Categories

After relevant benefit categories are identified and scientists quantify the physical effects, dollar values of the benefits need to be developed. As noted above, the EPA Guidelines provide a useful means of categorizing the potential ecological benefits according to how they are experienced and where they fall along a private good/public good continuum. Figure 2 reproduces the figure from the EPA Guidelines, which we have supplemented by addition of the specific categories noted above as relevant for §316(b) evaluations. As EPA notes, this categorization helps direct analysts to suitable valuation methods.

Figure 2. Ecological Benefits Classification Scheme
[see hard copy for figure]

This section summarizes the methodologies that have been developed by economists to value these various effects, which are the methodologies recommended in EPA's Guidelines. Before discussing the specific techniques that are used to develop values for specific categories, it is useful to describe benefits transfer, a methodology for using the results of previous studies to develop dollar values for any type of benefit category.

The Benefit Transfer Approach Can Reduce the Cost and Increase the Reliability of Benefit Assessments When the Approach is Used Correctly

Benefit transfer techniques take advantage of the stock of existing studies—often done by academic or public agency researchers—by "transferring" the results of the various studies to a particular policy case.

The EPA Guidelines provide a concise statement of the advantages of the benefit-transfer approach. As the Guidelines note,

The advantages to benefit transfer are clear. Original studies are time consuming and expensive; benefit transfer can reduce both the time and financial resources needed to develop benefit estimates... Additionally, while the quality of primary research is unknown in advance, the analyst performing a benefit transfer is able to gauge the quality of existing studies prior to conducting the transfer exercise. (U.S. EPA 2000, p. 86)

The advantages of benefits transfer assume that the benefit transfer study has been appropriately undertaken, as discussed below, and relies on relevant studies.

The EPA Guidelines provide a list of well-established steps (consistent with the existing literature on benefit transfer methodologies) that should be carried out to develop a reliable benefit-transfer study.

These steps include the following:

1. Describe the policy case. This step involves describing the nature of the policy and the populations affected. In the context of §316(b) recreational benefit assessments, for example, this would involve identifying the types of fishing experiences and fishermen potentially affected.

2. Identify existing, relevant studies. The literature search to identify studies should include published studies, as well as the "gray" literature (government publications, unpublished research, works in progress).

3. Review available studies for quality and applicability. The quality assessment involves evaluating the soundness of the data and methods used. The applicability assessment involves determining whether the available studies are comparable to the policy case. Specifically,

-the basic commodities must be essentially equivalent;

-the baseline and extent of change should be similar; and

-the affected populations should be similar.

4. Transfer the benefit estimates. This step involves using the existing studies to develop the transfer estimate. Four types of benefit transfer methods are possible: (1) point estimates; (2) benefit function; (3) meta-analysis; and (4) Bayesian techniques.

5. Address uncertainty. This final step involves describing the various assumptions that are being made as well as other major sources of uncertainties in the benefit estimates.

The four methods of benefits transfer differ in their applicability and likely accuracy. The EPA Guidelines note that the direct transfer of a "point estimate" (i.e., exact value for a given benefit, such as the value per additional recreational fish caught) is not likely to be appropriate, because the specific circumstances that determine value are likely to differ. The benefit function method is likely to be more accurate because one would be able to substitute the site-specific features into the function. As the EPA Guidelines note, the most rigorous benefit approach uses meta-analysis, a statistical method of combining a number of valuation estimates that allows the analyst to develop a statistical function relating to variation in value estimates across studies; as with the benefit function approach, the site-specific values would be substituted into the resulting function. The Bayesian approach is a less common alternative to meta-analysis in which case study information is combined with prior information.

EPA Response

The comment summarizes EPA's Guidelines regarding the benefit transfer method and its proper application, and does not comment on specific aspects of EPA's analysis.

For the final Phase II 316(b) analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. For detail on the benefits transfer approach used at proposal, see response to comment #316bEFR.075.504.

In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region. Where benefit transfer is used, EPA has followed generally accepted procedures, and has carefully applied benefit transfer methods.

For the North Atlantic region, EPA's benefit transfer uses the benefit function from the Hicks, et al. (1999), study recommended by several of those who commented as the most appropriate study for benefit transfer for the North Atlantic region (DCN #4-1603). By using benefit function transfer, EPA was able to make appropriate adjustments to Hicks' model, to estimate values for relevant changes in catch rates. This benefit function transfer follows accepted methods and was performed carefully to provide the best available estimates of values for changes in catch rates for the North Atlantic region.

For the Inland region, EPA did a benefit transfer using values from several studies. EPA generally followed its Guidelines for Preparing Economic Analyses for benefits transfer (BT) in developing a benefits transfer approach for the Inland region. The steps were followed as recommended in the Guidelines when using BT: (1) describe the policy case; (2) identify existing, relevant studies; (3) review available studies for quality and applicability; (4) transfer the benefit estimates; and (5) address uncertainty. Further information on the methods EPA used to estimate recreational fishing benefits for the Inland region is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See Chapter H4: Recreational Fishing.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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Commercial Fishing Benefits

Commercial Fishing Benefits Can Be Quantified Based Upon Readily Available Data on Commercial Fishing Prices

Benefits due to additional commercial catch can be developed using conventional economic analysis of the likely gains to producers (i.e., commercial fishermen, wholesaler and retailers) and consumers due to demonstrated changes in the commercial fishery. These analyses, however, are complicated by the "open access" nature of most commercial fisheries, which means that much (or all) of the potential additional producers surplus ("profits") due to increases in the productivity of the commercial fishery tends to be dissipated as fishermen respond by increasing fishing activity. This phenomenon has been dubbed "the tragedy of the commons" (Hardin 1968) because of the early "open access" example of grazing on the English commons—no individual owner ultimately gained any advantage from the common property because none had an incentive to maintain its productivity. The same effect occurs for commercial fishing in the form of "overfishing."

Increased Net Revenues to Commercial Fishermen

The beginning step for estimating commercial fishing benefits is a set of estimates of commercial fishing prices. Values for the ex vessel prices (i.e., prices that fishermen receive at the dock for their catch) of various commercial species are available from the National Marine Fisheries Service ("NMFS"), which publishes values annually. These values differ by location and of course vary over time and based upon other factors. Although it would be desirable to have projected prices—since commercial benefits, if any, from a §316(b) technology could extend into the future for several decades—such projected prices typically are not available and average prices in the recent past typically are used. Multiplying the set of commercial ex vessel prices times the demonstrated increase in commercial catch provides an estimate of the potential additional gross revenues to commercial fishermen due to the §316(b) alternatives.

The next step to estimate commercial fishing benefits is to estimate net gains to commercial fishermen, taking into account the additional expenditures required for the additional catch. These additional expenditures consist of the variable costs fishermen incur with additional catch, e.g., labor, fuel, and the like. Studies of commercial fishing suggest that variable costs are in the range of 50 percent of total revenues (see, e.g., Rettig and McCarl 1985). These values suggest that, ignoring effects of open access to commercial fisheries, net benefits to commercial fishermen would be about 50 percent of the additional ex vessel catch.

Implications of Open Access Commercial Fisheries

Taking into account the open access nature of commercial fisheries and other considerations means that the long-term benefits to fishermen are likely to be substantially less than these potential gains. Indeed, the traditional models of open access fisheries, which apply to commercial fisheries without binding quotas, indicate that all potential gains are eliminated, and thus the long-term gains to fishermen from additional commercial catch are zero.

It has been well established for almost 50 years that under an open access fishery, competition among fishermen will drive producer surplus to zero for all fishermen. <FN 1> Ocean fisheries are typically common property resources, with no one exercising control over them. Since no individual or group has the property rights to the fishery, no single fisherman can exclude any other from exploiting the fishery. As noted, this situation has been labeled “the tragedy of the commons” in a well-known article by Garrett Hardin (1968).

Under such circumstances, “externalities” associated with the use of the common resource by many independent producers result in a reduction in the productivity of that resource. In open access fisheries—which characterize most commercial fisheries affected by §316(b) cases—as more fishermen harvest fish from the water, the ability of the fish population to reproduce at the most profitable rate is compromised. The result is that the economic value of the resource—i.e. the producer surplus—is dissipated and even destroyed, because fish are harvested at a point where the marginal cost of harvesting them, including the effects on the future stock, is higher than the marginal benefit.

The economic inefficiencies associated with open access fisheries can be summarized as follows: <FN 2>

-too many economic resources are committed to fishing—more fishermen employ more boats and fishing effort than would be economically optimal;

-current fishermen therefore earn a substantially lower return on their efforts; and

-over-fishing reduces the stock below its optimal level, which in turn lowers future profits from fishing. <FN 3>

These considerations mean that an open access fishery will generate no producer surplus. For our purpose, the key implication is that changes in conditions at the fishery—such as a potential increase in the number of commercial fish available due to reduced I&E—will not lead to any change in producer surplus.

Freeman (1993) provides a graphical depiction of the implications of open access on producer surplus and illustrates that changes in environmental quality—such as a reduction in impingement and entrainment due to §316(b) controls—would not lead to increases in producer surplus to fishermen. Figure 3 shows the marginal cost curve and average cost curve for a given commercial fishery, along with the relevant demand curve. As Freeman notes, if the fishery were privately owned, the output and price would be given by the intersection of the marginal cost function and the demand curve, with price equal to Pm0 and quantity equal to xm0; fishermen would obtain a producer surplus in this case. An improvement in environmental quality—such as a reduction in impingement and entertainment at a power plant—would reduce the marginal cost (not shown) and lead to an increase in quantity, a decrease in price, and an increase in producer surplus to fishermen.

Figure 3. Welfare Measurement for Open-Access Resources: The Case of a Fishery
[see hard copy for figure]

The situation is very different in the case of an open access fishery. In this case, the economic incentives lead to a situation where the price (Pc) would be equal to average cost (not marginal cost), and thus where each fisherman earns zero profits. (Fishermen earn zero profit when average cost is equal to average revenue, i.e., price.) Freeman notes that for the same change in environmental quality in a fishery with open access, even if quality improves and fish become more abundant, "there is no change in producer surplus." The logic behind this result is that positive producer surplus would lead additional fishermen to enter the fishery, driving the price down to p1c and the quantity up to x1c. At this point, the producer surplus is again dissipated and no fishermen receive any producer surplus.

The graph shows that changes in environmental quality, therefore, have no effect on net producer surplus. Better fishing conditions shift the average cost curve outward to AC1x. This reduction in costs and temporary improvement in profit results in additional fishing effort by existing fishermen and by new entrants. The added effort increases fishing output <FN 4> and reduces the price of fish until the zero profit position is reached in the new circumstances. The net result is that the improved conditions do not yield long-term producer surplus gains to fishermen; the superior fishing conditions are dissipated by additional fishing effort (and price changes, to the extent that these occur).

Consumers Would Not Gain if §316(b) Alternatives Do Not Affect Commercial Prices

Figure 3 suggests that consumers would gain from the environmental improvement in the form of reduced prices for fish. This result, however, depends upon the demand elasticity; the more elastic the demand for fish, the smaller the welfare gain associated with the environmental improvement. <FN 4> Because small segments of a given market have more elastic demand curves than the market as a whole, consumer benefit from changes to small market segments will also be small or even negligible. As Freeman (1993) notes:

[I]f this fishery is small relative to the market and the demand curve is perfectly elastic, there is no welfare gain [from the improvement in environmental quality]. The physical improvement in productivity brought about by the higher water quality is entirely dissipated by the uneconomic competition of fisherman for the potential increase in rents.<FN 5>(Freeman 1993, p. 308-9)

Figure 4 illustrates the situation in which the effect is small relative to the overall market for fish-and thus demand is perfectly elastic. As discussed below, this is likely to be the case for §316(b) changes. The figure shows the shift in the average cost curve from AV0x to AC1x and the increase in the number of fish bought and sold. Because the average cost still equals the price, however there is no change in the profits to commercial fishers. Moreover, there is no change in consumer surplus, since the price remains the same. The technology additions may lead to additional fish caught and sold, but, even if they do, there is no increase in producer or consumer surplus, and thus no social benefits.

Figure 4. Welfare Measurement for Open-Access Resources with Perfectly Elastic Demand
[see hard copy for figure]

Implications for §316(b) Benefit-Cost Analyses

These considerations suggest that commercial fishing benefits from §316(b) site-specific alternatives can be estimated using the following steps.

-use biological models to estimate potential increases in site-specific commercial catch for relevant species;

-calculate the increased ex vessel value of the additional commercial catch based upon the relevant commercial markets;

-based upon the size of the commercial market, assess whether or not changes due to §316(b) alternatives are likely to result in any decreases in the prices consumers pay;

-assuming no changes in prices, calculate potential gains as bounded by zero and the increased ex vessel catch value; and

-if the preliminary results warrant additional analysis, develop estimates of the increased variable costs and develop more detailed estimates of the likely fraction of added commercial catch value likely to lead to long-run gains to commercial fishermen.

Footnotes

1 The classic article is Gordon (1954). The basic arguments are described in environmental and natural resource textbooks. See, e.g., Tietenberg (2000).

2 These inefficiencies are described as “economic over-fishing” as distinguished from “biological over-fishing,” in which fish are harvested faster than they can reproduce their population, leading to a decline in fish stocks.

3 Note that the increase in output from the additional fishing effort may be short-lived if the increased effort further diminishes fishing stocks.

4 See Freeman (1993). Freeman (1991) provides illustrative calculations of the magnitude of the effects of alternative demand elasticities on consumer surplus gains.

5 The term “rents” as used here is roughly synonymous with “profits.”

EPA Response

EPA assumes no change in effort but shifts in marginal costs curves, so additional expenditures may be minimal. For comments regarding biological modeling see responses to comments #316bEFR.005.009, #316bEFR.025.015, #316bEFR.029.105, #316bEFR.206.065, #316bEFR.305.003, and #316bEFR.306.506.

EPA selected a conservative range of 0% to 40% (i.e., producer surplus as percent of gross revenue) to represent all fisheries affected by the final rule, given the difficulty and uncertainty associated with estimating percentages for individual fishery markets. For EPA's response to comments on the methods used to estimate commercial fishing losses and benefits, please see the response to comment 316bEFR.005.029.

Comment ID 316bEFR.338.512

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Recreational Fishing Benefits Can Be Calculated Based Upon Benefit Transfer Techniques to Value Marginal Fish

Assessing the likely gains from increased recreational catch poses more difficulties than assessing commercial gains, since there are no published market values for recreational catch. Moreover, calculating recreational values is complicated by the need to develop estimates of the marginal value that anglers place on additional catch; this marginal value tends to decrease as expected catch increases and thus simpler estimates of the average values for recreational catch are not accurate (see, e.g., Tietenberg 2000). Nevertheless, appropriate benefit transfer techniques can be used to develop marginal values.

Recreational Anglers' Value for Additional Catch Decreases as the Catch Rate Increases

One of the major conclusions of economic theory and practice is that the value households place on additional amounts of a given good or services tends to decrease as they have more of the good or service; this feature leads to the downward sloping demand curve shown in economics textbooks (see, e.g., Mankiw 2003).

Recreational fishing demand studies show that this general principle applies to recreational fishing experiences and the value placed on additional recreational catch. These studies indicate that the additional value that recreational anglers place on additional catch decreases as the expected catch increases. Figure 4 illustrates this relationship for a given angler, showing the total value as a function of the catch rate.

Figure 5. Hypothetical Value per Angler Trip at Different Catch Rates
[see hard copy for figure]

Figure 6 shows the marginal value of additional fish as a function of the catch rate. This relationship shows that the incremental (or marginal) value of additional fish to recreational anglers is lower than the average value per fish caught. As a result, fishing values for §316(b) benefit-cost analyses should reflect the incremental (or marginal) value rather than the average value, because fish protection measures lead to small changes in catch for many anglers. Otherwise recreational values would be overstated.

Figure 6. Hypothetical Marginal Value of Additional Catch at Different Catch Rates
[see hard copy for figure]

Recreational Fishing Demand Models

Site-specific estimates of recreational fishing benefits could be developed by undertaking a site-specific study—an original study that would involve collecting primary data and statistical analyses to determine the increased willingness of recreational anglers affected by a given §316(b) decision to pay for additional fish. These data could be used to estimate a function such as that illustrated in Figure 1.

Numerous studies have been done to assess the value of potential recreational fishing benefits (see, e.g., Freeman 1993 for a partial list). These studies focus on the choices that recreational anglers may make to fish at a site. The basic notion is that anglers generally make their choices based upon the satisfaction gained from fishing at the site—based upon the quality of the fishing and other attributes—and the value of money and time given up.

As noted in the EPA Guidelines, the empirical recreational demand models generally fall into two groups:

1. Travel cost models. These studies use information on visits and travel costs to infer the value that anglers place on fishing. The simplest models involve trips to a single site. Surveys provide information on the residential location of visitors, generally showing an inverse relationship between distance traveled and fishing participation. The distance variable can be converted to a cost measure using information on out-of-pocket travel costs as well as the value that travelers place on travel time. Thus, one can use the visitor survey information to develop a demand function, with the number of trips being a function of the travel costs of reaching the site. This single-site model can be extended to multiple sites using information on visitation rates and the costs of visiting the alternative sites. The travel cost methodology, however, is not well suited to model choices among competing sites.

2. Discrete choice models. These models are designed explicitly to model choices that anglers make among competing sites. (These models are sometimes referred to as “random utility models” or RUMs.) The discrete choice models consider travel costs as one of the variables affecting the decision on where to fish; others include the expected catch rate as well as the availability of various facilities (e.g., boat ramps).

Benefit Transfer Techniques Can Be Used to Develop Estimates of the Marginal Value of Recreational Fish

A second strategy is to develop a benefits transfer approach. As noted above, a benefit transfer approach uses results from existing studies to develop results for the particular case. The benefits transfer approach is likely to be a superior approach to estimate recreational fishing benefits for §316(b) applications in situations where there are existing studies that can be used for the area. Original studies can be costly, particularly if many recreational fish species are affected by the facility and these fish migrate over wide ranges. An original study would require measuring the values of additional recreational catch for many species across the wide geographic range, often an impractical alternative.

As noted above, where multiple recreational valuation studies are available, the meta analysis technique is likely to produce the most reliable estimates of the values that recreational anglers place on the additional catch. The basic steps for a meta analysis of recreational fishing benefits are the following:

-Step 1: Obtain recreational fishing value studies. The first step is to obtain studies that estimate the additional value that recreational fishermen place on additional catch. These studies include both journal articles and published reports.

-Step 2: Determine relevant studies. The next step is to select studies that are relevant to fishing potentially affected in the particular situation. Studies would be selected based upon the type of fish, the fishery location and the mode of fishing.

-Step 3: Conduct a statistical meta-analysis of the marginal value of increased catch. This step uses the relevant studies and statistical estimation procedures to determine the relationship illustrated in Figure 6. (As noted above, this study is referred to as a meta-analysis because it uses results from many studies.)

-Step 4: Determine the marginal value per pound of fish. The final step is to use the results of the meta-analysis to calculate the appropriate marginal value for fish relevant to this study.

The results of the meta analysis—in conjunction with biological estimates of the numbers of additional recreational catch that may be attributable to §316(b) alternatives—will allow the calculation of the potential value to recreational anglers of a particular 316(b) BTA alternative.

Implications for 316(b) Benefit Assessments

These considerations suggest that recreational fishing benefits from §316(b) site-specific alternatives can be estimated using the following steps.

-use biological models to estimate increases, if any, in site-specific recreational catch by species;

-develop estimates of the marginal values of any additional recreational catch to the relevant anglers, i.e., the anglers whose catch would be reasonably likely to increase as a result of the §316(b) alternatives (Note that this geographic area may be wide due to the wide-range migration patterns of many fish species.); and

-use this marginal value (or values) and the biological estimates of potential changes in relevant fish populations to estimate the benefits that recreational anglers would obtain from the §316(b) technology.

EPA Response

For the final Phase II 316b analysis, EPA has reduced its reliance on benefit transfer to estimate recreational fishing benefits. In addition, EPA no longer uses case studies of individual facilities. Instead, EPA has estimated regional models. For the recreational fishing analysis, benefit transfer is used for the Inland region, and benefit function transfer is used for the North Atlantic region. EPA has estimated RUM models for all other coastal regions (Mid-Atlantic, South Atlantic, Gulf of Mexico, and California), and for the Great Lakes region.

EPA has followed standard, generally-accepted methods of RUM modeling, which do estimate marginal values. See responses to comments 316bEFR.041.452, 316bEFR306.320, and

316bEFR337.010 for additional details regarding EPA's RUM analysis.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02.04

Valuing Forage Species (incl non-use and non-landed)

Indirect Values for Forage Fish Can Be Estimated With Inputs on Commercial and Recreational Values

Many of the fish species that might be affected by CWIS are not valued either by commercial or recreational fishermen. Some of these affected fish, however, may provide indirect benefits to the extent that they provide forage for species that are valued directly. Thus, increases in forage fish populations result in gains to individuals, but only indirectly as a result of the predator-prey relationship.

These indirect benefits can be included in a §316(b) benefit-cost analysis using a combination of biological and economic information. The biological information consists of estimates of the likely increase in predator populations due to any increases in forage fish populations. The economic information consists of applying the values for predator populations—based upon their commercial and recreational values—to any additional gains.

Implications for 316(b) Assessments

The following steps can be used to develop estimates of indirect forage fish benefits due to §316(b) alternatives.

-identify the forage fish species relevant for various predators (commercial and recreational value) in the affected areas;

-using biological information and models, determine the likely increases in forage fish population due to various §316(b)technologies;

-using biological information and models, determine the likely increases in the numbers of various predators in the commercial and recreational catch due to any increases in forage fish; and

-using economic information and values, determine the values that commercial and recreational fishermen place on any additional commercial and recreational catch.

EPA Response

EPA has revised the methods for estimating losses associated with forage species. In a manner similar to that suggested by this comment, EPA translates foregone production among forage species into foregone production among harvested species that are impinged and entrained using an assumed trophic transfer ratio, and then translates foregone production among these harvested species to foregone yield. Further information on the methods EPA used to estimate forage losses is provided in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See

Chapter A5: Methods Used to Evaluate I&E.

Please see EPA's responses to comments on fish population modeling (#316bEFR.005.009), and the discussion of ecosystem benefits found in Chapter A9 of the Regional Study Document (DCN #6-0003).

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

Nonuse Values Can Be Assessed

Assessing nonuse value is substantially more complicated and subject to considerably more uncertainties than the other benefit categories. As noted above, there are relatively few situations in which nonuse values are likely to be significant. Such cases are limited to those in which the fish protection alternative would affect a unique or special resource and protect a fish species that would otherwise be compromised in a manner that would not quickly be reversed.

If nonuse values are expected to be significant, the same two general approaches to valuation are possible, as noted above for recreational studies:

1. develop a site-specific study using the revealed preference (survey) methodology; or

2. use benefit transfer to assess nonuse values.

Although the general natures of these two types of studies are the same as those discussed above with regard to recreational benefits, assessing nonuse benefits is considerably more difficult as many commentators have pointed out (see, e.g., Freeman 1993).

The potential dilemma is well summed up in the conclusions regarding stated preference methods contained in the EPA Guidelines:

In conclusion, because of the issues raised here, among other factors, there is a divergence of views within the economic profession concerning whether stated preference methods can provide useful information on economic values and on validity of individuals' responses to hypothetical questions. Nevertheless, for goods providing nonuse value, stated preference methods may provide the only analytic method currently available for benefits estimation. (U.S. Environmental Protection Agency 2000, p. 85)

The difficulty of evaluating nonuse benefits, in conjunction with the fact that the conditions that would lead to significant nonuse benefits should not arise very often in practice for §316(b) cases, suggests a limited and cautious approach to attempting to quantify nonuse benefits.

Implications for §316(b) Assessments

The following steps can be used to develop estimates of nonuse benefits due to §316(b) alternatives.

-Using biological information, identify whether a unique or special resource is involved and whether the viability of any species would be affected by the §316(b) alternatives.

-If these conditions are met—and if the nonuse benefits are likely to be important to the §316(b) decision—develop estimates of the dollar value of nonuse benefits based upon one of two methods:

--Develop a well-designed, stated preference survey (contingent valuation) study to determine the willingness to pay of the relevant population for the relevant biological changes.

--If appropriate existing studies are available, use benefit transfer methods to assess the willingness to pay.

-If unique resources are not involved and if the viability of species would not be preserved due to the fish protection alternatives, assume that nonuse benefits are not relevant for the 316(b) alternatives.

This procedure follows the logic in Freeman (1993) regarding the situations in which nonuse benefits are likely to be significant and the EPA Guidelines' emphasis on only undertaking expensive studies if they are likely to influence the policy results.

EPA Response

EPA has not included quantitative measures of nonuse values for the final 316(b) rule benefit-cost analysis. However, EPA does not agree that it is appropriate to assume that non-use values are not relevant, and the Agency has provided several measures that indicate the potential magnitude of non-use values.

EPA does not agree that only unique or special resources have non-use values. For EPA's response to comments regarding non-use values for losses to common species please see the response to comment #316bEFR.306.302.

While EPA agrees that either a stated preference study or benefit transfer are necessary for evaluating non-use values. For EPA's explanation of why the Agency did not conduct an original stated preference survey, please see response to comment number 316bEFR.306.105.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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RFC: Test: benefits should justify the costs

Steps in Developing a Site-Specific §316(b) Benefit-Cost Analysis

This section provides an example to illustrate the steps involved in developing a §316(b) benefit-cost assessment. Although not taken from any specific assessment, this example builds upon our experience developing site-specific §316(b) benefit-cost studies. This experience allows us to provide a roadmap for the concrete tasks involved in developing a site-specific benefit-cost analysis of §316(b) alternatives.

Overview of Benefit-Cost Steps

This example uses a series of steps consistent with EPA's Guidelines (2000) to estimate the benefits and costs of fish protection alternatives. The basic steps are as follows:

1. Identify §316(b) alternatives. The first step is to use technical information to identify the alternatives that could be installed and operated at the site and that would be effective in reducing impingement and entrainment of various species. These alternatives could include changes in the current cooling water intake structure as well as various means of reducing cooling water flow (e.g., seasonal reductions and types of cooling towers). These alternatives would be compared to a baseline alternative of making no modification.

2. Determine the impacts of alternatives. The next step is for technical experts to determine the physical impacts and to identify which effects are favorable (benefits) and which are unfavorable (costs).

3. Develop dollar values for costs and benefits. This step uses economic and technical information to assess the value of the various benefits and costs, to the extent feasible.

4. Calculate net benefits and identify other effects of Alternatives. The cost and benefit information is used to calculate the net benefits (i.e., benefits minus costs) of each alternative considered.

5. Determine the sensitivity of the results to key parameters. The final task of the benefit-cost assessment is to determine how sensitive the results are to key parameters, such as the discount rate.

EPA Response

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

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RFC: Test: benefits should justify the costs

Roadmap for Estimating the Benefits of Fish Protection Alternatives

The nature of the available biological information affects the specific steps required to develop benefit estimates. For purposes of this example, we assume that biological information on the benefits for each of the §316(b) alternatives is developed for a set of fish species labeled "representative important species," or "RIS." (Use of RIS for assessments under §316(b) is endorsed by EPA as a means of prioritizing information on the affected species.) Note, however, that in this example the benefit assessment includes the value of non-RIS fish as well.

Roadmap for Benefit Assessment

The benefit assessment consists of developing separate benefit estimates for all of the relevant categories, and then summing the results for each §316(b) alternative. This example assumes that nonuse benefits are judged not to be significant, following the criteria outlined above, so that the assessed benefits consist of three categories: (1) commercial benefits; (2) recreational benefits; and (3) indirect benefits due to changes in forage fish populations.

Figure 7 illustrates the steps used to develop estimates of the benefits for each alternative. The following are overviews of the steps.

1. Estimate additional pounds of equivalent adults caught by commercial and recreational fishers. Biologists and engineers develop estimates of the changes in equivalent adult fish weight for each of the RIS under each of the alternatives considered. This weight includes the change in commercial/recreational fish weight due to changes in the abundance of forage RIS.

2. Divide overall catch between commercial and recreational fisheries. For each RIS, biologists and fisheries experts divide the total change in catch to the fishery between commercial and recreational fishers, using data on the relative weight of recreational and commercial harvest over each species' geographical range during a recent time period.

3. Determine wholesale commercial values. To estimate the value of commercial fishing benefits, develop data on wholesale prices (from the relevant fish market, as reported by the NMFS) that can be used to value RIS caught by commercial fishermen.

4. Assess recreational values. To estimate the value of recreational fishing benefits, conduct a meta-analysis of recent studies of the value of RIS and related species to recreational fishers. This analysis is used to determine the value that recreational fishermen would place on additional RIS fish catch.

5. Calculate benefits from increases in RIS. Use the quantities (from Steps 1 and 2) and values (from Steps 3 and 4) to calculate the annual benefits of changes in the commercial and recreational catch for the MS for each of the fish protection alternatives considered.

6. Determine additional pounds of non-RIS. Determine the change in equivalent adult fish weight (pounds) of non-RIS.

7. Calculate benefits from increases in non-RIS. To estimate a dollar value associated with increases in non-RIS, use the average commercial and recreational value (per pound) for all RIS to calculate the annual benefits from changes in non-RIS fish.

8. Compute annual benefits. Sum the benefits from RIS and non-RIS to produce an estimate of the total annual benefits

9. Aggregate to obtain present value of benefits. Aggregate the annual benefits over the remaining lifetime of the facility using the same discount rate used to calculate the present value of costs.

Figure 7. Roadmap for Estimating Benefits
[see hard copy for figure]

This methodology produces estimates of the present value of benefits for each of the alternatives as of a fixed date; in this example we use January 1, 2002.

EPA Response

This comment describes the methods used by the author in preparing an alternative analysis of benefits. EPA notes this comment. No other response is required.

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 9.0
Costs

Roadmap for Estimating the Costs

The costs of fish protection alternatives can be estimated in several detailed steps— corresponding to the more general steps 2 and 3 described above. The general methodology for estimating the costs is as follows:

1. Identify categories of costs to be evaluated. Identify the categories of costs that likely result from one or more of the alternatives considered. The costs identified comprise three sub-categories of real resource compliance costs (consistent with the general findings discussed earlier), one of which has two components:

a. Construction costs;

b. Operating and maintenance ("O&M') costs; and

c. Cost of lost power, including

1.Lost power from construction-related outages

2. Lost power after installation.

2. Estimate the value of each cost category. Using sound economic methodologies, develop quantitative estimates for each of the cost categories for each alternative.

The components of costs and the methodologies for evaluating them are described in the subsections below.

Roadmap for Construction Costs

Figure 8 illustrates the methodology that can be used to estimate construction costs for each of the alternatives. Construction cost is estimated in three steps.

1. Estimate overnight capital costs. Overnight capital costs are engineering estimates of the cost of installing the necessary structures and modifications using current prices for materials, equipment and labor, and assuming the modifications can be completed immediately (i.e. "overnight"). These cost estimates are necessarily site-specific.

2. Develop estimates of annual construction expenditures. The overnight cost estimates and information regarding the timing of expenses needed to complete construction for each of the alternatives are used to develop estimates of the annual expenditures associated with the capital costs of construction for each of the alternatives.

3. Compute present values. These annual costs are translated into present values using the relevant real discount rate, e.g., 7 percent as recommended by the Office of Management and Benefit (U.S. OMB 1992).

Figure 8. Roadmap for Estimation of Construction Costs
[see hard copy for figure]

Roadmap for Operating and Maintenance Costs

As seen in Figure 9, which illustrates the methodology used to calculate the present value of O&M costs, O&M costs can be broken into two categories: annual labor costs and other operating and maintenance costs, including annual component replacements.

1. Estimate annual labor costs. Multiply estimated average wage rate by estimates of additional annual manpower hours for each alternative.

2. Calculate annual component replacement costs. The cost of replacing equipment components as they wear out is developed.

3. Aggregate to obtain annual O&M costs. Develop estimates of the annual O&M costs for each of the alternatives during the remaining useful life of the facility.

4. Translate to present values. Annual costs are translated into present values using a relevant real discount rate.

Figure 9. Roadmap for Operating and Maintenance Costs
[see hard copy for figure]

Lost Power Costs

The power costs consist of two distinct components:

1. Capacity costs. Capacity costs are the social costs of the reduction in the net amount of capacity (i.e., kilowatts) that the facility is able to provide.

2. Energy costs. Energy costs are the social costs of reduced net energy production (i.e., kilowatt-hours) at the facility. Energy costs include the net value of lost power as well as the value of changes in air emissions, i.e., the net social cost or benefit due to changes in air emissions resulting from the decreased power generation at the facility and the increased power generation by other power generation plants to offset these losses.

These components need to be estimated for two situations:

1. Energy losses related to construction. These are the losses related to reduced system output for any increased time the facility is shut down-in order to construct and/or install the particular alternative.

2. Energy losses related to continuing operation. These are losses due to a decrease of net output at the facility, from decreased facility capacity, increased auxiliary power requirements, i.e., the energy used to operate the alternative, or seasonal flow reductions.

We describe the methodologies used to estimate costs in these two situations below.

Roadmap for Power Losses Due to Construction Outages

During a construction outage, no energy is produced for sale on the market and no capacity is available. The cost of capacity, energy, and air emissions depends upon the timing of the construction outages due to differences in seasonal demands and seasonal regulatory requirements.

The following steps can be used to estimate the social cost of power losses due to construction outages:

1. Estimate monthly capacity costs. Calculate monthly capacity costs by multiplying the quantity of lost capacity that would be induced by a construction outage by the market price for capacity in that month in the relevant market.

2. Calculate monthly costs of replacing lost energy with energy from other power generating sources. The monthly cost of lost energy can be calculated by multiplying monthly changes in net energy output during each of three load periods (weekday peak, weekday off-peak, and weekend) by the wholesale price for that month during that load period. These costs are estimated net of cost savings at the facility due to reduced fuel and variable costs during construction outages.

3. Estimate monthly costs associated with changes in air emissions. Calculate the air emissions component of energy costs using estimates of the marginal cost of SO2, NOx, and CO2 emissions from replacement power; these marginal costs are assessed using methodologies that depend upon the regulations governing the facility's emissions; the methods can include the cost of control, pollutant impact estimates, and/or the forecast price of allowances. Costs reflect the increases in emissions from other plants and decreases of emissions at the facility.

4. Compute annual power costs for each category. Sum the monthly cost estimates to obtain annual costs for lost capacity and lost energy production associated with construction.

5. Translate to present values. Annual costs are translated into present values using a relevant real discount rate.

Figure 10. Methodology for Value of Lost Power from Construction Outages
[see hard copy for figure]

Roadmap for Power Losses Due to Continuing Operation

Fish protection alternatives can cause a loss of net output through three basic mechanisms:

1. In creased auxiliary power requirements. Auxiliary power requirements reflect the additional in-plant power requirements due to the operation of the CWIS alternatives. Energy used in plant

operations is not available to meet energy demand.

2. Performance (heat rate) penalties. Fish protection alternatives may reduce the facility's power generation efficiency. For example, closed-cycle cooling systems create higher cooling water temperatures that in turn cause higher turbine backpressure. This higher backpressure reduces the amount of energy that can be produced.

3. Decreased facility capacity. Intake alternatives may change the total amount of power that can be generated by the facility. The seasonal flow reductions, for example, decrease the amount of power that can be generated during the flow reduction periods.

Each of these operating impacts would reduce the quantity of power generated at the facility, and, potentially, the quantity of capacity available. Figure 11 summarizes the methodology used to calculate the cost of lost power due to changes in continuing operations. These losses include capacity, energy, and air emissions costs. The methodologies are similar to those used to estimate losses related to construction outages.

Figure 11. Roadmap for Value of Lost Power from Changes in Continuing Operation
[see hard copy for figure]

EPA Response

The Agency reviewed the comment and referenced figures and notes that their "roadmap for estimating compliance costs" correlates well with the methodology utilized by the Agency for the final rule cost estimates, as discussed in the Technical Development Document

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Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Roadmap for Considering the Implications of Qualitative Factors

Some categories of benefits and costs are not included in these roadmaps. These potential categories include the following:

-costs to the facility of obtaining the 316(b) determination;

-prototype test facilities (relevant for some technological options);

-field tests (relevant for some technological options);

-disposal of waste materials (relevant for some technological options);

-fish losses at other power facilities whose production would increase;

-aesthetic impacts associated with cooling towers (e.g., visibility effects);

-air emission costs, other than those included in the assessment; and

-land acquisition costs.

The benefit-cost assessment thus should include assessments of how significant these categories are likely to be in light of the quantitative results.

In addition to these omitted categories, the quantitative analyses do not take into account some factors that might change the biological or economic values used in the analyses. Biological studies identify two biological relationships that may be excluded (see AKRF-LWB 2003, Barnthouse et al 2002):

1. Natural biological compensation, which would reduce the effects of losses and thus reduce the gains from fish protection alternatives; and

2. Lags in adult fish production, i.e., the delay between fish protection and the development of fish large enough to be caught commercially or recreationally.

Both factors would tend to reduce the estimated fish protection benefits, since the effects would either decrease the fish gains or delay the time when benefits are received. (As noted below, delay in realizing benefits reduces the total value of benefits.

EPA Response

The commenter cites several categories of benefits and costs are not included in EPA's analyses:

-costs to the facility of obtaining the 316(b) determination;

EPA response: The Agency included costs to facilities of obtaining and subsequently obtaining reissuances of 316(b) permits. Included in the Agency's costs are those of the "comprehensive demonstration studies," which include the data collection necessary for determining the feasible technologies. See the ICR (DCN 6-0001) and Chapter B1 of the EBA in support of the final rule (DCN 6-0002).

-prototype test facilities (relevant for some technological options);

EPA response: The Agency includes costs for field-implemented pilot plant studies at facilities needing to install technologies to comply with the rule requirements. See the ICR (DCN 6-0001) and Chapter B1 of the EBA in support of the final rule (DCN 6-0002).

-field tests (relevant for some technological options);

EPA response: The Agency includes costs for field-implemented pilot plant studies at facilities needing to install technologies to comply with the rule requirements. In addition, the Agency has included costs for field testing of the biology and hydrology in and around the intake in the "comprehensive demonstration studies." See the ICR (DCN 6-0001) and Chapter B1 of the EBA in support of the final rule (DCN 6-0002).

-disposal of waste materials (relevant for some technological options);

EPA response: For cooling tower costs, the Agency's estimates included costs for waste disposal in the operation and maintenance costs. However, the final rule requirements are not based on cooling tower technologies. The technologies forming the basis of the final rule do not generate appreciable waste materials that need disposal.

-fish losses at other power facilities whose production would increase;

EPA response: Based on its electricity market model analysis (see Chapter B3 of the final EBA; DCN 6-0002), EPA believes that it is unlikely that material shifts in electricity production will result from the final Phase II rule. Even where such shifts might occur, EPA disagrees that those shifts are likely to result in an increase in fish losses at other power facilities. The requirements of the Phase II rule apply to all power facilities that operate a CWIS and withdraw at least 50 million gallons per day (MGD) of cooling water. Furthermore, EPA is working on a future regulation (Phase III) that may apply to those facilities that withdraw less than 50 MGD. EPA also notes that requirements for new facilities regulated under the Phase I rule are more stringent the Phase II regulation. As a result, even if production shifts were to occur as a result of the Phase II rule, the facilities that would experience increases production would either be subject to 316(b) as well (for other CWIS users) or would not cause any fish losses (for facilities that do not operate CWIS). EPA also notes that the benefits estimate was based on installation of compliance technologies only. EPA's benefit estimates do not take into account additional reduction in impingement and entrainment that would result from a reduction in production. As such, even if increased production at other facilities caused fish losses, there would be a commensurate reduction at those facilities with reduced production.

-aesthetic impacts associated with cooling towers (e.g., visibility effects);

EPA response: The Agency did not include costs for aesthetic impacts of cooling towers at proposal/NODA. However, the final rule requirements are not based on cooling tower technologies, and any costs associated with them would further support EPA's decision not to promulgate a rule that contains cooling tower requirements.

-air emission costs, other than those included in the assessment; and

EPA response: Additional air emissions are primarily associated with cooling towers. The final rule requirements are not based on cooling tower technologies, and any costs associated with them would further support EPA's decision not to promulgate a rule that contains cooling tower requirements.

-land acquisition costs.

EPA response: Land acquisition costs are primarily associated with cooling towers. EPA did not include costs for land acquisition of cooling towers at proposal/NODA. However, the final rule requirements are not based on cooling tower technologies, and any costs associated with them would further support EPA's decision not to promulgate a rule that contains cooling tower requirements.

In addition, the commenter claims that two factors would reduce the estimated fish protection benefits:

"1. Natural biological compensation, which would reduce the effects of losses and thus reduce the gains from fish protection alternatives; and

2. Lags in adult fish production, i.e., the delay between fish protection and the development of fish large enough to be caught commercially or recreationally."

For a response to comments on natural biological compensation, please refer to comment 316bEFR.025.015 in subject matter code 10.01.02.02. For a response to comments on lags in adult fish production, please refer to the discussion on discounting in comment 316bEFR.005.029 in subject matter code 10.02.02.

Comment ID 316bEFR.338.519

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.02

Benefit Estimation Methodology

Roadmap for Considering the Sensitivity of Results to Alternative Discount Rates

The benefit-cost study should evaluate the sensitivity of the results to alternative discount rates. The discount rate is used to translate the time streams of costs and benefits into “present values,” i.e., the total amount in a given year (“present”) that would be equivalent to the stream of costs or benefits. The discounting calculation reflects the fact that a given dollar of cost or benefit is valued more highly today than in the future. This discounting procedure allows decision-makers to compare two values—the present values of benefits and costs— rather than the two streams.

Although the concept of discounting is universally accepted, there are different estimates of the precise magnitude of the discount rate (i.e., the rate at which society trades off present and future costs or benefits). The EPA Guidelines note that the literature on the choice of discount rate is voluminous and technically complex (U.S. EPA 2000, p. 33). The OMB has prescribed a real discount rate of 7 percent in different years, to provide uniformity for federal evaluations. The EPA Guidelines recommend that benefit-cost analyses use alternative discount rates to evaluate the sensitivity of the results to the choice of discount rate.

Present values can be calculated for various discount rates intended to bound the range of plausible alternatives. The study could then assess whether the choice of discount rate affects the basic benefit-cost results.

EPA Response

In the regional study document for the final Section 316(b) Phase II rule, EPA presents benefits estimates assuming three discount rates: 0%, 3%, and 7%. See DCN # 6-0003 for detail.

In the EBA for the final Section 316(b) Phase II rule, EPA presents costs and benefits estimates assuming two discount rates: 3%, and 7%. See DCN 6-0002 for detail.

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Benefit-Cost Assessments Are Not Overly Burdensome

The EPA has expressed concerns about the use of benefit-cost analysis, indicating that site-specific studies will be too burdensome, both to the facility owner and to the government agencies that must review the submissions. Indeed, EPA noted this concern in its Notice of Proposed Rulemaking and sought comments on how significant the concern is likely to be (67 FR 17167). The Agency also sought comments on how the workload of a site-specific approach could be streamlined to avoid such difficulties.

Earlier reports have considered the issues posed by study costs and how such concerns have been addressed in prior programs (Harrison et al. 2000 and National Economic Research Associates 2001). The key conclusions from those studies are the following:

-The potential gains from use of a benefit-cost approach to §316(b) decisions can be substantial, relative to a requirement that would impose uniform technology on all (or similarly situated) facilities;

-These potential gains are considerably smaller for small facilities, in which the costs and environmental effects are relatively small;

-These considerations mean that a tiered approach should be adopted for §316(b) benefit-cost assessments:

--Large and complex assessments should include a detailed benefit-cost analysis that would involve the development of new site-specific data and analyses,

--Small and simple assessments could use formulaic benefit-cost analysis that supplemented site-specific information with generic modeling.

-There are many precedents for this tiered approach in other programs as well as in other EPA regulations. These precedents include:

--EPA's noncompliance benefits program, in which a computer model ("BEN" model) was developed to provide methods of estimating the benefits a company achieved through noncompliance with an environmental requirement. These methods are less costly than those used in litigation, the alternative "tier."

--Natural Resource Damage Assessments ("NRDA") for Superfund assessments, in which two tiers are used to assess potential damages: Type A, for smaller releases, in which less expensive assessment methods are used; and Type B, for larger releases, which involve more detailed assessments.

-These precedents provide examples that EPA could use to develop a tiered system for site-specific benefit-cost assessments.

This report thus provides input into the methods that EPA could use to “streamline” the benefit-cost assessment. Streamlining would allow society to obtain the gains from site-specific assessments, without excessive burdens either to §316(b) applicants or to government agencies.

EPA Response

EPA agrees with the commenter that if a facility is seeking a site-specific determination of best technology available for minimizing adverse environmental impact on the grounds that costs are significantly greater than the benefits of complying with the otherwise applicable requirements of Sec. 125.94, a facility must use a comprehensive methodology to fully value the benefits achievable by compliance with the applicable requirements to reduce impingement and entrainment mortality. The Agency also agrees that a permittee and permit writers should consider the magnitude and the character of the ecological impacts from a facility in identifying the appropriate methods for conducting site-specific benefits cost analysis. See Section V of the preamble to the final Section 316(b) Phase II regulation for a discussion on site-specific determination of technology and for a discussion of the site-specific cost benefit test.

See also EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.338.521

Author Name Mark F. Strickland

Organization PSEG Services Corp obo PSEG Power, LLC

Subject Matter Code 10.07.03

RFC: Test: benefits should justify the costs

CONCLUDING REMARKS

Benefit-cost methodology provides a time-tested means of evaluating the gains and losses from §316(b) alternatives and thus clarifying what is at stake in §316(b) decisions. EPA has contributed substantially to the practical implementation of §316(b) benefit-cost analyses by developing its 2000 Guidelines, which provide guidance on the types of benefits and costs to be included and the appropriate methodologies that can be used to estimate them.

This White Paper builds upon the EPA Guidelines—and other economic literature—as well as upon practical experience with §316(b) benefit-cost assessments in order to evaluate how benefit-cost analysis can be used in site-specific §316(b) decisions. The following are the principal conclusions of this White Paper.

1. Benefit-cost analysis is well suited to developing the benefit and cost information on alternatives that should be considered as part of the §316(b) permit decision process.

2. In response to a concern that the benefit assessment may not be complete, a review of all potential benefit categories as reflected in the EPA Guidelines reveals that only a relatively small number of categories generally apply to §316(b) alternatives.

3. Sound and manageable methodologies are available to develop dollar values for this relatively small set of relevant benefit categories.

4. With regard to developing a complete benefit-cost analysis, previous experience with §316(b) studies provides the bases for a roadmap of concrete steps to develop comprehensive cost and benefit values for §316(b) alternatives.

5. In response to concerns that site-specific studies would be too burdensome (both to the facility owner and to the permitting agency), a previous report provides guidance on how a tiered approach—in which large and complex assessments include detailed analyses and small and simple assessments combine site-specific information and generic modeling—can be used to “streamline” §316(b) benefit-cost assessments.

EPA Response

See the preamble for a discussion of the site-specific compliance alternative.

For EPA's response to comments on application of the cost-benefit test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.020.

For EPA's response to comments on application of the "significantly greater than" test to assessing the value of alternative CWIS technologies, please see comment #316bEFR.005.003.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gregg Tieken

On Behalf Of:

City Public Service of San Antonio, Texas

Author ID Number:

316bEFR.339

Comment ID 316bEFR.339.001

Author Name Gregg Tieken

Organization City Public Service of San Antonio, Texas

Subject Matter Code 21.09

Permit applications/implementation schedule

City Public Service is concerned about the amount of time that will be needed to comply with the rule once the it becomes final and is in support of compliance schedules. We currently have two permits that will expire at the same time on two different reservoirs, since the Texas Commission on Environmental Quality has implemented the basin permitting process. The expiration date could potentially be less than one year from the date the rules become final. Having two permits that have to be renewed at the same time would be stretching resources and personnel. In addition to the difficulties of preparing a renewal, the agency renewing permits would probably be overwhelmed.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Scott F. Brown

On Behalf Of:

FirstEnergy

Author ID Number:

316bEFR.340

Comment ID 316bEFR.340.001

Author Name Scott F. Brown
Organization FirstEnergy

Subject Matter Code 7.01.03
Option 3--Site-specific determination

Site-Specific and Flexibility:

FirstEnergy supports EPA's recognition that no single technology will be the "best available" in all cases and strongly encourages EPA to recognize the site-specific features that must be considered in 316(b) decisions. Site specific information that is available should be used such as successful 316(b) demonstrations based on sound science. Also the rule should maintain as much flexibility as possible and continue reliance on technically sound 316(b) decisions and successful 316(b) state programs. Maintaining flexibility in this rule will help to insure that the electric utility industry can meet the challenge of providing reliable, adequate and affordable electricity.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

With respect to existing state programs, the final rule provides for EPA approval of alternative State program requirements where such State NPDES requirements will result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under § 125.94.

With respect to previous 316 demonstrations, a goal of today's rule is to set national minimum performance standards that reflect the best technology available for minimizing adverse environmental impacts. Given that previous determinations of best technology available were not made in reference to the national performance standards, EPA believes that the Director should not rely entirely on historical determinations. EPA believes that these national requirements will promote more effective and consistent implementation of section 316(b) requirements, and ultimately minimize adverse environmental impacts associated with the use of cooling water intake structures by Phase II existing facilities.

Comment ID 316bEFR.340.002

Author Name Scott F. Brown
Organization FirstEnergy

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Benefit-Cost:

FirstEnergy believes that the technology that maximizes net benefit should be the guiding principle not a strict performance standard approach. And the benefit-cost analysis should be based on "greater than" not "significantly greater than" due to the site-specific factors at issue.

EPA Response

Section 316(b) does not impose a "maximize net benefit" standard, rather, it provides that any standard established under CWA sections 301 or 306 and applicable to a point source must require that the location, design, construction and capacity of cooling water intake structures reflect best technology available for minimizing adverse environmental impact. EPA has considered the site-specific compliance alternative for the reasons discussed in section VII of the preamble to the final rule. With regard to use of the "significantly greater" standard, see response to 316bEFR.006.003.

Comment ID 316bEFR.340.003

Author Name Scott F. Brown
Organization FirstEnergy

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Comprehensive Demonstration Studies:

If a 316(b) demonstration study was done in the past and has been successful, and the plant conditions have remained the same, then the regulatory agency should be allowed to reapprove the existing intake. Where there is data that shows a healthy aquatic community exists, the expense of a comprehensive demonstration study is not warranted.

EPA Response

EPA disagrees that a facility that conducted a 316(b) demonstration study in the past should be exempt from the application requirements of today's final rule. Many of these demonstration studies were conducted 20 years ago or more, and may no longer be representative of conditions at the facility. EPA is, however, allowing the use of existing data that is reflective of current conditions to support application studies. Please see response to comment 316bEFR.040.001 for details.

Additionally, under compliance alternative 2 (see 125.94(a)(2)), a facility may demonstrate that it already meets rule requirements if its existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards at 125.94(b) and/or the restoration requirements in 125.94(c).

Comment ID 316bEFR.340.004

Author Name Scott F. Brown

Organization FirstEnergy

Subject Matter Code 21.04

Determination of compliance

Compliance and Baselines

FirstEnergy supports the “as built” approach option for entrainment. Historical data should be allowed to be used if there is no reason to believe it is not representative. We support the recognition that consideration should be given for ‘moribund” fish in any calculations and believe that mortality for entrainment should be considered not just total entrainment.

EPA Response

EPA agrees that the “As-Built” approach is an acceptable method for establishing the calculation baseline. Please see EPA’s response to comment 316bEFR.343.011 for a discussion of factoring naturally dead or moribund organisms into the calculation baseline. For EPA’s position on the factoring of naturally dead or moribund organisms, please see EPA’s response to comment 316bEFR.306.116.

Comment ID 316bEFR.340.005

Author Name Scott F. Brown

Organization FirstEnergy

Subject Matter Code 6.08

Non-aquatic impacts

Also, we believe that exotic species that are regarded as “nuisance” should not be used in calculating the performance standard reductions.

EPA Response

Please see the response to comment 316bEFR.062.007 for the discussion regarding an all species approach versus a representative species approach for determining compliance with the requirements in today's final rule.

Comment ID 316bEFR.340.006

Author Name Scott F. Brown

Organization FirstEnergy

Subject Matter Code 8.03

Proposed standards for Great Lakes

While the Great Lakes are unique, entrainment is not unique to the Great Lakes, and the Great Lakes should be handled as other lakes for entrainment requirements.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies.

Comment ID 316bEFR.340.007

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Scott F. Brown

Organization FirstEnergy

Implementation and Compliance Schedule

FirstEnergy has concerns with the implementation schedule of the proposed rule. Facilities should be allowed to utilize a previously approved 316(b) study in their application renewal and absent a previous 316(b) study be given at least three years to evaluate a system, perform biological sampling, review technology options and implement a technology. Once a facility has selected a technology and installed and it is found the technology did not achieve the expected performance standard results, the facility should not be subject to immediate enforcement action until it has an opportunity to reevaluate options and implement any changes. Those facilities that have achieved the standard should not have to undergo a complete reevaluation every permit term.

EPA Response

EPA disagrees that existing BTA determinations should remain valid under today's final rule. Please see response to 316bEFR.040.001 for a discussion on the use of historical BTA determinations.

EPA has provided tremendous flexibility in today's final rule and offers five compliance alternatives with varied study requirements to facilitate application completion and speed permitting. For some facilities, EPA expects that technology installation and monitoring may be an iterative process which may require modifications to meet appropriate performance requirements. This process should be conducted in consultation with the Director; immediate enforcement action for an exceedance of the performance requirements under these conditions is not expected.

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion.

Comment ID 316bEFR.340.008

Author Name Scott F. Brown

Organization FirstEnergy

Subject Matter Code 18.01.01

UWAG definition of “adverse environmental impact”

Adverse Environmental Impact

FirstEnergy believes that EPA should define Adverse Environmental Impact (AEI) based on an aquatic population, not an individual fish or single egg or larvae. We recommend the definition given by UWAG in the comments submitted August 7,2002. Absent a definition based on population, it appears the rule will be mired in unresolved long-term arguments on when protection has been achieved.

EPA Response

Please see the response to comment 316bEFR.002.019 for the discussion on the definitions EPA rejected for adverse environmental impact in this rulemaking.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Kenneth S. Johnson

On Behalf Of:

Constellation Energy Group

Author ID Number:

316bEFR.341

Comment ID 316bEFR.341.001

Author Name Kenneth S. Johnson
Organization Constellation Energy Group

Subject Matter Code SUP
General statement of support

The New Regulation Continues to Have Many Favorable Features

EPA is to be commended for the considerable effort that has been put toward this regulation. There are a number of positive elements in the rule that we endorse and hope will be part of the final requirements. Among the provisions that will improve the overall 316(b) processes are:

- Cost and benefit tests to determine technology suitability;

- The option to use voluntary environmental restoration and enhancement measures to satisfy compliance requirements;

- The use of 'baseline' intake condition with no controls from which compliance is determined; and

- Allowances for plants with low utilization.

We appreciate that EPA has seriously considered the comments from the regulated community and recognized that the proposed rule needs further refinements. It is also good that the entire slate of issues in the proposed rule remains open for additional comments.

EPA Response

EPA notes the comment. No response necessary.

Comment ID 316bEFR.341.002

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code OPP

General Statement of Opposition

However, despite the extensive work and many new considerations offered in the NODA, we continue to be frustrated by the vagueness and absence of clear guidance in this rulemaking. Too many important provisions are still subjective, open for interpretation or simply not addressed.

EPA Response

Please refer to the response to comment 316bEFR.034.002.

Comment ID 316bEFR.341.003

Subject Matter Code 18.03.01

Follow 1977 Guidance

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

The Regulation Needs a Definition of 'Adverse Environmental Impact'

It seems clear that the final rule will not attempt to define 'adverse environmental impact'. We continue to believe this is an unfortunate lapse of regulatory oversight. The statutory language is clear. To have a rule that is based on the concept, repeatedly references it, purports to reduce it yet refuses to define it will not serve the process well.

Rather than focus on reducing an absolute number of organisms, EPA should recognize the importance of population-level impacts and accept that, as a matter of basic biology, (sometimes large) losses occur naturally with little or no effect on the health of aquatic populations. In its comments on the proposed Phase II rule, UWAG recommended the following definition:

"Adverse environmental impact is a reduction in one or more representative indicator species that [1] creates an unacceptable risk to the population's ability to sustain itself, to support reasonably anticipated commercial and recreational harvests, or to perform its normal ecological function and [2] is attributable to the operation of the cooling water intake structure."

EPA Response

EPA has chosen not to define the term "adverse environmental impact" in the final rule. Please refer to section VIII of the preamble to the final rule for more information.

Comment ID 316bEFR.341.004

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 18.03.01

Follow 1977 Guidance

The New Rule Should Encourage Site-Specific Regulation of Cooling Water Intake Systems

We strongly urge EPA to craft a rule that accepts the site-specific aspects of power plants, their cooling systems, the source water bodies, the surrounding environments and the affected populations of aquatic organisms. All of these factors intuitively argue for greater consideration of a site-specific application of this rule and less uniform, one-size-fits-all alternatives. The original 1977 guidance and regulations required site-specific considerations. There is no sound scientific or technical basis to change EPA's or Congress's 30-year record that promotes site-specific regulation of cooling water intake systems.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b) determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact at cooling water intake structures.

Comment ID 316bEFR.341.005

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Entrainment and impingement are largely determined by factors that vary from site to site. Just because the proposed rule distinguishes certain water body types, it does not mean that everything after that is the same and amenable to one type of solution. Power plants are still different, as are water bodies and their surrounding landscapes. In fact, one might suggest that no two plant sites are the same. Every locality has its distinctive environmental characteristics, independent of the facility. Aquatic populations vary and the technologies and control options that are feasible will not perform the same way in certain environments.

EPA Response

EPA recognizes the variability in site-specific characteristics and notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information. EPA also authorizes State Directors to allow facilities to demonstrate compliance by means of a TIOP, which among other things, helps address the variability in aquatic populations even at a particular site.

Comment ID 316bEFR.341.006

Author Name Kenneth S. Johnson
Organization Constellation Energy Group

Subject Matter Code 21.01.04
Comprehensive demonstration study (7 parts)

Prior (site-specific) determinations should be considered. Also, if there are data that already show there is so little entrainment or impingement that the community is not affected or the economic impact is exceeded by the cost of a comprehensive study, there should be no need for further evaluation.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support studies. Please see response to comment 316bEFR.040.001 and the final rule preamble, section VIII.D. 2., Existing Programs and Determinations for details.

Additionally, under compliance alternative 2 (see 125.94(a)(2)), a facility may demonstrate that it already meets rule requirements if its existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards at 125.94(b) and/or the restoration requirements in 125.94(c).

Comment ID 316bEFR.341.007

Subject Matter Code 7.02.03

Technology Efficacy Database

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

In the NODA @ P. 13539, EPA requests comment on the documents in the "Technology Efficacy Database", a collection of 148 references on the performance of the recommended intake control technologies. To quote from the FR notice,

"EPA requests comment on whether these data are of sufficient quantity and quality to support the determination that the proposed performance standards are best technology available and that the existing facilities can meet these standards by implementing design and construction technologies either singly or in conjunction with other design and construction technologies (including operational and restoration measures)."

At this time, we do not believe that enough of the proposed intake technologies have demonstrated experience at the operating plant level or under sufficiently representative hydrologic conditions. Until more experience is available to support BTA decisions, it may be premature to suggest that some technologies will meet the performance standards...especially if non-compliance is to be based on strict percent reduction requirements.

Also, while relevant historical and operations experience from other plants has value, we do not want to facilitate hasty decisions or encourage challenges based on a simplistic justification that would be as follows:

"This plant is on an estuary... it installed fine mesh screens and restored a wetland … you are on an estuary… you should do the same."

Experiences elsewhere are worthwhile but technology determinations are another of the many factors that clearly argue for site-specific determinations.

EPA Response

Please see response to comment 316bEFR.325.004.

Comment ID 316bEFR.341.008

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 18.02

RFC: Use of previous demonstration studies

EPA Should Make it Easier to Accept the Considerable Long-Term Data That Shows Many Plants Have Negligible Adverse Environmental Impact

Many states have already done extensive work to regulate the impact of cooling water intake systems. If some plants have not yet conducted studies and assessed the impact of their cooling water intake systems, EPA should not conclude this is a reason to make others revisit an issue that has been demonstrably resolved.

EPA Response

EPA has disallowed the use of historical determinations of BTA in today's final rule; however, existing data that is reflective of current conditions may be used to support the required studies. Please see response to comment 316bEFR.040.001 for details.

Comment ID 316bEFR.341.009

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 8.03

Proposed standards for Great Lakes

The Great Lakes and Estuaries Do Not Require More Regulation Based on Sensitivity to Cooling System Impacts

The Great Lakes are unique but that does not make them uniquely sensitive. Great Lakes fisheries are highly managed and consist largely of introduced and stocked species. The life history characteristics of the Great Lakes commercial and recreational fish of concern are not put at risk by power plant operations.

Similarly, burgeoning human development and the fishing pressures on the abundant populations of commercial and recreational species have impacted estuaries. That many estuaries continue to be productive in spite of over-fishing, pollution and habitat degradation suggests resilience more than sensitivity. It also suggests that, if the overall health or 'sensitivity' of certain, important waters are at issue, the EPA should place as much attention on more obvious threats to the sustainability of important species. Habitat losses, competition from introduced species, non-point source runoff and over-fishing all contribute [to a greater degree] to the loss of commercial and recreational species.

EPA Response

Please refer to the response to comment 316bEFR.025.013 for a discussion of the Great Lakes as sensitive waterbodies and a discussion of introduced and nuisance species.

EPA acknowledges that other factors such as overfishing or declining water quality may also affect fish populations. However, these factors do not diminish the increased potential for adverse environmental impact from cooling water intake structures in tidal rivers and estuaries.

Comment ID 316bEFR.341.010

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Allowing Restoration and Environmental Enhancements is Good Policy

Mitigation can be a cost-effective way to offset the impacts of cooling water intake systems and a most reasonable alternative to many technologies. Congress has consistently promoted creation and restoration of wetlands in a number of laws. EPA should not accept the Riverkeeper position that restoration measures are “wholly unrelated” to intake structure technologies and therefore cannot be BTA. The State of Maryland has included mitigation measures as part of 316(b) settlement decisions and we hope the new national guidance will continue to encourage that option. The voluntary option should remain in the final regulation.

The NODA (@ p. 13542) requests comment on additional proposed requirements for the use of restoration measures.

- Documentation of sources and magnitude of uncertainty in expected restoration project performance;

- Creation and implementation of an adaptive management plan; and

- Use of an independent peer review to evaluate restoration proposals.

We agree with UWAG’S recommendations on the requirements. All three can be useful to evaluate and endorse a proposed measure but the degree to which each requirement is applied should depend on the specific project. Based on the environment and experience, some activities certainly have less uncertainty and should need less scrutiny.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the nature of the requirements in the final rule, see EPA's responses to comments 316bEFR.307.047 and 316EFR.311.022.

Comment ID 316bEFR.341.011

Author Name Kenneth S. Johnson
Organization Constellation Energy Group

Subject Matter Code 21.09
Permit applications/implementation schedule

Utilities Need Clear Guidance Regarding the Effective Date and Implementation Requirements of the Rule

While we are certain this concern was a high priority comment in many of the responses to the proposed rule, the NODA seems to have done little to lessen the vagueness that detracts from the proposal in so many important places. This is a complex matter that requires the kind of guidance that EPA produced in 1977. We suggest that uniform approaches to this very site-specific activity are not possible without more comprehensive guidance.

CEG has a total of six facilities that would be regulated under this proposal. One nuclear facility has an NPDES permits that expires in December 2004. If the complete application package is due to the permitting agency 180 days before the permit expires (May, 2004), it is most unreasonable to expect to have all the elements of the Comprehensive Demonstration Study completed in time. We will have known the final regulatory requirements for only three months. EPA misses the point when they justify the 180-day requirement (68 FR 13584). This is not about the time that permit writers need to review such complex and extensive submittals. It is about the time the applicants need to prepare the package. In fact, the expanded submittal that permit renewals will become might argue for even more time to review the substantial additional material.. .after all, most states require the 180-day lead time already and have much less to address (by comparison).

Our concern is about the time we will need to develop the application package with all the elements that the Comprehensive Demonstration Study requires. Sufficient time must be allowed to bring together the necessary information. More important than that, the application must be prepared with the understanding that comes from the final rules. It is unreasonable and unfair to expect the commitment of resources that would be required to prepare the next round of Phase II permit renewal applications before we know what the final requirements will be.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.341.012

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 21.04

Determination of compliance

The Rule Needs a Better Definition of 'Calculation Baseline' and Guidance on How it is Determined

We agree with UWAG'S recommendations to factor full operation conditions into a fair baseline characterization. We particularly agree that the process should be consistent with the same, overly-conservative assumptions EPA uses to estimate CWIS impacts and benefits - all fish are alive and in good health when impinged and there is zero survival. To be consistent, the baseline assessment should apply the same assumptions.

We appreciate that there will be a hypothetical, rudimentary basis to which the proposed performance standards will be applied. However, there must be acknowledgement that many cooling water intake systems have always had features that are improvements on (or just different from) the 'baseline' condition. Apart from operational considerations, we still need guidance on how we are expected to factor biological phenomena and all the structural differences that most intakes have into an assessment of a condition that never existed before. EPA (and UWAG, for that matter) continues to address what the 'baseline' intake should look like and we suggest the greater uncertainty is how we determine the entrainment and impingement at such a facility.

EPA Response

EPA has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.341.013

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 21.04

Determination of compliance

Determining Compliance

CEG agrees with UWAG and strongly suggests that the final rule clearly indicates what constitutes compliance with the numerical performance standards. If we complete the demonstration study and install the technology specified in the NPDES permit, we should be considered in full 'compliance'. If monitoring shows that the measures have not actually achieved the required reductions in impingement and/or entrainment, the facility should not be in violation and be penalized. The facility should be expected to evaluate and commit to additional measures to meet the performance standards.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan. EPA disagrees that a facility that is out of compliance should not be subject to enforcement actions.

Comment ID 316bEFR.341.014

Subject Matter Code 21.03

Monitoring requirements

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

In the NODA @ p. 13585, there is some worrisome language that suggests perpetual reconsideration of 316(b) issues and compliance with every NPDES permit renewal. If a facility has installed and operates technologies that monitoring shows meet the new performance standards, the issue should be closed. The plant has met the BTA standard or its equivalent under the site-specific determinations. To recommend that each renewal application include information that demonstrates that conditions have not changed suggests that facilities may have to monitor constantly in order to have this information. This should not be necessary if the accepted technology has demonstrated that it meets the performance standard.

This same difficulty arises on p. 13586 with the issue of how much time a facility needs to come into compliance. If compliance is NOT just having BTA that is installed/operated/maintained but monitoring that demonstrates that it meets the percent reduction standards, we may have to monitor routinely.. .as we do for effluent limits. The Clean Water Act enforcement framework has fines for daily non-compliance. If we cannot show we are in compliance every day, how will we counter accusations that we are not? This is another reason why, once monitoring demonstrates that the performance standards are met, the issue should be closed.

EPA Response

Please see EPA's response to comment 316bEFR.021.007.

Comment ID 316bEFR.341.015

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 21.09

Permit applications/implementation schedule

Finally, EPA has some suggestions @ p. 13584 to address the considerable feedback it got regarding how applicants will be able to get the substantial permit application package together when it is due in 2004, shortly after the rule becomes final. We would agree to at least a one-year delay and two years if new biological studies would have to be conducted. We continue to believe that an easy way to cleanly resolve this question would be to make compliance start with a renewed permit that specifically requires all the elements of compliance in the new five-year term. Field studies, economic assessments, technology selection, approvals, installation and compliance monitoring can all be done with the applicants and permit writers having the advantage of knowing the final requirements [and having a guidance manual and training available].

One option we do not want is a 'Compliance Schedule' (p. 13584). . .if that approach implies that the facility is not in compliance with the regulations. While EPA describes a process that is attractive and innocent enough, with the permit writer preparing a "reasonable" schedule that "will ensure the facility is brought expeditiously towards compliance", we do not want any presumption that our facilities are out of compliance now. With the understanding that considerable time will be needed to do all that is required, EPA should call the approach an "Implementation Schedule" and make it clear that the facility is not in a state of non-compliance during this intermediate stage.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.341.016

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 21.03

Monitoring requirements

Impingement of Moribund Organisms Must be Factored Into the Impact Assessment

There is no doubt that certain environments can produce conditions that result in mass mortalities of aquatic organisms. Cold shocks in winter and the presence or sudden movement of low oxygen water in the summer have caused fish kills in the vicinity of the Calvert Cliffs Nuclear Power Plant on the Chesapeake Bay. Such conditions have killed or irreversibly weakened thousands of vulnerable fish, which are essentially collected by the plant's intake system. If this happens during impingement sampling, the numbers collected can be overwhelming. However, since impingement monitoring is a sub-sampling process and the numbers are extrapolated to the longer period of plant operation, these episodic events can yield huge estimates of impinged organisms. The final guidance for determining impingement impacts must factor in the obvious influence of episodic events where dead fish are drawn into the plant intakes. Guidance should allow for the development of scientific methods that document such episodes (and ultimately discount this site-specific phenomenon from the impact assessment).

EPA Response

Please see EPA's response to comment 316bEFR.306.116 for an explanation of EPA's position on factoring naturally dead or moribund organisms. For EPA's position on upset or bypass provisions for episodic impingement mortality and/or entrainment events, please refer to the preamble to today's final rule.

Comment ID 316bEFR.341.017

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 7.02

Performance standards

The Final Regulation Should Allow Entrainment Survival to Determine Compliance With the Performance Standard

As with impingement, the performance standard for entrainment should be mortality. Mortality is what constitutes the adverse impact.. .and it can be argued that planktonic organisms that are killed are not as lost to the food web they support, as other parts of the system would be. Also, it seems EPA is going to rather extreme lengths to criticize the body of work on entrainment survival. While many of the utility studies are dated and some methodologies may not be exquisite, one is still left to wonder why EPA does not apply the same level of scrutiny to the studies that support its initiatives.

The assumption of 100 percent mortality is too conservative and is inconsistent with the proposed impingement standard. Also, there are considerations that should be factored into any given facility's impact assessment. If we understand that entrainment mortality is a combination of three primary factors - exposure to heat, biocides and physical stresses, there are site-specific issues to consider. Biocide use is infrequent. Most entrained organisms are not exposed to the chemicals. Some plants have very efficient or substantial condensers and do not reject as much heat to the cooling water. The maximum temperature increase at the Calvert Cliffs Nuclear Power Plant is 12°F, not a significant thermal shock to many organisms. Finally, while certain groups of organisms may be vulnerable to the physical stresses of entrainment, others are not. The foregoing simply supports what many studies have demonstrated.. .sometimes, a significant number of entrained organisms survive. We need a regulatory framework that honestly assesses impacts and has a valid basis for evaluating the controls that may be required.

EPA Response

EPA disagrees. Today's final rule sets performance standards for reducing entrainment rather than reducing entrainment mortality. EPA chose this approach because EPA does not have sufficient data to establish performance standards based on entrainment survival for the technologies used as the basis for today's rule. If entrainment survival were to be incorporated into any determination of compliance with the performance standards, then the actual performance standard that would need to be met would be higher.

Based on its review of all entrainment survival studies available to the Agency, EPA believes that its assumption of zero percent survival in the benefits assessment is justified. The studies reviewed are characterized by significant uncertainty and variability which complicates efforts to synthesize the various results in a manner that would provide useful generalizations of the results or application to other particular facilities for the benefits assessment. The primary issue with regard to these studies is whether the results can support a defensible estimate of survival substantially different from the value zero percent survival assumed by EPA. The review of the studies has shown that while some individual organisms may be alive in some of the discharge samples, the proportion of the organisms that are alive in the samples is highly variable and unpredictable. In addition, the studies contain various sources of potential bias which cause the estimated survival rates to be higher than the actual survival rates. For these reasons, EPA believes the current state of knowledge does not support reliable predictions of entrainment survival that would provide a defensible estimate for entrainment survival above zero.

Comment ID 316bEFR.341.018

Author Name Kenneth S. Johnson
Organization Constellation Energy Group

Subject Matter Code 7.04
Streamlined Technology Option

We Support the Streamlined Technology Option

At 68 FR 13,539, EPA suggests that the burdens of the Comprehensive Demonstration Study might be reduced if a facility in the appropriate water body agrees to install a control technology that has a confirmed history of meeting the proposed performance standards in that type of aquatic environment. Although the proposed example will not apply to any CEG facility, we support the Streamlined Technology Option and any other provisions that will [with sufficient scientific justification] lead to expeditious agreement on compliance without protracted monitoring and reporting.

EPA Response

EPA appreciates Constellation Energy Group's support of EPA's Approved Design and Construction Technology option.

Comment ID 316bEFR.341.019

Author Name Kenneth S. Johnson

Organization Constellation Energy Group

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

We Still Need a Better Definition of 'Significantly Greater'

The cost/benefit tests that make economic feasibility a part of BTA selection are one of the most important features of the proposed rule and CEG strongly supports their retention in the regulatory process. However, as we noted in our comments for the 2002 Phase II rule, such a subjective term is not the way to go. 'Significantly greater' is too vague, and clearly needs clarification.. .preferably as a measurable or quantifiable expression. Otherwise, we face different interpretations across the country and the potential for regulators to say, "the difference is not significant enough."

EPA Response

See responses to 316bEFR.006.003 and 018.009.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Theresa Pugh

On Behalf Of:

American Public Power Association

Author ID Number:

316bEFR.342

Comment ID 316bEFR.342.001

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 7.02

Performance standards

Cooling Towers

EPA's proposed rule is based on "performance standards'' that call for reducing impingement mortality by 80-95% and, for many facilities, entrainment by 60-90%. EPA has looked at available intake structure technologies and concluded that some of them can achieve these standards. The candidates are wedge wire screens, fine mesh screens with fish return systems, and aquatic filter barriers. However, APPA is concerned that certain parts of the proposed rule seem to imply that if these technologies cannot achieve the performance standards at a particular site, that cooling towers (closed-cycle cooling) might be required.

APPA believes that EPA does not (and should not) intend to require existing facilities to retrofit cooling towers, as demonstrated by several passages in the NODA. For example, EPA deliberately did not include costs for cooling towers in its economic analysis for the "preferred" option. Furthermore, other parts of the economic analysis that do consider cooling tower costs (as well as environmental side-effects to other media such as air pollution and feasibility problems due to space constraints), clearly show, that cooling towers should not be required at existing facilities.

APPA believes EPA should make it very clear in the final rule that cooling towers are not the "default" option to be required whenever the other alternatives cannot achieve the numerical standards. APPA believes, along with the National Rural Electrical Cooperatives Association (NRECA) that EPA should add the following language to the rule:

"Although existing facilities with closed cycle cooling will be deemed to have complied with this rule, this rule does not require closed cycle cooling systems to be installed on any existing facility, even if the intake structure technologies considered in this rulemaking cannot achieve the performance standards in practice. ''

EPA Response

Today's rule does not require any facility to retrofit its cooling system to include closed-cycle cooling (cooling towers), although EPA notes that this option remains available to any Phase II facility in order to satisfy the requirements of the regulation. If a facility were to adopt closed-cycle cooling (compliance alternative 1), it would be exempt from many of the additional elements required of facilities opting for one of the other compliance alternatives. EPA also notes, however, that today's rule preserves each State's right to adopt or enforce more stringent requirements.

With regard to this issue, EPA believes the language adopted in today's rule is sufficient and does not warrant further changes as proposed by the commenter.

Comment ID 316bEFR.342.002

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 7.02

Performance standards

While APPA has not had an opportunity to assess each of the studies EPA cites, APPA believes that these studies show that the technologies EPA has identified (wedge wire screens, fine mesh screens with fish return systems, and aquatic filter barriers) will be deployable at appropriate sites, are capable of achieving appreciable reductions in impingement and entrainment. APPA believes that they will meet the proposed performance targets at many, if not all sites, as long as those targets are properly and reasonably applied.

While APPA believes that there may be some sites for which the performance standards are not achievable, APPA believes that the cost-cost and cost-benefit tests offer an appropriate means of resolving issues and setting alternative targets for those cases.

APPA believes strongly that there is no technology - even cooling towers - that

- can feasibly be deployed at each and every existing facility and

- would meet the proposed performance targets (as opposed to a flow reduction target, which is not the equivalent of a reduction in entrainment and impingement) at all sites.

EPA Response

EPA agrees with the commenter and notes that today's rule maintains the flexibility for facilities to opt for the most cost-effective means of satisfying the requirements of the rule.

Comment ID 316bEFR.342.003

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 21.04

Determination of compliance

Nature and Implementation of the Performance Standards

As we have said in our previous comments, APPA believes that the performance standards provide useful targets for evaluating existing technologies, selecting and designing new intake technologies, and for evaluating and refining their performance after installation. We do not believe, however, that they should be incorporated directly into permits as enforceable limitations. As EPA's own technology performance data show, the performance of specific technologies will vary over time in response to widely varying biological, physical, and even chemical conditions within the waterbody. Unlike the case for pollutant discharges produced and controlled by a discharger, varying in-stream conditions - particularly the high natural variability of biological populations and communities - are not under the permittee's control, nor can the permittee reasonably be expected to anticipate and adjust for all such variations.

APPA believes that the appropriate means of using performance standards is as targets for technology selection and design and then as standards for assessing technology performance. The enforceable BTA permit requirements should be expressed as requirements to (1) identify a technology or technologies (or other measures) that will achieve the performance range (or an alternate range justified by the cost-cost or cost-benefit test) with appropriate operating and maintenance specifications adapted to the technology and the site; (2) install/operate, and maintain the technology in accordance with the technology specifications approved by the permit writer; (3) perform appropriate monitoring to gauge performance; and (4) refine or adjust operation, maintenance, or other factors as appropriate in light of initial monitoring.

EPA Response

EPA disagrees that performance standards should be used only as targets. EPA also disagrees that a facility that is out of compliance should not be subject to enforcement actions. However, EPA has provided a tremendous amount of flexibility in today's final rule for meeting 316(b) requirements, including 5 compliance alternatives (one of which is site-specific), and the option to demonstrate compliance with a Technology Installation and Operation Plan rather than with numeric performance standards (see final rule preamble). Furthermore, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see the preamble to the final rule and EPA's responses to comments 316bEFR.017.003 and 316bEFR.063.005.

Comment ID 316bEFR.342.004

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 7.01

RFC: Three-option framework for determining BTA

APPA strongly believes that the U.S. EPA should expressly allow permittees and permit writers flexibility to develop appropriate site-specific performance evaluation requirements because of the inherent difficulties of working with aquatic populations in a regulatory setting.

This overall approach makes sense for a number of reasons. First, it is consistent with 316(b) and with EPA's interpretation and application of 316(b). Second, it would tend to minimize administrative burdens by avoiding controversy over the specific value chosen. Third, it would avoid the disincentive to innovate that a rigidly enforceable performance standard would create.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative. Please refer to the response to comment 316bEFR.338.002 for more information.

EPA disagrees with the commenter's statement about the historic interpretation of 316(b). Today's rule is the first major regulation for 316(b) for existing facilities; all other § 316(b)determinations for existing facilities to date have used a best professional judgment approach. The final rule does include a site-specific compliance alternative as one of the five alternatives available to facilities, creating a flexible regulatory framework. EPA believes that today's final rule will minimize adverse environmental impact associated with cooling water intake structures.

Comment ID 316bEFR.342.005

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 21.04

Determination of compliance

Baseline

EPA introduced the concept of the “Baseline” as a starting point for assessing the performance of cooling water intake technologies. While EPA addressed the “Baseline” in the NODA, APPA joins other utility organizations including NRECA in expressing uncertainty as to how this “datum plane” is to be determined. As we expressed in our earlier comments on the proposed Phase II regulations, however, as long as EPA does not use the performance criteria as directly enforceable permit limitations, many of our concerns about how to accurately establish the baseline are reduced.

APPA continues to urge EPA to find a simple way of employing this concept in the final rule. One suggestion that has already been made is to assume zero percent reduction as the baseline condition (the intake without any control technologies) thereby giving full credit for the percentage reductions achieved by technologies that have already been added to the intake or for those that are to be added in the future in order to comply with the new BAT regulations.

EPA Response

EPA has clarified its definition of calculation baseline in today’s final rule (see §125.93). For additional explanation of EPA’s definition of calculation baseline, please refer to EPA’s response to comment 316bEFR.034.013.

Comment ID 316bEFR.342.006

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 7.04

Streamlined Technology Option

Streamlined Technology Option

Part B, Section VII of the NODA addresses a “Streamlined Technology Option for Certain Locations” (68 Fed. Reg. 13,539 col. 2). EPA asks whether the following technology would qualify for streamlined application requirements:

Use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity is 0.5 feet per second ft/s) or less.

APPA is concerned not only with the potential capital costs imposed by the regulations, but also with the “transaction costs” of determining what to do and how to do it. We would therefore support this as a suggested way for meeting the technology requirements of the rule, as long as it is applied within the general context of the rule (including the option for cost/benefit assessment) and not as a ‘one size fits all’ requirement.

EPA Response

EPA agrees that the Approved Design and Construction Technology compliance option should not be applied to all facilities. For this reason, EPA has included the option as one of several from which a facility may select. Regarding how a facility will determine which option to choose, this ultimately will be up to the Director to decide. The Director will evaluate a facility’s permit application and make a determination, based on the facility’s intake structure, operational data, waterbody type, and existing protective technologies, of the most appropriate compliance option. EPA anticipates providing guidance to State permitting agencies to assist Directors in implementing the requirements set forth by today’s final rule. In addition, the Agency intends to develop implementation guidance for owners and operators to address how to comply with the application requirements, the sampling and monitoring requirements, and the record keeping and reporting requirements in these final regulations. Finally, State permitting agencies and permit applicants may refer to Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P.L. 92-500 (U.S. EPA, 1977), for additional guidance.

Comment ID 316bEFR.342.007

Author Name Theresa Pugh
Organization American Public Power Association

Subject Matter Code 11.01
RFC: Proposed use of restoration measures

Mitigation

APPA strongly supports the concept of voluntary restoration as a way to offset any impacts caused by the cooling water intake system, Mitigation has become an accepted part of the wetlands program and is now being embraced by the Fish and Wildlife service as part of their new ESA Conservation Mitigation Banking program announced on May 8, 2003.

EPA Response

In the final rule, EPA allows use of restoration measures to minimize or to help to minimize the adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures in final rule, see the preamble to the final rule.

For a discussion of the extent to which restoration measures are voluntary, see EPA's response to comment 316bEFR.060.022.

Comment ID 316bEFR.342.008

Author Name Theresa Pugh

Organization American Public Power Association

Subject Matter Code 21.09

Permit applications/implementation schedule

Realistic Timeline

APPA appreciates the EPA's willingness to consider the phasing in of the 316(b) program through the NPDES renewal process. A number of public power systems will have a NPDES permit renewal within two years of the EPA's final rule on 316(b) for existing facilities. This presents a difficulty for both state permit writers and public power system environmental managers.

APPA urges the EPA and the states to give adequate time to issue NPDES permit renewals after the 316(b) Phase II rulemaking is finalized so that there are no unnecessary delays in permit approvals and no uncertainty if the state permit writer may approve the NPDES renewal if the 316(b) program is not fully in place. APPA urges the EPA and states to provide for adequate time for 316(b) studies and data collection, etc. This compliance schedule should not imply that a public power system is not in compliance with the 316(b) program if it is not practical or possible to implement the 316(b) studies, data collection etc by the time of the NPDES permit renewal.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion. See also response to comment 316bEFR.025.019 and other responses in this subject code.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

William Sarbello

On Behalf Of:

N/A

Author ID Number:

316bEFR.343

Comment ID 316bEFR.343.001

Author Name William Sarbello

Organization N/A

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

EPA made a huge error of omission in evaluating the cost/benefit of converting to closed-cycle cooling. EPA FAILED TO CONSIDER AND EVALUATE THE TREMENDOUS BENEFIT OF ELIMINATING ALMOST ALL HEAT DISCHARGE as a result of employing closed-cycle recirculating cooling as the Best Technology Available.

One of the reasons EPA gave for not requiring closed-cycle cooling at all or part of the power plants affected by Phase II rule was the cost. However EPA in its cost-benefit analysis of closed-cycle cooling FAILED to account for the benefits of a 95-99% reduction of the pollutant HEAT being discharged from these once-through cooling systems. This should have been presented in the "Economic and Benefits Analysis (EPA-821-R-02-001)," "Case Study Analysis (EPA-821-R-02-002)," and "Technical Development Document (EPA-821-R-02-003)," and the results incorporated in the decision for selecting the best technology available alternative. I believe had EPA done this that closed-cycle recirculating cooling would have been selected as the preferred alternative.

This is a humongous error of omission! On page 17136 of the Draft regulations (Federal Register Vol. 67, No. 68, April 9, 2002) EPA states that the volume of cooling water currently used by these facilities is 279 billion gallons per day. This is a HUGE volume of hot water being discharged daily, equivalent to a discharge of 431,677 cubic feet per second. To provide some context, the mean discharge of the Columbia River at the Bonneville Dam (the most downstream dam) in 2002 was 172,019 CFS, or 111.179 billion gallons per day. So the quantity of hot discharge water affected by this rule is equal to 2.5 Columbia Rivers of heat-polluted water!

Going to closed-cycle cooling would reduce this volume of pollutant discharge by approximately 95-99%. Taking the low figure, 95%, this would reduce the discharge of hot water to the Nation's waters by more than 265 billion gallons per day, eliminating a pollution discharge roughly equivalent to 2.4 Columbia Rivers per day! Yet EPA failed to calculate this as a benefit in its cost/benefit analysis!!!

EPA should remember that the goals of the Clean Water Act is the ELIMINATION of pollution discharges (33 USC 1241) and the title of the permit program is the National Pollutant Discharge ELIMINATION System (emphasis added). HEAT is a named pollutant under the Act and EPA should be seeking its elimination, especially where applying the technology will also have big entrainment and impingement mortality reductions.

The quantity of heat discharged to waters by a single once-through cooling systems is huge. For example, Indian Point 2 & 3, a 2000 MW nuclear station, discharges 332.9 billion BTUs per day. Two 1200 MW fossil-fueled stations, Roseton 1 & 2 and Bowline 1 & 2, each discharge 135.4 BTU/day<FN 1>. The ΔT varies from plant to plant, but it probably is 15° F or greater for most facilities. These few examples are indicative of the huge quantity of heat discharged daily in sum from all the facilities affected by the Phase II rule.

This discharge of this huge quantity of heat is itself should be considered additionally as one further "adverse environmental impact" to be minimized in meeting 316(b) in that it is a harmful aquatic impact to coldwater species; apart and separate from any 316(a) implications.

EPA should do the calculations to project the total "rejected heat" that will be eliminated by converting these large polluters regulated under the Phase II Rule to closed-cycle cooling. The volume of polluted water and the intensity of the pollutant heat eliminated in BTU and in ΔT should be calculated and presented, and the results incorporated into EPA's decision-making on the Best Technology Available selected in the final Phase II rule..

The value of eliminating this heat pollution should be given a value. The Technical Development Document presented an annualized cost estimated at $2.26 to $2.32 billion, for closed-cycle cooling at the subject facilities. However, it did not calculate the value of the concomitant benefit of eliminating roughly 69,725 billion gallons per year of heat pollution from these plants (279 billion gallons per day times 95% reduction from closed cycle times 365 days in a year). This seems like a really good value! To give this pollution elimination benefit a context relative to cost, EPA should compare it to the volume of water discharged from municipal sewage systems versus the dollars spent on building and upgrading sewage treatment plants (STPs) nationwide. I'd bet that the volume of water from STPs is comparable, or even less than the volume from of water from Phase II once-through heat pollution discharges! I'd also bet that hundreds of billions of dollars were spent on these STPs, which should be converted into same-year-basis dollars. And again, in going to closed-cycle cooling at Phase II power plants, the benefit of eliminating heat discharge is in addition to the benefits already calculated from the huge reduction in impingement and entrainment mortality!

Footnotes

1 Draft Environmental Impact Statement for State Pollution Discharge Elimination System Permits for Bowline Point, Indian Point 2 & 3, and Roseton Steam Electric Generating Stations, Chapter IV.

EPA Response

EPA notes simply that section 316(a) of the CWA applies to heat discharge. Section 316(b) applies to cooling water intake. Therefore, in this final 316(b) rule EPA is not basing its regulatory decisions on heat discharge. The benefits of the cooling water intake national rule are from reduction in the impingement and entrainment of aquatic organisms.

However, the Agency has allowed in the final rule the ability of local authorities, where the local conditions warrant, to require more stringent requirements (potentially including cooling towers) than are required by this final rule. As such, the sections of the CWA may be applied in their proper instances and not be restrictive of each other.

As a matter of record, the Agency notes that the commenter's assessment of the water reducing potential of cooling towers on a national level is optimistic and misleading, when marine water performance is considered. As such, the Agency refers to comment response 316b.efr.404.034 for more discussion of the true water withdrawal reduction potential of closed-cycle cooling in marine environments.

Also as a matter of record, the Agency disagrees with the hypothetical methodology suggested by the commenter for assessing a potential benefit of a reduction in heat discharge: "compare [heat pollution] to the volume of water discharged from municipal sewage systems versus the dollars spent on building and upgrading sewage treatment plants (STPs) nationwide ." This methodology is not explained further by the commenter and simply does not make logical sense as presented. In the Agency's view, heat pollution is not directly related to the costs of building and upgrading sewage treatment plants. These are too disperse and unrelated entities, which the commenter fails to equate.

Comment ID 316bEFR.343.002

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name William Sarbello

Organization N/A

EPA has given unreasonable, exaggerated weight to potential for energy supply disruptions.

EPA also states it did not choose conversion to closed cycle cooling because "EPA also has serious concerns about the short-term energy implications of a massive concurrent conversion and the potential for supply disruptions that it would entail." This is unreasonable, as the simple, logical solution is to develop an "implementation plan" or "schedule for compliance" that would achieve the conversion with a minimum of disruption. Since the passage of the Clean Water Act more than 30 years ago many dozen industries and thousands municipal sewage systems have built treatment works, without major disruptions. Cooling system cut-overs can be scheduled during months of lower demand, and the dates of conversion to closed-cycle cooling could be spaced out in time to assure adequate power reserves. EPA did not require all municipal STP's to be brought up to standards overnight, "...massive concurrent conversion..." for Phase II facilities is an unreasonable concept. Such an unreasonable excuse should not be used as a rationalization for not having an orderly conversion to closed-cycle cooling.

Footnotes

2 Page 4-10, Technical Development Document, Chapter 4 "Cooling System conversions at Existing Facilities, " economic and Benefits Analysis (EPA-821-R-02-001).

EPA Response

See section 7 of the preamble for a discussion of alternatives considered by EPA and the basis for accepting/rejecting alternatives. See also the preamble for a discussion of compliance issues.

Comment ID 316bEFR.343.003

Author Name William Sarbello

Organization N/A

Subject Matter Code 9.04

Cooling system costs (e.g., dry, wet, recirculating)

EPA has erred in not considering the financial incentives available to facilities that upgrade to close cycle cooling and/or re-power.

There are a variety of business incentives which EPA should have considered in reducing the cost of converting to closed-cycle recirculating cooling systems, and for re-powering or replacing once-through cooling facilities.

There are federal and state tax credits or advantages available for investing in new equipment. States like New York, through its Environmental Facilities Corporation, have low-cost loans available from a revolving fund to help finance the cost of adding pollution control measures. Also, facilities located in certain targeted areas may qualify for other incentive programs, such as New York's Empire Zone program and similar incentive in other state. Various State and Local governments often have Industrial Development Authorities that provide financial mechanisms for lower cost loans and local property tax advantages.

For example, the conversion in Bethlehem NY of the boiler-fired, once-through cooled 400 MW Albany Steam Station to the re-powered combined-cycle, closed-cycle cooled 750 MW Bethlehem Energy Center was funded by the Bethlehem Industrial Development Authority with loan and tax advantages far superior to conventional corporate bonding, greatly reducing the cost of the conversion project. See part of the financial advantage at
http://albany.bizjournals.com/albany/stories/2001/06/04/daily27.html and
http://albany.bizjournals.com/albany/stories/2002/02/11/daily16.html

The resulting Bethlehem Energy Center will produce 47% more energy with a 97+% reduction in air pollution, a 98+% reduction in water use, and a greater than 99% reduction in impingement and entrainment mortality. See http://www.state.ny.us/governor/press/year02/june10_1_02.htm. The point is that there are lower-cost financing and substantial tax advantages to plants that modernize, and EPA Must include these economic incentives in any evaluation of conversion to closed cycle cooling.

EPA Response

EPA notes that the final Phase II rule does not contain requirements to retrofit cooling towers.

The commenter claims that EPA erred in its analysis of regulatory options at proposal by not considering possible financial incentives that facilities might use to reduce the cost of installing equipment needed to comply with the 316(b) regulation. The commenter argues that financing programs such as those available from the New York Environmental Facilities Corporation would reduce the cost of installing closed-cycle recirculating cooling systems and that EPA should have accounted for such programs as part of its analysis of regulatory options.

The commenter correctly identifies that, in some instances, financing programs, such as those offered by states under EPA's Clean Water State Revolving Fund (CWSRF) and other state-level financial assistance programs, might reduce the cost of obtaining the financial capital needed for installation of environmental compliance equipment. However, EPA does not agree that the Agency should have considered the effect of such programs as part of its analysis of regulatory options and compliance technologies at proposal or for the final rule.

Financing assistance programs, such as those offered by states under the CWSRF or other programs such as the New York program cited by the Commenter, provide loans with "better than market" terms to qualifying parties for certain environmental projects. The advantages of these loans are that they carry a lower interest rate than otherwise available to the borrower from conventional sources and may offer a longer repayment schedule than conventional loans. As a result, these loans may make a capital project more affordable to the borrower. While such financing programs might conceivably reduce the cost to some parties for installation of equipment to meet 316(b) regulatory requirements, it is unlikely that such reduced cost financing would be generally available to 316(b) facilities. Key reasons include:

- Such programs are generally available only to municipal borrowers. Private parties would thus not generally be able to obtain funds from the financing assistance programs. Even when funding may be provided to private borrowers, availability of these funds is generally limited to small business or other disadvantaged parties believed to have relatively weaker access to capital than private borrowers, generally.

- Because the total funding value of these programs is limited to the amount provided by public agencies, funding from the programs is subject to rationing, and strict project criteria must be met to gain access to the funds. Candidate borrowers have no assurance of receiving financing from the programs.

Because of these limitations on access to these funding programs, EPA judges that it would not be reasonable to assume the lower cost of financing that these programs might provide to some parties for its general economic/financial analysis of 316(b) regulatory options. While these programs might be available in specific cases, this could not be modeled at a national level. However, EPA expects that those facilities that have this lower cost loan advantage available to them will take advantage of it and will take it into account in the case of a cost-to-cost test.

EPA also notes that the financial benefit conferred by these programs is likely to have little effect on the total financial burden imposed on the complying party. These programs reduce the cost of the capital funds for installing compliance technology but do not the affect the cost of the required capital outlay per se. A difference in this one element of the total cost framework is not likely to materially affect the overall economic/financial burden of regulatory compliance, which includes the capital outlay, the cost of baseline and compliance studies, permitting and monitoring costs, ongoing operating and maintenance expenses, and repermitting costs.

Finally, EPA notes that these financing programs affect only the affordability of regulatory compliance to the complying parties, and have no affect on the total cost to society of regulatory compliance. The reduction in cost of financing provided by these programs does not reduce society's cost of allocating capital resources to the compliance projects. The true societal cost of capital remains unchanged.

Comment ID 316bEFR.343.004

Author Name William Sarbello

Organization N/A

Subject Matter Code 7.02

Performance standards

EPA's proposed rule does not meet the requirement "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact" as required by CWA section 316(b).

The 60-90% reductions in entrainment and the 80-95% reduction in impingement mortality are ranges in name only, in reality they are meaningless. As a practical fact, the bottom end of the range (the minimum reduction number) will be the only standard that permittees will have to meet.

There obviously is no penalty for exceeding 90% reduction in entrainment or a 95% reduction in impingement, so these upper numbers are in fact meaningless. So EPA's de facto standard is only a minimum of 60% reduction in entrainment a minimum 80% reduction in impingement mortality. This is not Best Technology Available. EPA stated on page FR 17142 that closed-cycle, recirculating cooling can reduce impingement and entrainment mortality by 98%. Thus EPA's proposed performance standard underachieves BTA by 38% for entrainment and 18% for impingement mortality just on the basis of capacity, before factoring in location, design, and construction.

Thus, EPA is proposing a standard of 60% entrainment and 80% impingement mortality reduction from a "worst technology available" calculation baseline shoreline intake. That is, EPA is in effect proposing a performance standard of "somewhat better than the worst technology available" which is a far cry from the "best technology available for minimizing adverse environmental impact" required under the law. EPA compounds this inadequacy by proposing "special dispensation" for intakes on artificial canals that may perform worse than the hypothetical baseline. They further dilute this bad proposed standard by giving credit for unproven and out-of-kind "restoration" efforts, whether successful or not. Thus, under EPA's proposed rule, reductions will be less than the poor 60% entrainment and 80% impingement mortality nominally proposed. This is unacceptable when optimizing just one factor, capacity, could achieve a 98% reduction of all species, irrespective of whether the species sensitive or robust, or in low or high populations that year.

But the plain language of CWA section 316(b) require the not just the capacity, but the location, design, construction, and capacity reflect the best technology available for minimizing adverse environmental impact. That is, the location and design and construction and capacity each reflect the best technology available. The word "reflect" means "to manifest as a result of one's actions" or "to realize" which means "to bring into concrete existence." EPA's proposed draft rules do not minimize adverse impact from any one of these 4 factors, when they should be minimizing impact from each and every one of them.

The approach should be to require capacity restrictions (such as closed-cycle cooling) and location measures (e.g., offshore placement if most entrainables are inshore) and design measures (e.g., 2-mm spaced wedgewire screening with approach velocity under 0.5 ft/sec) and construction features (e.g. seasonally-deployed appropriately sized Gunderboom MLES or equivalent with through-filter flows below 5 gpm/sq ft and pore size less than 0.4 mm) with a total reduction of impact of 99% or greater than EPA's baseline. Real-world examples of conversion or replacement with multiple factor optimization (capacity, construction, location, and design) are Bethlehem Energy Center (PSEG) <FN 3>, Reliant Astoria Station re-powering<FN 4>, and New York Power Authority's Poletti Station replacement<FN 5> in New York, and PSEG's Linden Generating Station in New Jersey. These replacements use fuel more efficiently often 55-60% efficient fuel use versus 30-35% for the plants they replace. They produce substantially less air pollution, for example, Bethlehem Energy Center reduces SO2 emissions by 97% and NOx emissions by 98% while increasing energy production 188%. Such a positive impact can be crucial in air quality nonattainment areas, where it can free up air emission reduction credits, or ERCS, which can either be retired or used to support increased development.

Footnotes

3 Http://www.pseg.com/companies/fossil/fossil_stations.html

4 http://www.dps.state.ny.us/reliant_energy.html

5 http://www.state.ny.us/governor/press/year02/sept5_1_02.html

EPA Response

For a discussion on EPA's authority to promulgate today's rule and the basis for this action, please see the preamble.

For a discussion on the performance standards and their applicability and implementation under today's rule, please see section VII and section IX of the preamble.

EPA disagrees that it is required under section 316(b) of the Clean Water Act to identify a Best Technology Available (BTA) for minimizing adverse environmental impact for location and design and construction and capacity. EPA believes that the statute gives EPA the discretion to identify technologies that relate to any one of these so long as the result is a technology or suite of technologies that is economically practicable and minimizes adverse environmental impact.

Comment ID 316bEFR.343.005

Author Name William Sarbello

Organization N/A

Subject Matter Code 7.02

Performance standards

EPA should give NO CREDIT for angled screens as they do not reduce entrainment nor impingement mortality.

The concept that credit should be awarded for angled intakes is without merit. EPA should be asking the key question, "Does it work?" For cooling water intakes with conventional screens, approach velocities of 0.5 ft/sec or less, the answer is NO. For example, at the Oswego Harbor Power (formerly Niagara Mohawk Oswego Steam Station, 1,399 MGD), Unit 6 has 2 angled screens (approximately 45°) leading to a central fish bypass, while Unit 5 has conventional screens angled 90° to the flow. Counter to intuition, Unit 6, the angled screen, has higher impingement mortality than Unit 5.

Furthermore, the concept of a "guiding flow" is a fallacy in conventional cooling water intake screens operating at common flow velocities. The "bow wave" of an approximately 1 to 3 mm wire that comprises the screen is nil. See the work of Dr. Ian Fletcher for RiverKeeper who calculated the force vectors of angled screens. (I do not have a copy.)

EPA may be getting confused by some work at hydropower intakes involving angled louvers, pressure screens like Eicher or Modular Inclined Screens (MIS), angled bar racks, or the submerged traveling screens (STS) on large dams of the Columbia River system. The velocities, forces, and structures employed by such systems are far different from the 316(b) cooling water intakes. For example, angled louvers have been used in power canals at Holyoke MA (Holyoke Canal Louver Facility at the Hadley Falls) to divert herring, shad, and salmon to a fishway. These louvers are INCHES wide, are set at a steep angle to flow (15°), are operating in velocities around 2 ft/sec to create a bow wave on each slat, have a bypass attraction flow of about 5% of canal flow. The fish bypass flow is created by gravity (head) so that there is no pump to injure fish in the bypass. The louvers in the canal create resistance to the flow, which costs a loss in hydraulic head for the hydro project that, if this was a steam-electric station, pumps would have to be overcome by the cooling water pumps. Realizing that energy increases with the square of velocity, increasing the approach velocity by pumping from 0.5 ft/sec to 2 ft/sec would take 16 times as much energy! Such velocities are not typically needed for steam-electric condenser cooling.

Pressure screens such as the Eicher screen or the MIS require a 10% bypass flow. These screens also only work at high velocity, have a 1-2 mm gap wedgewire panel set at about a 15% angle of attack to the water flow, and literally strain out organisms, which slide up the wedgewire "ramp" into the bypass pipe. These are designed for outmigrating salmon and steelhead smolts, far more rugged fish than many impingable/entrainable organisms at typical steam-electric facilities. For example, see Portland General Electric's Sullivan hydroelectric station on the Willamette River (OR). Tests of an MIS on the Hudson River at Waterford proved disappointing on outmigrating blueback herring, from injuries from belly scutes catching in the slots as they slid up the screens. Besides needing a high water velocity, the 10% fish bypass flow is also an impressive quantity of water. For example, the 2,000 MW Indian Point 2 & 3 Nuclear Generating Station uses 2,800 MGD; a 10% bypass flow would mean pumping additional 280 MGD just for the fish diversion! This is not very likely configuration for a 316(b) cooling water intake. In comparison, a 1,080 MW combined cycle plant (Athens Generating Station, original evaporative closed-cycle configuration proposal) would use 7.5 MGD maximum with oil firing.

Angled bar racks at hydro stations have had some limited success for Atlantic Salmon on small rivers, but are unproven for other species. EPRI tests on a 5 ft wide test flume with bars set at 15% angle at 1-3 ft/sec intake velocities have had some limited success. However, extrapolating from a baffled 5 ft wide test flume to a 150 ft wide intake of a 1,000 MW nuclear unit is tenuous at best, and these studies are continuing.

Thus, no credit should be given for angled racks, as anything likely on a 316(b) cooling water intake will not provide any additional protection. The only exception should be where a site-specific study has demonstrated effectiveness at that specific intake site.

EPA Response

EPA notes that with the exception of compliance alternatives 1 and 4, no technology is pre-approved to satisfy the requirements of today's rule. EPA agrees with the commenter that the deployment of any one technology (in this case angled screens) will not automatically correspond to a decrease in impingement or entrainment.

Some data have shown that angled screens can be an effective means to reduce overall rates of impingement or entrainment, but, as with all technologies, results may vary from one site to another based on many contributing factors (see Chapter 3 of the Technology Development Document). Any design and construction technology, operational measure, or restoration measure selected to meet the performance standards in today's rule must be demonstrated to achieve the desired level of performance in order to be acceptable to the Director.

EPA appreciates the distribution of any data that might lead to increased understanding of the effectiveness of all technologies, including angled screens. In keeping with the preferred flexibility of today's rule, however, EPA has not precluded any technology from among the options available to Phase II facilities in meeting the performance standards.

Comment ID 316bEFR.343.006

Subject Matter Code 7.02
Performance standards

Author Name William Sarbello
Organization N/A

EPA should gibe NO CREDIT simply for placing an intake in deeper water as it does not assure lesser impingement or entrainment impacts.

EPA's proposal to give carte blanche credit for reducing impingement mortality and entrainment by simply locating an intake in deeper water is an unsupported assumption at best, and not true in all cases. The impacts depend on the ecology of the specific waterbody. For example, in Cayuga Lake (an oligotrophic finger lake in central New York State) placing a cooling water intake in relatively shallow water entrains and kills smelt and alewife, as at the AES Cayuga Station (formerly NYSEG Milliken Station). However, placing a cooling water intake in deeper water still entrains these species, but additionally entrains a critically important forage organism the mysid shrimp Mysis relicta, worsening the impact. (See studies performed for Cornell University's lake source cooling water intake.)

Placing an intake in the deep anoxic waters of some reservoirs may avoid entraining fish, but creates an anoxic discharge that may contain significant biochemical oxygen demand, and can violate dissolved oxygen standards in the receiving waters. (e.g. the discharge from Swinging Bridge Reservoir often violates dissolved oxygen standards in the receiving water, the Mongaup River when the intake water is drawn from the anoxic zone.) Thus, no credit should be simply given because an intake is deeper than the surface. Any consideration for credit should be based on site-specific studies and demonstrated effectiveness at that specific intake site.

EPA Response

EPA notes that with the exception of compliance alternatives 1 and 4, no technology is pre-approved to satisfy the requirements of today's rule. EPA agrees with the commenter that the mere location of an intake structure (in this case deeper, offshore waters) will not automatically correspond to a decrease in impingement or entrainment.

Some data have shown that offshore intakes located in deeper, less productive waters can be a means to reduce overall rates of impingement or entrainment, but, as with all technologies, results may vary from one site to another based on many contributing factors. Any design and construction technology, operational measure, or restoration measure selected to meet the performance standards in today's rule must be demonstrated to achieve the desired level of performance in order to be acceptable to the Director.

EPA appreciates the distribution of any data that might lead to increased understanding of the effectiveness of all technologies, including offshore intakes. In keeping with the preferred flexibility of today's rule, however, EPA has not precluded any technology from among the options available to Phase II facilities in meeting the performance standards.

Comment ID 316bEFR.343.007

Author Name William Sarbello

Organization N/A

Subject Matter Code 7.02

Performance standards

If EPA persists in using a "calculation baseline" cooling water intake, a of 3/8 in mesh traveling screen is an appropriate convention.

It is a fact that many old, harmful intakes have 3/8 inch screen, so there is a logic to support using 3/8 inch screen as a convention in EPA's baseline calculation. However the problem with the approach remains, instead of designing the best technology available EPA using a baseline of the Worst Technology Around, which does not satisfy the requirements of the law. If EPA insists on pursuing this course, then 3/8 inch screen is an appropriate convention for the baseline calculation.

EPA Response

EPA has modified the definition of calculation baseline to include 3/8-inch mesh as part of the baseline configuration.

Comment ID 316bEFR.343.008

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.04

Determination of compliance

It is critical that EPA's "Calculation Baseline" of operational measures reflect actual efficient flows, including reduced flows in colder seasons of the year that are standard operating practice in much of the US.

Baseline practices and procedures are those the facility would maintain in the absence of any specific measures for reducing impingement mortality and entrainment. This is very important quantification that must be made. Otherwise, once-through facilities will claim "bogus" reduction credits by claiming a baseline of running all pumps at 100% of capacity all the time. In reality, many plants operate at efficient flows to optimize fuel use and power production through the seasons of the year. That is, in the absence of any impingement/entrainment reduction efforts, powerplants in more northerly latitudes usually use a lower volume/minute of cooling water in the winter (when the water temperature is coldest), the highest flows in summer with the warmest water intake temperatures, and intermediate volumes/minute in the spring and fall. Permits will often permit a higher ΔT in different seasons, as water temperature drops further below the maximum lethal temperature of many organisms. The plants will use less than the maximum volume of intake water to save energy running unneeded pumps, and to avoid the problems associated with "over chilling" the steam/water condensate in the condenser. Consequences of over-chilling include:

- Making the condensate too cold, requiring more fuel to boil it again, reducing plant efficiency.

- Creating excessive vacuum in the condenser, which can cause premature leaks or failure, and

- Creating too great a vacuum (too low a backpressure) across the steam turbine, causing excessive steam velocity through the turbine. This is a problem because the steam can reach supersonic speeds, causing excessive erosion of turbine blades and shortening their useful life.

Thus EPA should require permittees to provide the baseline provide an honest profile of water use throughout the days of the year. These should preferably coupled with actual operation records, to show the volume of water pumped at different intake water temperatures or through the different months.

EPA Response

EPA has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.343.009

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.04

Determination of compliance

EPA should not give "special dispensation" to facilities on canals or bays or other areas where the actual intake has higher impingement/entrainment than the "calculation baseline intake" on an open shoreline. (Page FR 13581)

EPA appears to have completely misplaced its priorities and thinking if it is looking to give an adjustment or "finagle factor" to facilities on canals (bays, constructed waterways) if they kill more fish than the hypothetical "baseline intake." If any facility is killing more fish, it needs to do more to minimize its impacts!! EPA's proposed "baseline intake" is already a really bad intake that is far from BTA; if the intake on the canal is performing worse than such a really bad baseline intake, it needs to be fixed. A plain reading of 316(b) states that the "... LOCATION, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." If the current placement of the intake in the canal or bay causes killing of more fish, it is absurd to give a "special dispensation," it is EPA's duty under the law to remedy the location problem. No adjustment should be given if the location of an existing intake results in higher mortality than the calculated "shoreline intake baseline."

EPA Response

In today's final rule, EPA has accounted for situations where a facility may have much higher impingement mortality and entrainment rates than would be seen in the calculation baseline. As specified in the definition of calculation baseline (§ 125.93), EPA did not take the approach to give facilities credit when their intakes were located on a canal rather than on an open shoreline. EPA has tried to set a baseline not as a worst-case scenario, but rather at a baseline level, expecting that some facilities may have much lower impingement mortality and entrainment rates and some may have higher rates. EPA understands that aquatic organisms may tend to concentrate in canals, and has not given facilities the ability to take "credit" for having higher impingement mortality and entrainment rates relative to the calculation baseline. Instead, the calculation baseline would demonstrate that the impingement mortality and entrainment rates are elevated at that intake, and the facility would be required to "make up for the difference" between the actual configuration and the configuration described in the definition of calculation baseline.

Comment ID 316bEFR.343.010

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.04

Determination of compliance

EPA should adopt The As-built approach with sampling in front of the existing intake for entrainment, but actual impingement counts on screens for impingement, and then take reductions against these numbers.

This seems like a more reasonable approach for entrainment of planktonic organisms that could not avoid the sampling gear. Gear like the pump sampler used in NY's Hudson River studies (4 inch pipe drawing water in the water column drawing water into a plankton net suspended in a barrel, with water being drawn into the barrel by a 4 inch trash pump whose intake is located downstream of the plankton net.)

For impingement, however, actual impingement off the screen collected from the screen washings should be used. No conventional sampling gear like nets or trawls used to estimate numbers will perform similar to a real intake, and sampling gear avoidance would make such results inaccurate and probably biased low.

Actual collections of impingement off the screens should be benchmarked to establish the percentage of impingeable-sized organisms actually recovered. That is, known numbers of marked dead organisms, covering a range of impingable sizes in sufficient numbers to assure statistical reliability, should be released upstream of the intake at a point where the current will carry all such fish to the intake screens. This should be done with traveling screens operating as well as not operating, as the hinge areas between the screens are one common place where fish can pass by the screen and otherwise not be counted. The number recovered off the screen by size class should be compared to the numbers released, and the resulting recovery efficiency should be used to expand for gear inefficiency.

EPA Response

With respect to the As-Built approach, see the preamble to the final rule. EPA has not specified in today's final rule how the sampling should be performed to determine the calculation baseline. The sampling methodology will be proposed by the permit applicant for review and approval by the Director.

Comment ID 316bEFR.343.011

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

EPA SHOULD NOT accept data on impingement/entrainment from nearby facilities or waters as a substitute for sampling at the actual plant site as it is not comparable. Even very close plants have very different impingement/entrainment characteristics.

Each plant must be required to sample individually. Data from other sources is unacceptable for accurately quantify the impact of an individual plant, and to reduce this impact to meet Best Technology Available levels.

Intakes at even very close plants can have very different impacts. For example, the intakes of Roseton Station and Danskammer Station are located on the same west side of the Hudson River about 1,000 yards apart. However, Danskammer entrains roughly twice as many organisms per unit volume of water as Roseton, and their impingement characteristics are also quite different. If two intakes 1,000 yards apart can have such different results it makes no sense for EPA to accept data from other stations or waterbodies that are further apart and more different! Each plant must be required to sample individually and no substitutions should be accepted.

EPA Response

EPA disagrees that facilities should never be allowed to use existing data from facilities on the same waterbody. However, it is the burden of the facility to demonstrate that the data submitted is representative of the current physical and biological conditions in the vicinity of the cooling water intake structures of that facility, and to what extent the data is representative. Furthermore, the facility must be able to demonstrate that the data were collected using appropriate quality assurance/quality control procedures. EPA believes that with strict controls in place, that only facilities using truly representative data from other facilities will succeed in having that data approved by the Director.

Comment ID 316bEFR.343.012

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.03

Monitoring requirements

EPA should incorporate the ALL SPECIES in determining the percent reduction.

A “capacity” reduction, such as going from once-through to closed-cycle cooling would reduce impacts to ALL SPECIES, and that is the standard by which all other reductions should be judged. Furthermore, each individual collected by sampling should be identified to species and life stage. Where numbers are large, standard statistical sampling techniques should be used to assure numbers are estimated to a reliable level of precision. Species should not be lumped into a total combined count, nor weight, nor marginalized even further into a “dry weight.” Does a 5-kg carp (an exotic species) have the same ecological value as 5,000 1-g young-of-year shortnose sturgeon (an Endangered Species Act threatened species)? Or, say the millions of bay anchovy eggs that weigh a total of 5 kg, and which would have hatched to assure a forage base for the contemporaneous striped bass young-of-year age class production? The answer is that ALL are important, and all should be evaluated individually by identifying the impacts to ALL SPECIES and then taking action to reduce all these impacts.

EPA Response

Please see EPA’s response to comment 316bEFR.074.023.

Comment ID 316bEFR.343.013

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.03

Monitoring requirements

EPA should not use biomass from an outfall as an indicator of a facility's entrainment impact, it will grossly underestimate impact.

I take severe issue with EPA's proposal to measure biomass from an outfall as the measure of a facility's impact. I believe this would grossly under-represent the impact of the plant. Fish eggs and larvae are fragile, that is why they die going through once-through cooling systems. Does EPA really expect to be able to find and accurately quantify 100% of the biomass after it has been strained through an intake screen, abraded by passage through pipes, macerated by circulating water pump impellers, subjected to cavitation and pressure shear, cooked and cauterized by passage through a steam condenser, subjected to chlorine or other cooling solutions, and then discharged? Will it be of a size that won't be extruded through say ½ mm (505 micron) plankton nets? Yes there will be some recognizable fish parts, but there is a lot that would be reduced to "slime and eyeballs." This is recipe for underestimating impact and should not be used.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.343.014

Author Name William Sarbello

Organization N/A

Subject Matter Code 10.01.02.01

EPA methods: age 1 equiv, yield, prod foregone

EPA's "Representative Species Approach" is fatally flawed as proposed.

The major flaw is that the permittee is proposing the representative species, which creates a "fox guarding the chicken coop" dynamic. That is, it is very easy to omit a species that may be suffering great impact to make the results more favorable to the permittee. EPA is only suggesting the permittee consult with the Director and Federal, State, and Tribal fish and wildlife management agencies. This completely inappropriate, these fish and wildlife management agencies should be the ones, along with the Director, identifying the species. The fish and wildlife resources belong to the People of the State or Tribe as a public trust resource, and the management of those resources is generally under the stewardship of the state or tribal fish and wildlife agency, with additional protections and treaty responsibilities of the Federal government under the stewardship of the US Fish and Wildlife Service and the National Marine Fisheries Service. The list should be the species identified by all these agencies to the Director, with the Director having the option of adding additional important species.

The 8 characteristics for "critical aquatic organism" contained in the 1977 guidance (DCN 4-0006) is still appropriate guidance to the Director and affected agencies. If the fish and wildlife agencies fail to comment, then the Director should propose the list of species based on the 8 characteristics for "critical aquatic organisms." The number of species should not be arbitrarily limited to 10-15; there may be good reason to have more.

In addition, the additional proposed language to change criteria number 8 as indicated on NODA page 13583 should be REJECTED. These public trust resources should not be subject to the potential for self-serving interest on the part of the permittee.

EPA Response

EPA agrees that facilities should provide accurate monitoring of species impinged and entrained, that the Director should be able to require additional information, and that other agencies (federal, state, and tribal) and the public should be included in the process. The Agency also agrees that the number of species subject to detailed analyses should not be a pre-determined number, but should depend on the species vulnerable to I&E at a given site.

Comment ID 316bEFR.343.015

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.04

Determination of compliance

EPA should require counting ALL organisms, allowing discarding moribund or dead organisms that wash up on screens is an unacceptable bias and opportunity for bias or fraud.

Allowing removal of moribund or dead organisms from the screen counts is an unacceptable creates a loophole for fraudulent counts. Technicians counting the organisms should have the simple instructions to count ALL the organisms on the screen of a once-through cooling system. They should not have to divine how or when it died. If intake capacity was reduced by 95% or more by converting to closed-cycle cooling, the number of dead and moribund organisms impinged would be reduced by 95% or more, just like the live organisms. EPA is again further weakening its already weak proposed 80-95% impingement mortality “standard” unnecessarily and illogically.

Rather than letting individual organisms be removed arbitrarily as moribund or dead, the following procedure is recommended for doing counts of impinged fish over a specified sampling time period. First, the screens should be cycled and cleaned and any fish (alive or dead) should be removed from the collection basket. Then the timed collection period (day, week, hours, whatever) should commence, and all fish caught on the screens should be counted between the beginning and end of the collection period counted. This raw count should be expanded by the collection efficiency factor for the size organisms captured.

EPA Response

In today’s final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. It should be emphasized that the Director will have to approve any proposed methods for handling naturally dead or moribund organisms. Please see EPA’s response to comment 316bEFR.306.116.

Comment ID 316bEFR.343.016

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.03

Monitoring requirements

EPA's proposal to quantify biomass instead of identifying counts by species and life stage does not meet CWA Section 101 goals of restoring biological integrity of the Nation's waters.

EPA's fixation on quantifying a biomass of organisms is especially troubling, as it trivializes and marginalizes the importance of these organisms as though they were a stick of driftwood. We remind EPA that their charge under the Clean Water Act is to restore the chemical, physical, and biological integrity of the Nation's waters. Reducing entrainment to a dry mass or wet weight does not adequately address the biological integrity of the ecosystem supported by the waterway (the biological integrity of the waters). Identifying organisms by species, life stage, and number begins to provide the information needed for assessing that biological integrity. All total biomass or total gross count irrespective of species should be summarily rejected as inadequate for evaluating whether a technology has minimized adverse environmental effects, as required under the plain language of 316(b).

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.343.017

Subject Matter Code 21.03

Monitoring requirements

Author Name William Sarbello

Organization N/A

EPA should not use an Averaging period in meeting reduction targets. Mortality should be summed over a whole year and the target must be met each and every year.

Averaging periods should not be used, the level of reduction should be required to be met or exceeded every year. Again, the yardstick should be closed-cycle cooling, which reduces the numbers of organisms killed by entrainment and impingement by a very high (95%+) percentage each and every year. This is irrespective of whether densities are high or low. EPA should expect nothing less from any other blend of technologies. The reduction percentage should be treated like any other annual standard. The disadvantage of choosing a multi-year averaging is that exceedances could continue for years before enforcement/corrective action could be taken, and then it would be too late. Reduction rate be determined and reported on a yearly basis.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.343.018

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.09

Permit applications/implementation schedule

EPA already has adequate regulations for schedules of compliance.

Current NPDES regulations already provide for schedules of compliance; no additional regulatory language is needed to give special breaks. The permit writer can develop a compliance schedule that is reasonable based upon the specific issues of a specific permit.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.343.019

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

EPA should require "Comprehensive Demonstration Study" every permit cycle, as waters and biological communities continue to improve thanks to Clean Water Act caused improvements.

Evaluation studies should be done EVERY PERMIT CYCLE for facilities that have not converted to closed cycle cooling. The waters of the US are constantly improving as other dischargers do their fair share to clean up harm to the nation's waters. In the New York harbor area there have been tremendous increases in the numbers of species and numbers of organisms impinged and entrained at the Ravenswood, Astoria, and Polletti power plants. Species compositions on the Great Lakes have changed through recent times, with intentional and unintentional species introductions. Dramatic changes in the species impacted have been seen through time at the Fitzpatrick and Nine Mile Point 1 Nuclear Generating Stations on Lake Ontario. Furthermore, impact reduction technology is constantly improving, and effectiveness can be quite different for different species. For example, sound deterrent at the Fitzpatrick Nuclear Generating Station intake has been very effective for reducing alewife impingement/entrainment. However, during declines in alewife population, a greater proportion of the entrainment has been sticklebacks, which are not repelled by the sound deterrent. Thus, evaluation studies and evaluation this should be performed every permit cycle at a minimum.

A permittee that is concerned that additional costs of periodic studies to quantify their negative impact should consider that converting to closed-cycle cooling or equivalent levels of protection will result in long-term savings and certainty, as well as true meeting the Best Technology Available standard.

EPA Response

EPA agrees that the Comprehensive Demonstration Study should be required with every permit renewal cycle unless a facility demonstrates that conditions at that facility have not changed. Please see EPA's response to comment 316bEFR041.126. For an explanation of monitoring requirements, please see the preamble to today's rule and EPA's response to comment 316bEFR.307.027.

Comment ID 316bEFR.343.020

Author Name William Sarbello

Organization N/A

Subject Matter Code 21.03

Monitoring requirements

Assertions that "the waters have not changed" should not be accepted, weaknesses in robustness of statistical tests make such hypothesis testing unreliable.

EPA should not accept the assertion that "conditions have not changed" in the source water body. Indeed, power plant monitoring experience in New York State in a wide variety of waterbodies (Finger Lakes, Great Lakes, estuaries, ocean harbor and sounds) suggests quite the opposite, that biological communities continue to change through time. Statistical tests are not neat and simple, there can be many ways to create a Type 2 or Beta error–accepting the null hypothesis of no change when there actually was change. Samples with a very large variance, like impingement/entrainment sampling data, will be more susceptible to a Type 2 error. Therefore, EPA should require sampling every permit cycle, and should consider monitoring every year.

EPA Response

Please see the preamble and EPA's response to comment 316bEFR.034.005 for EPA's position on conducting a Comprehensive Demonstration Study with each permit cycle.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Charles R. Wakild

On Behalf Of:

Progress Energy

Author ID Number:

316bEFR.344

Comment ID 316bEFR.344.001

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 7.02

Performance standards

General Comment

In the NODA EPA states that it has compiled a Technology Efficacy Database which is to serve as a compilation of data that supports the determination that the proposed performance standards are best technology available (page 13538). EPA goes on to state that based on a preliminary review of the available data, it continues to believe that the proposed performance standards are achievable (page 13539). Since the performance standards have yet to be thoroughly defined, i.e. representative species or all species, enumeration or biomass, etc. it is difficult to understand how EPA can state that the evaluated technologies will meet the standards. We believe, as does EPA, that the technologies evaluated do have the potential to meet the performance standards depending upon site-specific factors. We also believe that the projected performance of the technologies is promising, but projected performance does not equate to a reasonable certainty of compliance with a regulatory standard. This issue is significant when viewed from the perspective of permittees who will be held liable for failure to comply with a percent reduction performance standard when the performance of the technologies is uncertain. We urge EPA to structure the regulation so that the performance standards are targets or BMPs and not a directly enforceable standard.

EPA Response

EPA has discussed the range of technologies used to establish the performance standards (see Sections VII.B.2 and B.3 of the preamble to today's rule). Available data indicate that, when considered as a suite of technologies, barrier, and fish handling technologies are available on a national basis for use by Phase II existing facilities. These technologies exist and are in use at various Phase II facilities and, thus, EPA considers them collectively technologically achievable. For example, currently, 14 percent of Phase II existing facilities potentially subject to this final rule already have a closed-cycle recirculating cooling water system. In addition, 50 percent of the remaining potentially regulated facilities have some other technology in place that reduces impingement or entrainment. Thirty-three percent of these facilities have fish handling or return systems that reduce the mortality of impinged organisms. The fact that these technologies are collectively available means that one or more technologies within the suite is available to each Phase II facility. Economic practicability is discussed in Sections VII.B and XI.B of this preamble. See also response to comment 316bEFR.041.701.

EPA finds that the design and construction technologies necessary to meet the requirements are commercially available and economically practicable, because facilities can and have installed many of these technologies years after a facility began operation. Typically, additional design and construction technologies such as fine mesh screens, wedgewire screens, fish handling and return systems, and aquatic filter fabric barrier systems can be installed during a scheduled outage (operational shutdown).

Comment ID 316bEFR.344.002

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 10.08

RFC: "Significantly greater" for eval. alt. req.

Site-Specific Cost-Cost Comparison

Page 13525, EPA requests comments on the revised costing methodology and its relationship to the proposed site-specific cost-cost comparisons. We support the site-specific cost-cost comparison option as well as EPA's efforts in being as accurate as possible in determining financial impacts on affected facilities. In the April 9, 2002 proposal, EPA presented the site-specific cost-cost comparison option and outlined in a Technical Development Document, the costs that EPA considered for these purposes. This presented a straightforward approach for use by a permittee in evaluating the cost-cost option. With the new costing methodology the previous straightforward approach appears to be superseded. We ask that EPA present the new costs in a straightforward manner as possible similar to the April 9, 2002 concept.

EPA Response

See response to 316bEFR.308.004.

Comment ID 316bEFR.344.003

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 7.04

Streamlined Technology Option

Streamlined Technology Option

Page 13539, EPA invites comments on two variations of a streamlined compliance option that would reduce the information collection burden imposed on permit applicants. We support EPA in their efforts for a streamlined approach and ask that the following comments be considered.

Variation One - EPA would evaluate the effectiveness of specific technologies under specific circumstances. If, based on such an assessment, the Agency identifies technologies that are sufficiently protective and for which applicability conditions can be defined, EPA would promulgate regulations that allow for their use as a means of complying with Phase II section 316(b) requirements. Such a technology would be used to treat the entire cooling water intake flow and would not be used in combination with restoration measures to meet the performance standards. Monitoring would be required as necessary to verify that the technology is in fact achieving an acceptable level of performance.

This concept is sound but can be implemented in a manner that has a better probability of success. First, it is doubtful that approval of a technology by regulation is practical or expedient. Just the process of promulgating the regulation in the environment of 316(b) will be difficult as well as burdensome on the regulatory agencies. A better approach might be to approve the technology by issuance of a Technical Support Document or similar technical documentation. Second, if a permittee desires to include restoration in addition to an approved technology, then that should be acceptable. The permittee could simply get credit for Best Technology Available (BTA) for the portion of intake flow that is impacted by the preapproved technology. This credit could be allowed without the burden of the Comprehensive Demonstration Study. The remaining portion of flow could be addressed through restoration measures that are otherwise supported. Third, the monitoring should be conducted for informational purposes, not compliance purposes. If the technology has been established as being BTA then the permittee should not be liable if he has properly installed and maintained the technology but monitoring demonstrates that the performance standard percentages are not met.

EPA Response

Please refer to EPA's response to comment 316bEFR.307.027. See also the preamble to the final rule regarding the availability of restoration technologies. EPA also authorizes the use of a Technology Installation and Operations Plan for demonstrating compliance, subject to the Director's approval.

Comment ID 316bEFR.344.004

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 7.04

Streamlined Technology Option

Variation Two - The Phase II regulations would establish the criteria and process for approving cooling water intake structure control technologies, but would allow the approval process to be carried out by the Director. The Director's draft determinations would be subject to a public participation process. After the public participation process the Director would then modify the State's implementing regulations to establish the technology as BTA for all eligible facilities.

The implementation process should be set up on a state basis similar to the process for a general NPDES permit. The approval criteria would be subject to the public participation process. Once the approval criteria are approved, the regulatory agency could then issue approval certificates (or denials) to the eligible applicants. As with the first variation, monitoring should be conducted for informational purposes, not compliance purposes. Again, if the technology has been established as being BTA then the permittee should not be liable if he has properly installed and maintained the technology but monitoring demonstrates that the performance standard percentages are not met.

EPA could possibly implement both variations. If so it should follow the above recommendations.

Any regulatory language in proposed §125.94(a)(4) and §125.95(c) should reflect the above concepts especially that monitoring should be for information purposes and not as compliance requirements. If a permittee is required to monitor a preapproved technology for compliance with the performance standards then the "streamlined" compliance option may be essentially undermined because most permittees will not install a preapproved technology if they are liable for its performance (or lack of performance).

EPA Response

In response to the comment that monitoring should be used only as a means of gathering data and not to evaluate compliance, EPA disagrees. For EPA's position on monitoring, please refer to EPA's response to comment 316bEFR.307.027. For EPA's response to the assertion that most permittees will not install a preapproved technology if they are liable for its performance, please refer to EPA's response to comment 316bEFR.317.009.

Comment ID 316bEFR.344.005

Author Name Charles R. Wakild
Organization Progress Energy

Subject Matter Code 11.06
RFC: Performance/effectiveness of restoration

Restoration

Page 13542, EPA is considering requiring the following practices during the development of restoration projects:

- documentation of sources and magnitude of uncertainty in expected restoration project performance

- creation and implementation of an adaptive management plan

- use of an independent peer review to evaluate restoration proposals

Documentation of Uncertainty - Uncertainty in project performance is related to natural variations in both the restoration project and in the ecosystem that is affected by the restoration project. It is recognized that this uncertainty exists and it should be taken into account in determining the feasibility of a project. Prescribing how this uncertainty must be addressed is regulatory overkill and adds needless burden to the process.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of peer review, adaptive management, and uncertainty analysis is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.344.006

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Adaptive Management Plan

These plans serve a purpose, however they have the potential to elevate some restoration measures to intensive, expensive efforts that can rapidly reach a point of diminishing return. This could make effective restoration efforts less attractive and cause permittees to forego restoration efforts needlessly. We believe that if significant progress is made towards the goals of restoration, the permittee should be allowed to consider the efforts successful without further adaptive measures.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022).

For a discussion of the limits on the resources expended on restoration measures, see EPA's response to comment 316bEFR.312.006.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.344.007

Author Name Charles R. Wakild
Organization Progress Energy

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Peer Review

EPA's discussion of the Independent Peer Review process is somewhat ambiguous. From the discussion it appears that EPA is proposing to require permittees to consult with federal and state resource agencies and select a panel of multi-disciplinary private individuals that would review the restoration project plan prior to submittal. Selection of reviewers and alternates, coordination of review timeframes and logistics, consultation with federal and state resources agencies, all add expense and delay to the Comprehensive Demonstration Study with the benefits being questionable.

As a general comment, the addition of these practices for restoration projects will add additional time and effort in the process of compiling the Comprehensive Demonstration Study. EPA should consider this aspect when determining the overall time needed to prepare the Study.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of peer review is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022). For additional discussion of the use of peer review, see EPA's response to comment 316bEFR.312.006.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.344.008

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 21.04

Determination of compliance

Calculation Baseline

Page 13580, EPA is asking for comments on adding 4 specifications to the definition of calculation baseline. We endorse the addition of these specifications. We also endorse the “as built” option presented on page 13581.

EPA Response

For a discussion of calculation baseline, including the "as built" option, see the preamble to the final rule.

Comment ID 316bEFR.344.009

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 21.04

Determination of compliance

A general comment - EPA defines the baseline calculation as an estimate of impingement mortality and entrainment. EPA also asks for comments on how to set a consistent and reproducible baseline. As stated in previous comments on the proposed regulation the biological variability on hourly, daily, monthly, seasonal, yearly and generational bases makes the baseline indeed an estimate. This estimate is also bounded by large confidence intervals. It seems irrational to make this gross estimate part of a more precise ratio (performance standard) that permittees are to be held legally liable to comply with in all circumstances. A more rational approach in dealing with this type of variability is to define the performance not as enforceable standards but as goals or BMPs.

EPA Response

EPA has provided a tremendous amount of flexibility in today's final rule for meeting 316(b) requirements, including 5 compliance alternatives (one of which is site-specific), and the option to demonstrate compliance with a Technology Installation and Operation Plan rather than with numeric performance standards (see final rule preamble section IX). Furthermore, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003.

Comment ID 316bEFR.344.010

Subject Matter Code 21.04

Determination of compliance

Author Name Charles R. Wakild

Organization Progress Energy

Evaluating Compliance

EPA asks for comments on two approaches for determining compliance with the performance standards. These approaches are 1) an all species approach and 2) representative species approach. Additionally compliance may be determined by either enumeration or biomass.

We believe that a permittee should have the option of choosing between the two approaches of all species or representative species. That way a sound, site-specific approach that captures the highest net benefits can be implemented. If forced to choose between the two options, we believe a representative species approach is the better approach. Using a representative species approach provides insight into the impacts on the species that are the most important for the designated use of the waterbody which is what it is all about. It should be noted here that according to EPA's own regulations the setting of water quality standards and the determination of beneficial uses should take into account the use of the waterbody for industrial purposes (e.g. cooling water) as well as for protection and propagation of fish, and shellfish. A balance needs to be achieved between the two uses.

Count verses biomass - if either is acceptable the permittee should have the option of doing either or both.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.344.011

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Author Name Charles R. Wakild

Organization Progress Energy

Emergency Service Water Intakes

We recommend that EPA distinguish between primary cooling water intakes and emergency service water intakes at nuclear facilities. For example, at a certain facility, the primary cooling water system employs a natural draft wet recirculating cooling tower. The facility also employs an emergency service water system with an intake which normally operates a nominal amount of time to ensure that the system is in working order. However, this emergency intake has a design capacity greater than 50 MGD. We believe that an intake, regardless of design flow, that is used in this mode of testing for reliability should be excluded from the 316(b) regulation.

EPA Response

Please see response to comment 316bEFR.019.003 and 316bEFR.041.202.

Comment ID 316bEFR.344.012

Author Name Charles R. Wakild

Organization Progress Energy

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Timelines

EPA requested comment on the Concentrated Animal Feeding Operations (CAFO) approach as well as other options for establishing an appropriate compliance timeline. The CAFO approach (disregarding the NPDES administrative requirements) requires that all CAFO facilities develop and implement a nutrient management plan by December 31, 2006 and that large CAFO facilities comply with the effluent guideline requirement (land application area) by the same date (68 Fed. Reg. 7184). Since the rule was published February 12, 2003, this provides a compliance time of almost 4 years.

In regard to a compliance timeline, some of the issues that are critical for us as a company are 1) being able to forecast necessary expenses for budgeting purposes, 2) being able to forecast needs for personnel resource allocation planning and scheduling, and 3) being able to coordinate potential intake modification construction with scheduled outages. These issues are critical not only in business practices but in successful compliance with the regulation. Consequently, EPA must structure the compliance timeline so that industry has adequate time to implement the above activities. A worst-case timeline for compliance with the regulation may take up to 5 years when regulatory agency approval time is factored in the process. Recognizing these necessities, we believe the CAFO approach with its 4 year timeframe is inadequate for successful compliance with the 316(b) rule due to the possible 4-5 year timeframe needed for studies/construction and the potential lack of adequate consulting/field resources needed if all industry crowds in compliance activities in a 4 year period. Consequently, the CAFO approach is not appropriate for 316(b) efforts unless the final compliance date is perhaps 2012.

In more recent effluent guideline activities:

- Coal Mining Category, Final Rule, January 23, 2002 (67 Fed. Reg. 3370)

- Iron and Steel Manufacturing Category, Final Rule, Oct. 17, 2002 (67 Fed. Reg. 64216)

- Centralized Waste Treatment Category, Final Rule, Dec. 22, 2000 (65 Fed. Reg. 81242)

- Pulp, Paper, and Paperboard Category, Final Rule, April 15, 1998, (63 Fed. Reg. 18505)

EPA has simply stated that existing dischargers must comply with limitations as soon as such requirements are imposed in their NPDES permits. Without becoming overly complicated and unrealistic with permitting reissuance scheduling, determining advance times for application development etc., EPA should follow an approach that is similar to the one listed above. This approach should allow the permittee and the permitting agency to work out a permitting method that adequately addresses compliance for existing facilities. This method would have the phase II regulations become effective at the end of a period of time (with interim milestones) that is decided upon by the permittee and the permitting agency. This would allow both the permittee and the permitting agencies to determine resource needs and scheduling without causing the permittee to be out of compliance as soon as the permit is issued.

EPA Response

See response to comment 316bEFR.071.004.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Annette M. Holzer

On Behalf Of:

Entergy Services, Inc.

Author ID Number:

316bEFR.345

Comment ID 316bEFR.345.001

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 7.04

Streamlined Technology Option

Performance Standards (VII)

Streamlined Technology Option for Certain Locations (B.) - The Comprehensive Demonstration Study (CDS) requirements outlined in the proposed rule are extensive, as well as time and labor intensive. Several of the CDS components require more than one year of preparation time and become especially problematic when preparing them for multiple facilities concurrently.

Allowing a facility to streamline the CDS process by choosing to install one of a group of specified technologies would decrease the burden to applicants and permit writers significantly. The two variations described in the NODA are a step in the right direction and be incorporated into the rule as options. The first variation would allow EPA to determine the effectiveness of impingement and/or entrainment reductions for technologies specified in the proposed rule, EPA would also identify conditions where the technologies would be expected to yield the prescribed results. Subsequently, a facility would be required to demonstrate the conditions will be met at the site and monitor the results following the implementation of the technology.

The second variation is especially beneficial because it allows the permitting agency, with oversight from EPA, to review and approve technologies for the streamlined approach. The final rule would identify control technology criteria required for approval and describe the process facilities would be required to follow in order to have a technology approved for the streamlined CDS process.

EPA Response

EPA believes that it has enabled facilities to potentially install one of a group of specified technologies under the Approved Design and Construction Technology option. Please see EPA' response to comment 316bEFR.333.004 for additional details.

Comment ID 316bEFR.345.002

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

Cost Tests (VIII)

The proposed rule allows a facility to choose a site-specific determination if the costs are shown to be "significantly greater than" the costs or benefits determined by EPA. A definition of what constitutes "significant" was not provided. Even though this term is not precise, attaching a quantitative definition would restrict flexibility. Flexibility is essential; therefore Entergy requests a quantitative definition not be developed.

The EPA costs and benefits to be used by facilities when preparing their cost-cost or cost-benefit analyses and corresponding methodologies should be clearly defined so that accurate comparisons can be made. Facilities should also be allowed to incorporate into their cost-cost and cost-benefit comparisons any costs incurred to implement 316(b) measures/technologies prior to the promulgation of the final rule.

EPA Response

See response to 316bEFR.006.003. See the preamble to the final rule and the record for discussion of EPA's basis for the site-specific provisions in the final rule and the Agency's determinations regarding economics and costs for this rule. Also see 40 CFR 125.94(a)(5)(i).

Comment ID 316bEFR.345.003

Author Name Annette M. Holzer
Organization Entergy Services, Inc.

Subject Matter Code 18.03
Process for determining site-specific BTA

Proposed Rule - Other Cost Issues

The cost tests will involve a large amount of time and resources to complete for each technology; therefore we support UWAG'S approach (in their proposed rule comments) that if a technology can be proven "infeasible" through engineering analysis; a cost test should not be necessary. This will aid in streamlining the cumbersome process of permit renewal applications and analysis required by the state agencies. We have several facilities on the Mississippi River and some of the technologies listed in the rule may not be feasible due to the high flow rate of the river or for navigational reasons.

EPA Response

See section XI.H of the preamble to the final rule.

The cost to cost test does not pose any requirements on facilities for developing costs of compliance other than those the facility would do to comply with the rule in absence of the cost to cost test. If a facility determines that a technology is not feasible or will not meet the rule requirements, it is the facility's decision whether or not to pursue a full engineering cost analysis on these technologies. If a high flow rate precludes the use of a technology on a river, such as a net barrier, then the facility's judgment is used to determine this fact and the technology is not considered further for compliance with the rule. This is the same regardless of the existence or form of the cost to cost test.

Comment ID 316bEFR.345.004

Author Name Annette M. Holzer
Organization Entergy Services, Inc.

Subject Matter Code 12.03
RFC: Entrainment vs. entrainment mortality

Biology - Supporting Information (IX)

EPA solicited comments in the NODA regarding whether the use of entrainment survival data should be allowed and whether the definition of restoration should be expanded.

Entrainment Survival (A)- Entrainment survival data relies heavily upon site specific factors. Entergy believes that entrainment survival data will be crucial to the preservation of site specificity and must be recognized. In order to ensure data quality, Entergy is not opposed to data quality requirements being developed as a guideline.

EPA Response

Please see response to comment 316bEFR.305.001 with regard to entrainment-based performance standards. Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.345.005

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Restoration (B)

Voluntary restoration is an important component of the proposed rule. Restoration has been widely accepted as a mitigation strategy for environmental impacts and extending it to the NPDES program would be in line with past practices.

The language proposed within the NODA to be added to Section 125.95(b)(5)(ii) is appropriate, as it maintains flexibility, while defining expectations for compliance.

EPA Response

For a discussion of EPA's authority to include restoration measures in the final rule, see the preamble to the final rule.

For a discussion of the extent to which restoration is voluntary, see EPA's response to comment 316bEFR.060.022.

EPA acknowledges the commenter's statement on the language to be added at 125.95(b)(5)(ii).

Comment ID 316bEFR.345.006

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 21.04

Determination of compliance

Implementation and Other Regulatory Refinements (XI)

Definition and Methods for Determining the "Calculation Baseline " (A.)

- EPA seeks comment on specifications to be added to the definition of "calculation baseline". In general, "calculation baseline" should be defined as when the facility is at full operation with full flow. This keeps the definition clear and consistent and avoids confusion that would arise from times of the year when facilities do not run at full capacity or restrict flow. In regards to intake configuration and screen mesh size, the parallel shoreline intake and 3/8 inch mesh size are appropriate to be included in the definition.

EPA Response

EPA has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013.

Comment ID 316bEFR.345.007

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 21.04

Determination of compliance

Another area EPA solicits comment is on the use of data from other facilities to determine baselines. Entergy has several facilities within the same waterbody and sharing data between them would provide a cost effective method to determine baselines. Of course, the use of data from other facilities should be required to undergo analysis by the permitting agency to ensure it is relevant to the other facilities prior to usage.

EPA Response

EPA agrees that under certain circumstances data from other facilities may be used to determine calculation baselines. Please see EPA's response to comment 316bEFR.343.011 for more details.

Comment ID 316bEFR.345.008

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 21.04

Determination of compliance

Options for Evaluating Compliance with Performance Standards (B.)

- EPA requests comment on two approaches (All Species Approach and Representative Species Approach) to measuring I&E reductions. Instead of requiring one or the other approach, EPA should provide guidance as to which approach will yield the most accurate results for particular situations. As mentioned previously, the site specific nature of reductions will necessitate different approaches at different facilities. Guidance will provide a road map for facilities to follow and obtain accurate results without restricting them to one type of approach.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.345.009

Author Name Annette M. Holzer

Organization Entergy Services, Inc.

Subject Matter Code 21.09

Permit applications/implementation schedule

Compliance Timelines, Schedules, and Determination (C.)

- It is important that EPA define a schedule for compliance with the rule. If the rule is effective the day after publication, many facilities would technically be in "violation" of the rule. A clear schedule for implementation would eliminate this problem. In order to comply with the rule, facilities must conduct the requisite sampling and then identify and install the appropriate technologies and verify that the technologies are functioning properly. All of this requires a considerable amount of time.

In UWAG'S August 7, 2002 comments to the Phase II Proposed Rule (67 FR 17122) it proposed a timeline for compliance. Basically, action by the facility would be determined by the amount of time before the expiration of the current permit. If a facility is three or more years away from expiration, a full application, including the Comprehensive Demonstration Study would be required by the application due date. If a facility is three years to one and a half years away from permit expiration, an abbreviated permit application would be due with a plan for data collection included. Lastly, if a facility was one and a half years or less away from permit expiration, there would be no application due until the next permitting cycle.

The above timeline allows facilities the time to conduct sampling and obtain valid results. In addition, it staggers the application process to ease the burden to permit applicants and permit writers and avoid permit renewal delays.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.345.010

Author Name Annette M. Holzer
Organization Entergy Services, Inc.

Subject Matter Code 21.04
Determination of compliance

Proposed Rule - Other Compliance Issues

- Many of the technologies in the proposed rule have not been extensively used and there is a potential for them to not produce the required percentage of reductions. If a technology is installed, maintained and monitored properly, and does not produce the percentage of reductions originally expected or required, a facility should not be considered to be out of compliance with their 316(b) requirements. Therefore, compliance measurement should be based upon factors that can be monitored and controlled; installation and maintenance. If a technology does not produce the percentage of reductions required, the facility should be permitted an appropriate amount of time to determine where the problem lies and propose a solution. This presents a problem with compliance.

EPA Response

In today's final rule, EPA has created a provision by which a facility may choose to demonstrate compliance with a Technology Installation and Operation Plan rather than with numeric performance requirements (please see preamble for a detailed discussion).

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Scott Arentsen

On Behalf Of:

Dayton Power and Light Company-
Environmental Mgmt

Author ID Number:

316bEFR.346

Comment ID 316bEFR.346.001

Subject Matter Code 7.04
Streamlined Technology Option

Author Name Scott Arentsen

Organization Dayton Power and Light Company-Environmental Mgmt

Performance Standards

Item VII.B of the NODA (68 FR 13539) - Streamlined Technology Option for Certain Locations, discusses the consideration by USEPA of two variations of a streamlined compliance option that would purportedly reduce the information collection burden imposed on permit applicants in exchange for them installing certain pre-approved technologies to reduce impingement and entrainment. In general, DP&L supports the concept of increased flexibility imparted to the regulated community in order to meet the impingement and entrainment reduction targets envisioned by the proposed rule.

USEPA states that it is in the process of assessing this option and has not completed a comprehensive review of control technology efficacy. With regard to the deployment of wedge-wire screens in certain freshwater applications (the only streamlined technology option presented in the NODA), the agency states “that the record would thus justify limiting the amount of site-specific information required to be collected to support of the use of this technology in freshwater systems.” In concept, DP&L supports the option of choosing to implement certain identified, pre-approved control technologies in exchange for streamlined permit application requirements. However, DP&L notes that no specifics are presented in the NODA as to what relief would be granted from the permit application requirements. Without details in the NODA on the option, it is impossible to determine it attractiveness as an alternative to the proposed Comprehensive Demonstration Study.

Furthermore, USEPA states that “at a minimum, monitoring would be required as necessary to verify that the technology is in fact achieving an acceptable level of performance.” DP&L understands that some post-installation monitoring is necessary. However, DP&L again notes that no details are presented as to what monitoring would be proposed, for how long and for what purpose. DP&L has a concern that should an entity voluntarily implement a “pre-approved” control technology and post-installation monitoring shows that for reasons not related to the facility, the performance standard is not achieved (80-95% impingement mortality reduction and 60-90% entrainment reduction), additional controls would be imposed at the site. If USEPA evaluates a particular control technology and determines it qualifies under the streamlined technology option and that technology is properly installed and maintained, no de-facto penalty should be meted out to the regulated entity in the form of additional control requirements to compensate for circumstances beyond its control. Yet that is exactly what USEPA considers at 68 FR 13540

[f]inally, where a facility plans to implement an approved technology, EPA expects that Directors would retain discretion to impose permit conditions necessary to ensure the technology meets applicable standards, as well as the ability to add permit conditions as necessary to ensure all Phase II existing facilities that pursue this compliance option meet section 316(b) standards.

Included in the same discussion within the NODA is a second variation whereby the Phase II regulations would establish the criteria and process for approving cooling water intake structure control technologies for eligibility under the streamlined technology option. DP&L commends the agency for considering this alternative as an incentive for the regulated community to develop and document both existing and new technologies. While no details are provided on the data requirements and process to be used to determine whether a particular technology satisfies the applicable performance criteria, the agency postulates that this would be up to the Directors of the individual permitting authorities, perhaps with USEPA oversight or approval. Here again, with no specifics presented in the NODA, the regulated community is unable to provide more than conceptual support/comments on the proposed variation.

EPA Response

In today's final rule, EPA specifies that those facilities that choose to comply using the Approved Design and Construction Technology option will only be required to submit the Design and Construction Technology Plan in § 125.95(b)(4) and the Verification Monitoring Plan in § 125.95(b)(7) (see § 125.95(b)). In answer to the second question regarding monitoring requirements, EPA has determined that the Verification Monitoring Plan must include a minimum of two years of monitoring to verify the full-scale performance of the proposed technology or operational or restoration measures. The Director may determine in some cases that more monitoring is necessary to determine the efficacy of a given technology or operational or restoration measures (see Verification Monitoring Plan in § 125.95(b)(7)). However, facilities not demonstrating compliance through the Verification Monitoring Plan must conduct monitoring in accordance with their Technology Installation
and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5). The Director may consider
additional monitoring requirements as well. Specific study parameters may be proposed by the applicant for review and approval by the Director.

With regard to the commenter's assertion that facilities choosing to comply with the Approved Design and Construction Technology option should not be penalized for failing to meet the performance standards, EPA notes that facilities may use a Technology Installation and Operation Plan, with the approval of the Director, to demonstrate compliance. However, EPA believes that ample evidence supports the capability of the wedgewire screen technology with the specifications and conditions outlined in § 125.99(a) to achieve the performance standards, so that EPA hopes that use of Technology Installation and Operation Plans will be minimal in connection with compliance alternative 4. See the Technology Development Document, Phase II Existing Facilities Final Rule Docket, DCN 6-0004. For more information on EPA's position with regard to the advantages to facilities choosing to comply through the Approved Design and Construction Technology option, please see EPA's response to comment 316bEFR.317.009. Finally, EPA thanks the commenter for supporting the Approved Design and Construction Technology option. EPA expect to provide guidance to permitting Directors to enable them to determine whether a proposed technology will meet the performance criteria specified by today's final rule.

Comment ID 316bEFR.346.002

Subject Matter Code 11.06

RFC: Performance/effectiveness of restoration

Author Name Scott Arentsen

Organization Dayton Power and Light Company- Environmental Mgmt

Biology - Supporting Information

Item IX.B.2 of the NODA (68 FR 13542) - Adaptive Management discusses the possible requiring of adaptive management as part of a restoration project conceived and implemented in lieu of or in combination with installation of control technologies to reduce impingement mortality and entrainment. The agency's reasoning is that due to the uncertainty and evolving nature of restoration projects as an environmental management tool, adjustments may be needed to the project should monitoring indicate deviation of performance from accepted levels. DP&L understands the uncertainty of establishing performance criteria associated with environmental restoration projects and realizes that adjustments may be necessary as more experience and data are obtained for a particular site. However, DP&L is also concerned that this same uncertainty may contribute to unrealistic initial expectations for a restoration project which only after its implementation turn out to be unachievable. As a result, the regulated entity is potentially forced into a never-ending spiral of adaptive fixes to a site in an attempt to achieve goals that turned out to be unreachable. USEPA should recognize that the performance criteria for restoration projects may need to be adjusted once monitoring data provides information on actual project performance.

EPA Response

EPA believes there are uncertainties associated with the design, implementation, performance and assessment of restoration measures. For a discussion of these uncertainties, see EPA's response to comment 316bEFR.206.055. The use of adaptive management is intended to help reduce uncertainties associated with restoration measures and enhance their overall productivity (see EPA's responses to comments 316bEFR.307.047 and 316bEFR.311.022). Adaptive management involves identifying success criteria for a project and creating a plan for incorporating new information as it arises.

For a discussion of the limits on the resources expended on restoration measures, see EPA's response to comment 315bEFR.312.006.

For a discussion of the roles and responsibilities of the permitting authority and permit applicant for determining what is required to ensure a restoration measure meets the performance requirements in the final rule, see EPA's responses to comments 316bEFR.060.026, 316bEFR.212.001, 316bEFR.034.029, and 316bEFR.002.009.

EPA believes the requirements for restoration measures provide permitting authorities and permit applicants with flexibility. However, any restoration measure must meet all of the requirements described in the final rule.

Comment ID 316bEFR.346.003

Author Name Scott Arentsen

Organization Dayton Power and Light Company-Environmental Mgmt

Subject Matter Code 21.04

Determination of compliance

Implementation and Other Regulatory Refinements

Item X1.B - Options for Evaluating Compliance With Performance Standards (68 FR 1358 1) discusses measuring compliance with the impingement and entrainment performance standards using either an All Species Approach or alternatively a Representative Species Approach. In discussing the representative species approach, USEPA states that it is considering two options for making the compliance determination, 1) total enumeration or 2) reduction in impingement mortality and entrainment for each species (68 FR 13583). In general, DP&L supports the concept of representative important/indicator species (or critical aquatic organisms) as a method for determining reduction in impingement mortality and entrainment at a particular location. However, DP&L has concerns with the species-specific option if it is not structured properly. If a subset of species out of the entire number present at a location is selected for determining compliance with the performance standard and compliance is determined by measuring the reduction in impingement mortality and entrainment for each species, there exists the very real possibility that a facility will be able to meet the performance standard for every species but one or two. In such a case, the facility could be found to be in non-compliance with the requirement based on a single species. The implications of such a finding are enormous ranging from enforcement actions to the requirement to install additional control technologies to reduce impingement mortality and entrainment, possibly for only a single class of organisms. The key to utilizing this approach is the proper selection of the representative important species such that they are truly representative of the waterbody in question and therefore are able to present an accurate picture of the local environment. DP&L urges the agency to take this into account should it include detail on any such option in the final rule.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see. e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.346.004

Author Name Scott Arentsen

Organization Dayton Power and Light Company-Environmental Mgmt

Subject Matter Code 21.09

Permit applications/implementation schedule

Item 1X.C - Compliance Timelines, Schedules, and Determination (68 FR 13584) includes a discussion of the issues of integrating the requirements of the proposed rule within the scope of NPDES permitting structure. Specifically, USEPA acknowledges comments on the proposed rule expressing concern that the proposed rule does not provide sufficient time for permittees to develop the information required to be submitted with an NPDES permit application. The NODA states at 68 FR 13585 that

EPA is considering and requests comment on whether the final rule should allow facilities required to apply for a permit renewal shortly after promulgation of the Phase II rule additional time to complete the studies associated with submitting a permit application. EPA is considering the following options: (1) Allowing applicants whose permits must be renewed in the first year after promulgation of the Phase II rule to submit application materials required by the Phase II rule one year after their current permit expires; and (2) allowing a two-year extension in the deadline for submitting Phase II application materials.

DP&L submitted extensive comments on the proposed rule expressing concern with the timing of the rule's final effective date vis-a-vis the requirement in the rule to submit the Comprehensive Demonstration Study as part of an NPDES permit renewal. DP&L appreciates the consideration USEPA has given to this issue as evidenced by the two options identified above. However, DP&L remains convinced that additional time is needed after the rule becomes final to allow the Comprehensive Demonstration Studies to be performed by the members of the regulated community whose NPDES permits are up for renewal. There are limited resources available in terms of expertise and manpower for conducting these types of complex and detailed studies. A properly planned and performed Comprehensive Demonstration Study could take several years to execute especially when one considers that permitting agency involvement is critical in the planning aspect of the effort and that little or no pre-existing data may be present at a majority of facilities to assist with study design and implementation. Therefore DP&L repeats its suggestion that the requirement to submit a Comprehensive Demonstration Study with NPDES permit renewal applications not be implemented until the 2nd permit renewal after the effective date of the rule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.346.005

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Scott Arentsen

Organization Dayton Power and Light Company-Environmental Mgmt

In the same section of the NODA at 68 FR 13585, USEPA discusses that it is

considering whether to develop additional regulatory language that would allow the Director to relax the application information requirements if conditions at the facility and in the waterbody remain unchanged since the facility submitted their previous NPDES permit application, such that the information that they would submit would remain unchanged.

DP&L supports this effort. DP&L concurs that if facility operating conditions have not changed since the submission of the previous NPDES permit application, there is no reason to expect that the facility's impact on the local waterbody would have also changed and therefore permit application requirements could be relaxed. DP&L cautions however that conditions in the local waterbody may change from year to year independent of the facility's operation (due to natural population fluctuations and/or other influences). As a result, conditions in the waterbody may not "remain unchanged" and requiring a facility to conduct a full-blown Comprehensive Demonstration Study just because of natural year-to-year variations is not justified.

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion. Natural population fluctuations and/or other influences may be included in the facility's rationale/justification for reduced study requirements per 125.95(a)(3) of today's final rule.

Comment ID 316bEFR.346.006

Author Name Scott Arentsen

Organization Dayton Power and Light Company-Environmental Mgmt

Subject Matter Code 21.09

Permit applications/implementation schedule

USEPA also discusses in the same section of the NODA at 68 FR 13586 the issue of achieving compliance with the impingement and entrainment performance standards within the initial permit term and recognizes the difficulty of optimizing control technology performance due to natural variability in the biological community of the waterbody. USEPA states that it is

considering the need for regulatory language that would allow facilities time to come into compliance if they choose to install technologies to meet the performance standards in proposed 125.94. This would allow facilities a period of time to optimize technology(ies) so that they operate to minimize impingement and entrainment. EPA is currently evaluating and considering allowing six months, one year, two years, or five years (one permit term) for a facility to come into compliance after issuance of its permit.

DP&L supports the implementation of a compliance optimization period within the regulations. Clearly it is not reasonable to expect a facility to achieve compliance with the required performance standards immediately upon the installation of control technology(ies) at a facility given the significant uncertainty that exists in completing the Comprehensive Demonstration Study and the subsequent designing, installation, operation and maintenance of impingement and entrainment reduction devices/measures. While DP&L supports the inclusion of a compliance period in the regulations, DP&L emphasizes that too short of a compliance period is functionally equivalent to no compliance period at all. Six months or one year are simply not enough time to evaluate the effectiveness of impingement and/or entrainment reduction technologies at a facility before being exposed to enforcement actions on behalf of regulatory agencies. Even two years may not be sufficient time given the variability of the local waterbody conditions and populations. As a result, DP&L supports a five year compliance optimization period and requests that this be incorporated into the regulations.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.346.007

Author Name Scott Arentsen

Organization Dayton Power and Light Company-
Environmental Mgmt

Subject Matter Code 16.01

RFC: Regulating limited capacity facilities

Item IX.D - Determining Capacity Utilization Rates (68 FR 13586) includes a discussion whereby USEPA is considering modifying the definition of "capacity utilization rate" so that it is based only upon the steam electric portion of a facility's capacity and actual production (excluding non-steam generators). The basis for this potential change is that only the steam electric portion of a facility's capacity utilizes cooling water and therefore has the potential for adverse environmental impact. DP&L supports this change.

EPA Response

The comment agrees with the Agency's final rule decision on the method for the determination of the capacity utilization rate threshold. The final rule reflects this method of determination.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Tom Brown

On Behalf Of:

Westar Energy

Author ID Number:

316bEFR.347

Comment ID 316bEFR.347.001

Author Name Tom Brown

Organization Westar Energy

Subject Matter Code 21.01

Submittal of required information

NPDES Permit Application Data

To quote page 17154, third column, of the April 9, 2002 proposal "Of the 539 existing steam electric generating facilities that EPA believes would potentially be subject to the Phase II existing facility proposed rule, 73 of these facilities already have a recirculating wet cooling system (e.g. wet cooling towers on ponds). These facilities would meet the requirements under this option (to meet performance standards for reducing impingement) unless they are located in areas where the Director or fisheries managers determine that fisheries need additional protection."

Comment

This Company owns and operates one of these 73 facilities. It seems inappropriate to be subject to the same data submittal requirements as proposed by the modifications to 40 CFR 12.21(r) as the other 466 facilities. It is noted that because cooling towers are already in place, that this facility would be exempt from the (NPDES) application requirements of (r)(4), the Source Water Baseline Biological Characterization Data. However, we think that the data already submitted to EPA with EPA's January 14,2000, request, Detailed Industry Questionnaire Phase II Cooling Water Intake Structure, is sufficient to characterize this facility. Consequently, we are asking EPA to consider including an exemption in the proposed regulations for the submittal of additional data for utilities with a design intake structure of 50 MGD and that already utilize cooling towers.

The data previously sent in response to the above referenced request is extensive and would provide state (NPDES) permitting agencies significant information. EPA should reference the applicability of this data to the requirements of 40 CFR 122.2 1 (r). Would submittal of this data to state agencies meet the intent of the regulations? If not, what additional data would be required to be submitted? Such guidance may diminish our data submittal requirements and would provide guidance to state NPDES personnel.

It appears that even though a facility has installed cooling towers, there could be additional potential requirements per the Director or fisheries managers. We request that this uncertainty be removed from the proposed regulations

Finally, does the statement in (a)(l) "You must submit to Director.. ." mean submittal to an EPA Regional office or to a state agency? Is EPA taking authority from state agencies? Will there be double review of data submittals?

EPA Response

EPA is requiring that all existing Phase 2 facilities submit the information required at 122.21(r)(2),(3) and (5). If some of the information is duplicative of what was submitted in support of the Detailed Industry Questionnaire, the facility should make a copy of the required information and submit it with the later submission. No new studies are expected to be necessary if the facility is already employing cooling towers. The facility may also consult with the Director well in advance of permit expiration to verify the specific information required for 122.21(r)(2),(3) and (5). To clarify, the "Director" is only one entity, either a State Director in a State with NPDES program authority, or an EPA Regional Director if the State does not have program authority; only one review of the facility's application would ensue.

Comment ID 316bEFR.347.002

Author Name Tom Brown

Organization Westar Energy

Subject Matter Code 3.06.01

Withdrawal threshold of 50 MGD

Design Intake Flow

The following definitions are listed on page 17130, middle column, of the April 9, 2002 proposal.

‘‘Design intake flow means the value assigned (during a facilities design) to the total volume of water withdrawn from a source water body over a specific time period.”

Cooling water intake structure means the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the U.S. The cooling water intake structure extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps.

Additionally, Appendix 1. - Section 31 b (B) Phase II Existing Facility Rule Framework, page 17217, of the April 9,2002, proposal states, “Do you have a design intake flow of 50 MGD or more”.

Comment

For the one Company facility that EPA has listed as a Phase II facility, these definitions are contradictory. EPA has listed this facility based on the listed volume of the intake pumps. The pipeline that conveys water from the intake pumps at the intake structure has a significantly lower design (in mgd) than the intake pumps and this facility would not be a phase II facility. This has been operationally proven.

EPA should clarify that, when applicable, the lesser design value of an intake facility and conveyance structure vs. the design volume of intake pumps should be used to determine the 50 mgd threshold for applicability. Alternatively, EPA should provide guidance that a facilities design intake flow is not necessarily the flow associated with that of the intake pumps. Also, because of the importance of these definitions, it seems appropriate that they should appear in the regulations rather than in the preamble to the regulations.

EPA Response

Please see response to comment 316bEFR.019.003.

With regard to intake versus pump capacity, EPA notes that under § 125.93 of the final rule, design intake flow means the value assigned (during the facility’s design) to the total volume of water withdrawn from a source waterbody over a specific time period. Because numerous aspects of a cooling water intake or system can limit a facility’s intake flow, and because flow is a critical factor that affects the impacts posed by each facility’s cooling water intake structures, EPA has determined that it is more appropriate for the final rule to focus on a facility’s total design intake flow, rather than to conditional applicability of the rule on more specific parameters, such as intake capacity or pump design, which individually, do not fully account for total design intake flow.

Comment ID 316bEFR.347.003

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Tom Brown

Organization Westar Energy

Additional Time For Studies and Data Submittal

Page 13585, first column, of the March 19, 2003, proposal asks the following. "EPA is considering, and requests comment on, whether the final rule for a permit renewal shortly after promulgation of the Phase II rule should allow additional time to complete the studies (and perhaps data collection) associated with submitting a permit application." We note that the promulgation of the final rule is now scheduled for February 16, 2004.

Comment

We would favor the proposed option 2 - a two year extension in the deadline for submitting Phase II application materials. Reference is made to the circumstances surrounding EPA's recent two year extension of the effective dates for the SPCC regulations.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.347.004

Author Name Tom Brown
Organization Westar Energy

Subject Matter Code 21.09
Permit applications/implementation schedule

Reduction of Application Data Requirements for Unchanged Facilities

Page 13585, last column, of the March 19,2003, proposal states the following: “EPA is considering whether to develop additional regulatory language that would allow the Director to relax the information requirements if conditions at the facility and in the water body remain unchanged since the facility submitted their previous NPDES permit applications,. . .”

Comment

This makes sense. The conditions of intake structures and intake waters rarely change dramatically. However, EPA would need to define ‘unchanged’ and make specific references to what submittal information is sufficient for regulatory compliance (see our preceding comment No. 2 on NPDES Permit Application Data).

EPA Response

EPA agrees that a comprehensive demonstration study may not need to be conducted each time a permit is renewed. Please see response to 316bEFR 041.126 for a discussion. The Director will use best professional judgment when considering the justification for each element that the facility believes has remain substantially unchanged.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Allen Hubbard

On Behalf Of:

Industrial Wastewater Section

Author ID Number:

316bEFR.401

Comment ID 316bEFR.401.001

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Allen Hubbard

Organization Industrial Wastewater Section

PROCEDURAL PERMITTING ISSUES

Our August 7, 2002 comments discussed practical considerations related to the implementation of Phase II requirements in renewal permits for existing facilities. We suggested that the rule should incorporate regulatory measures to reduce uncertainty over the timing of implementation. Specifically, our suggestions in included a fixed period of time after the rule becomes final to evaluate and meet requirements, and/or a allowing a 316(b) compliance schedule in the facility's renewal permit.

Section XI.C., "Compliance Timelines, Schedules, and Determinations" of the NODA confirmed that existing NPDES regulations allowing compliance schedules in permits apply to the proposed rule. The NODA also indicated that EPA is considering options for extending the compliance period by up to two years for facilities with permits that expire relatively soon after the Phase II rule becomes effective. We concur with the NODA that options allowing appropriate additional time for compliance when it is needed should be incorporated into the rule.

EPA Response

EPA has clarified timing requirements for the submittal of the required studies. See response to comment 316bEFR.034.066 for a discussion.

Comment ID 316bEFR.401.002

Author Name Allen Hubbard

Organization Industrial Wastewater Section

Subject Matter Code 6.08

Non-aquatic impacts

ENDANGERED SPECIES ISSUES

Our comments in the August 7, 2002 correspondence also addressed concerns about the Florida manatee. The NODA did not appear to address these concerns in any direct manner. Rather than refer back to the previous letter, comments on manatee protection from the August 7, 2002 correspondence are provided again, as follows:

The Proposed Draft Rule seeks to protect endangered aquatic species by reducing losses due to impingement and entrainment from cooling water intake structures (CWIS) regulated under Phase II. To the extent that this beneficial effect will result from limitations on warm water discharges at once-through cooling water systems, serious harm may result for the Florida manatee, a very important endangered aquatic species in our State's waters. Unlike many other aquatic species, manatees are not impacted by impingement or entrainment from CWIS. On the contrary, manatees find refuge in the warm water discharge areas of some of Floridas steam electric power plants during cold days in the winter. It is estimated that two-thirds of the Florida manatee population uses these man-made warm water refuges on the coldest days. The situation presents a difficult case study in competing environmental benefits and impacts.

EPA Response

Thermal discharges are regulated under section 316(a) of the Clean Water Act. Today's final rule does not require wet cooling towers, and therefore, will not change levels of thermal discharge.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Denise Sheehan

On Behalf Of:

New York State Dept of Environmental Conservation

Author ID Number:

316bEFR.402

Comment ID 316bEFR.402.001

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 21.01.04

Comprehensive demonstration study (7 parts)

Comprehensive Demonstration Study

The Department believes it is appropriate for EPA to evaluate the effectiveness of technologies used to reduce impingement mortality by 80 to 95 percent and entrainment by 60 to 90 percent in the development of a Final Rule for Existing Facilities. Information derived from studies of a particular technology at one facility may be used to "streamline" compliance at another facility; the second facility could implement these technologies in lieu of a Comprehensive Demonstration Study. This streamlining could result in mitigative measures being implemented within a shorter timeframe, thereby protecting additional aquatic resources sooner. The Department recommends that verification studies be required in such cases to ensure that the technology is deployed and operated in a manner that achieves the desired results.

EPA Response

EPA agrees that today's final rule should include a "streamlining" alternative, and has therefore included the approved technology alternative, which is detailed at § 125.99.

Comment ID 316bEFR.402.002

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 10.07.02

RFC: Appropriateness of "significantly greater"

The Department recommends against changing the monetary standard for consideration of mitigative costs. As stated in the Department's letter in response to the Existing Facilities Phase II Proposed Rule, published in the Federal Register on April 9, 2002:

Lowering the standard from "costs wholly disproportionate to benefits" to the much less stringent "costs significantly greater than site specific benefits" is problematic. The former criterion has been applied to facilities since the 1970s and is supported by a substantial body of case law, permit decisions and legal opinions. This gives it a great advantage over the latter criterion, which would be fraught with disputes over what is "significant" and to whom.

EPA Response

See responses to 316bEFR.006.003 and 018.009. EPA believes that these decision criteria can be developed for standards included in the final rule, just as they evolved for the standard used prior to formal 316(b) regulations.

Comment ID 316bEFR.402.003

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

The Department recommends against changing the monetary standard for consideration of mitigative costs. As stated in the Department's letter in response to the Existing Facilities Phase II Proposed Rule, published in the Federal Register on April 9, 2002:

State fish and wildlife resources would be at risk if the lower standard were used. In New York, all aquatic organisms belong to the State (Environmental Conservation Law 11-0105), which provides an additional reason for the State's protection of the resource against impacts from cooling water intakes. Rather than the widely-accepted "polluter pays" approach, the EPA-proposed rule weighs a generator's cost against a monetized value of fish and wildlife resources the generator does not own and to which it has no entitlement.

EPA Response

The final rule does not preclude states from implementing more stringent requirements or from implementing a program that is consistent with applicable state laws. Please refer to § 125.90 for more information.

Comment ID 316bEFR.402.004

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

The Department recommends against changing the monetary standard for consideration of mitigative costs. As stated in the Department's letter in response to the Existing Facilities Phase II Proposed Rule, published in the Federal Register on April 9, 2002:

The value or "benefit" of State fish and wildlife resources is difficult to quantify. Whereas the costs of mitigative measures may be quantified using familiar accounting techniques, the task of placing an accurate dollar value on impacts to aquatic resources is rife with ecological and economic challenges; there is no widely accepted methodology. In contrast, by maintaining the "costs wholly disproportionate to benefits" analysis, generators would have to compare the incremental cost of controls with the dollars they earn selling electricity.

EPA Response

EPA agrees that developing a comprehensive measure of fish and wildlife resources is "is rife with ecological and economic challenges." However, the Agency points out that no methods are available for estimating either costs or benefits with perfect accuracy or without uncertainty. Therefore, informed decisions must be made with the best available information and analysis. Cost-benefit analysis provides such information. In addition, EPA points out that economic considerations should not strictly determine policy decisions, and that other factors should also be weighed. This supports the notion that EPA has significant discretion in weighing overall costs and benefits in evaluating various policy options.

Comment ID 316bEFR.402.005

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 12.03.01

RFC: Documented entrainment survival rate studies

Entrainment Survival

The Department agrees that caution must be used in interpreting the results of entrainment survival studies. Much of the research to evaluate ichthyoplankton entrainment survival has been conducted at facilities in New York State. These studies have demonstrated that survival rates are specific to species and to life stage. More important, the survival rates are specific to the facility being studied. Thus, any measure of entrainment survival must be based upon site-specific survival studies. Results from one facility should not be used to assess entrainment survival at another facility.

EPA Response

Please see response to comment 316bEFR.002.015 regarding the inclusion of entrainment survival estimates in site-specific benefit analysis.

Comment ID 316bEFR.402.006

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Restoration

Restoration should continue to be viewed as a temporary measure to allow the facility to continue to operate until suitable in-plant solutions can be devised or the facility is decommissioned. If employed, restoration plans should be designed to promote natural propagation and survival of indigenous species which have been impacted by plant operations. Stocking to replace organisms killed is not recommended as stocking introduces confounding issues such as genetics, disease, and intraspecies competition with naturally-spawned fish.

EPA Response

For a discussion of the role of restoration measures, see EPA's response to comment 316bEFR.212.001.

Comment ID 316bEFR.402.007

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 11.1

RFC: Discretionary restoration approach

On those occasions when restoration is the only reasonable option available to provide mitigation, the Department supports the recommendation for an independent peer review of the proposed project by scientists not involved in the permitting process.

EPA Response

As is described in the final rule, the permitting authority may choose to require a peer review of the Restoration Plan for a restoration measure.

Comment ID 316bEFR.402.008

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 12.01

RFC: Will I&E study supply sufficient information?

Measurement of Entrainment Losses

As an alternative to quantifying losses due to entrainment by a tally of the total numbers of organisms entrained, without differentiating between eggs and larval stages, the Department suggests converting all the early life stages to Juvenile Equivalents. Estimates of natural mortality for early life stages of many species are available in scientific literature. This information would enable conversions of the numbers of eggs, yolk sack and post yolk sack fishes to one consolidated number for each species which reflects life stage value.

EPA Response

Please see EPA's response to comment 316bEFR.074.023.

Comment ID 316bEFR.402.009

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 17.05

Option: I&E reduction without regard to WB type

NYSDEC Preferred Alternative

The Department reiterates its preferred alternative: “Impingement Mortality and Entrainment Controls Everywhere” (as presented on pages 17158-17159 in Section VI (B) (4) of the Phase II Proposed Rule for Existing Facilities). The Department recommends that EPA adopt this alternative because it “levels the playing field” for all generating companies and because it offers flexibility in the selection of mitigation technology. The generators would be fully aware of what is required to meet the performance requirements of proposed Section 125.94(b) (3) of the Proposed Rule. EPA would establish the required level of performance but generators would be free to select any or a combination of techniques to achieve the performance level. This is the simplest alternative to implement and EPA’s analysis found that it provides the highest benefit to cost ratio (3.74:l). An additional advantage is that companies and regulators could direct staff and monetary resources to reducing impacts instead of studies and rebuttals. This alternative also responds to EPA’s request for comment on the “extreme burden” imposed on state agencies over past years by cost/benefit and site-specific determinations. Finally, the Department agrees with EPA’s statement that “This alternative would establish clear performance-based requirements that are simpler and easier to implement than those proposed and are based on the use of available technologies to reduce adverse environmental impact. Such an alternative would be consistent with the focus on use of best technology required under Section 316(b).”

EPA Response

Please see EPA’s response to comment 316bEFR.320.014.

Comment ID 316bEFR.402.010

Author Name Denise Sheehan

Organization New York State Dept of Environmental Conservation

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

State Requirements

The Department supports those provisions that maintain states' abilities to impose more stringent limitations than those promulgated by EPA. The authority contained in Clean Water Act (C WA) Sections 401 (d) and 510 is necessary for states to conserve their natural resources and to enhance the welfare of the public who use and enjoy such resources. We have routinely exercised this authority with respect to generating facilities throughout New York. The Department notes that narrative statements made by EPA staff regarding Phases I and II of these regulations correctly describe how these CWA provisions are appropriately carried forward in both Phases I and II. [65 Fed. Reg. 49063,49079,49099; 66 Fed. Reg. 65320-321; 67 Fed. Reg. 17215.] We urge that EPA continue to recognize that the CWA clearly makes available to the States the authority to impose more stringent standards where necessary to protect, for instance, aquatic resources affected by cooling water intake structures.

EPA Response

EPA agrees and has preserved States' rights with the inclusion of 125.90(d) and 125.94(e). See response to 316bEFR318.006.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James F. Stine

On Behalf Of:

National Rural Electric Cooperative
Association

Author ID Number:

316bEFR.403

Comment ID 316bEFR.403.001

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.02

Performance standards

EPA's proposed rule is based on "performance standards" that call for reducing impingement mortality by 80-95% and, for many facilities, entrainment by 60-90%. EPA has looked at available intake structure technologies and concluded that some of them can achieve these standards. The candidates include wedge wire screens, fine mesh screens with fish return systems, and aquatic filter barriers. However, NRECA is concerned that certain parts of the proposed rule seem to imply that if these technologies cannot achieve the performance standards at a particular site, cooling towers (closed-cycle cooling) might be required.

We believe EPA does not (and should not) intend to require existing facilities to retro-fit cooling towers, as demonstrated by several passages in the NODA. For example, EPA deliberately did not include costs for cooling towers in its economic analysis for the "preferred" option. Furthermore, other parts of the economic analysis that do consider cooling tower costs (as well as environmental side-effects and feasibility problems), clearly show, we believe, that cooling towers should not be required at existing facilities.

NRECA believes EPA should make it very clear in the final rule that cooling towers are not a "default" option to be required whenever the other alternatives cannot achieve the numerical standards. EPA should add the following language to the rule: "Although existing facilities with closed cycle cooling will be deemed to have complied with this rule, this rule does not require closed cycle cooling systems to be installed on any existing facility, even if the intake structure technologies considered in this rulemaking cannot achieve the performance standards in practice."

EPA Response

Today's rule does not require any facility to retrofit its cooling system to include closed-cycle cooling (cooling towers), although EPA notes that this option remains available to any Phase II facility in order to satisfy the requirements of the regulation. If a facility were to adopt closed-cycle cooling (compliance alternative 1), they would be exempt from many of the additional elements required of facilities opting for one of the other compliance alternatives. EPA also notes, however, that today's rule preserves each State's right to adopt or enforce more stringent requirements.

With regard to this issue, EPA believes the language adopted in today's rule is sufficient and does not warrant further changes as proposed by the commenter.

Comment ID 316bEFR.403.002

Subject Matter Code 10.01.02

Methods to Evaluate I&E

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

EPA makes a number of overly conservative assumptions when they estimate the number of organisms lost due to entrainment and impingement. For example, EPA assumes that entrainment survival is zero and EPA ignores important compensation responses that occur in natural systems. Even more importantly, EPA's attempt to estimate the "non-use value" of aquatic resources misses the mark. (Refer to UWAG's comments for a detailed discussion of these issues.) These flaws lead to a gross overestimation of the potential benefits of reduced entrainment and impingent which could in turn require companies to install inappropriate and unnecessary technologies. It is critically important for EPA to correct these problems before finalizing the rule.

EPA Response

EPA's reasons for assuming zero entrainment survival are detailed in Chapter A7 of the Phase II Regional Analysis Document (DCN #6-0003). See also response to Comment 316bEFR306.506.

See response to Comment 316bEFR.025.015 for a discussion of EPA's assumptions regarding biological compensation.

Regarding EPA's nonuse analyses, please see responses to Comment 316bEFR.338.046 and 316b.EFR.338.047 on EPA's meta-analysis and response to Comment 316bEFR on the habitat-based approach.

See response to Comment 316bEFR.074.201 for a discussion of conservative assumptions.

Comment ID 316bEFR.403.003

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.03

Available I&E technologies

While NRECA has not had an opportunity to assess each of the studies EPA cites, we believe that these studies show that the technologies EPA has identified (wedge wire screens, fine mesh screens with fish return systems, and aquatic filter barriers) will be deployable at appropriate sites, are capable of achieving appreciable reductions in impingement and entrainment, and will meet the proposed performance targets at many if not all sites as long as those targets are properly and reasonably applied.

EPA Response

Please see response to comment 316bEFR100.004.

Comment ID 316bEFR.403.005

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

While we believe that there may be some sites for which the performance standards are not achievable, NRECA submits that the cost-cost and cost-benefit tests offer an appropriate means of resolving issues and setting alternative targets for those cases.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Comment ID 316bEFR.403.006

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.03

Available I&E technologies

Equally important, we believe strongly that there is no technology - even cooling towers - that (1) can feasibly be deployed at each and every existing facility and (2) would meet the proposed performance targets (as opposed to a flow reduction target, which is not the equivalent of a reduction in entrainment and impingement) at all sites.

EPA Response

EPA agrees with the comment. Today's rule maintains the desired flexibility for facilities to determine the most cost-effective combination of design and construction technologies, operational measures, or restoration measures best suited to each individual facility.

Comment ID 316bEFR.403.007

Subject Matter Code 7.02

Performance standards

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

As we have said in our previous comments, NRECA believes that the performance standards provide useful targets for evaluating existing technologies, selecting and designing new intake technologies, and for evaluating and refining their performance after installation. We do not believe, however, that they should be incorporated directly into permits as enforceable limitations. As EPA's own technology performance data show, the performance of specific technologies will vary over time in response to widely varying biological, physical, and even chemical conditions within the waterbody. Unlike the case for pollutant discharges produced and controlled by a discharger, varying in-stream conditions - particularly the high natural variability of biological populations and communities - are not under the permittee's control, nor can the permittee reasonably be expected to anticipate and adjust for all such variations.

Thus, NRECA believes that the appropriate means of using performance standards is as targets for technology selection and design rather than as standards for assessing performance. The enforceable BTA permit requirements should be expressed as requirements to (1) identify a technology or technologies (or other measures) that will achieve the performance range (or an alternate range justified by the cost-cost or cost-benefit test) with appropriate operating and maintenance specifications adapted to the technology and the site; (2) install/operate, and maintain the technology in accordance with the technology specifications approved by the permit writer; (3) perform appropriate monitoring to gauge performance; and (4) refine or adjust operation, maintenance, or other factors as appropriate in light of initial monitoring.

An additional facet of this approach is that EPA should expressly allow permittees and permit writers flexibility to develop appropriate site-specific performance evaluation requirements because of the inherent difficulties of working with aquatic populations in a regulatory setting.

This overall approach makes sense for a number of reasons. First, it is consistent with 316(b) and with EPA's interpretation and application of 316(b). Second, it would tend to minimize administrative burdens by avoiding controversy over the specific value chosen. Third, it would avoid the disincentive to innovate that a rigidly enforceable performance standard would cause.

EPA Response

Please see response to comments 316bEFR.307.064 and 316bEFR.029.040, as well as the preamble discussion of the Technology Installation and Operation Plan and its role in demonstrating compliance with today's rule.

Comment ID 316bEFR.403.008

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.02

Performance standards

EPA introduced the concept of the "Baseline" as a starting point for assessing the performance of cooling water intake technologies. While EPA addressed the "Baseline" in the NODA, NRECA is concerned that a great deal of uncertainty remains in how this "datum plane" is to be determined. As we noted in our comments on the proposed Phase II regulations, however, as long as EPA does not use the performance criteria as directly enforceable permit limitations, many of our concerns about how to accurately establish the baseline are reduced. Nonetheless, we continue to urge EPA to find a simple way of employing this concept when they issue the final rule. One suggestion that has already been made is to assume zero percent reduction as the baseline condition (the intake without any control technologies) thereby giving full credit for the percentage reductions achieved by technologies that have already been added to the intake or for those that are to be added in the future in order to comply with the new BAT regulations.

EPA Response

For discussions on the basis for and implementation of the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.022, as well as the preamble to today's rule.

Comment ID 316bEFR.403.009

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 7.04

Streamlined Technology Option

Part B, Section VII of the NODA addresses a “Streamlined Technology Option for Certain Locations” (68 Fed. Reg. 13,539 col. 2). EPA asks whether the following technology would qualify for streamlined application requirements :

Use of submerged wedge-wire screens where the cooling water intake structure is located in a freshwater river or stream, sustained countercurrents exist to promote cleaning of the screen face, and the design intake velocity is 0.5 feet per second (ah) or less.

NRECA is concerned not only with the potential capital costs imposed by the regulations, but also with the “transaction costs” of determining what to do and how to do it. We therefore support this particular technology as one possible way for meeting the requirements of the rule. However, our overall recommendation is for a more streamlined technology selection process -- a process that still fits within the general structure of the proposed rule (including the option for cost/benefit assessment) and does not attempt to identify a single “one size fits all” solution.

EPA Response

EPA believes that the Approved Design and Construction Technology compliance option as described in today’s final rule at § 125.99 is streamlined, and disagrees that this option constitutes a “one size fits all” solution. Rather, EPA believes that it has built tremendous flexibility into the Approved Design and Construction Technology Option, and expects that this will encourage and support innovation by industry and State Agencies (see § 125.99(2)(b)). For more details on the advantages of choosing to comply through the Approved Design and Construction Technology compliance option, please see EPA’s response to comment 31bEFR.306.062.

Comment ID 316bEFR.403.010

Author Name James F. Stine

Organization National Rural Electric Cooperative Association

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

In response to further discussion of this topic in the NODA, NRECA continues to support the concept of voluntary restoration as a way to offset any impacts caused by the cooling water intake system. Mitigation has become an accepted part of the wetlands program and is now being embraced by the Fish and Wildlife service as part of their new ESA Conservation Mitigation Banking program announced on May 8, 2003.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the extent to which restoration is voluntary in the final rule, see EPA's response to comment 316bEFR.060.022.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Reed Super

On Behalf Of:

Riverkeeper, Inc.

Author ID Number:

316bEFR.404

Comment ID 316bEFR.404.001

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

COOLING WATER INTAKE STRUCTURES AND THEIR ENORMOUS IMPACTS ON FISH AND AQUATIC LIFE.

Every year, electric generating facilities kill the overwhelming majority of organisms in the more than 70 trillion gallons they withdraw from U.S. waters for cooling. This staggering mortality -trillions of fish, shellfish, plankton and other species, including some that are endangered or threatened -has harmed aquatic, coastal and marine ecosystems for decades, and has contributed to the collapse of some fisheries.

This excessive mortality occurs both despite and as result of the facilities' attempts to filter extraneous materials including fish from the cooling water stream. Aquatic organisms too small to be screened out are drawn through the cooling system and are killed by "entrainment." <FN 3> Larger organisms become trapped on intake screens and are killed or injured by "impingement." <FN 4>

Existing studies provide an incomplete picture of the severity of the impacts of cooling water intake structures (abbreviated as "CWIS"). Nevertheless, generators and government agencies, including EPA, have documented massive fish kills by power plants for decades in the U.S. and Europe. As just a few examples of this mortality:

- The Brayton Point Station in Somerset, Massachusetts on Mt. Hope Bay in the northeastern reach of Narragansett Bay killed between 7 million and 164.5 million menhaden and river herring each day in the summer of 1971 by entrainment;

- the Millstone Point Nuclear Power Station on Niantic Bay in Waterford Connecticut killed 36 million menhaden and blueback herring during a sixteen day period in 1972 by entrainment; and

- the Connecticut Yankee Plant on the Connecticut River in Haddam Neck, Connecticut killed 179 million fish larvae were per year from 1969-70.<FN 5>

The same EPA document also reported enormous impingement death tolls at power plants, such as:

- The Surry Power Station on the James River, Virginia destroyed 6 million river herring by impingement from October-December, 1972;

- the Millstone Point Plant's intake screens on Niantic Bay killed more than 2 million fish during the late summer and early fall of 1971;

- the Indian Point Electric Generating Station on Haverstraw Bay on the Hudson River in Buchanan, New York killed 1.3 million white perch and striped bass during one 9-1/2 week period from 1969-1970, with a predicted impingement death toll of 6.5 million fish per year; and

-the P.H. Robinson Plant in Galveston Bay, Texas impinged 7,191,785 menhaden, anchovy and croaker in one year from 1969-70. <FN 6>

In the preamble to the Phase II Proposal, EPA provided further examples of devastating impacts associated with impingement and entrainment at individual steam electric generating facilities:

-The Brunswick nuclear plant on the Cape Fear estuarine system in North Carolina, has entrained as much as 3-4 billion individual fish and shellfish at early life stages annually. Studies there have predicted an associated 15-35 percent reduction in populations, which may be altered beyond recovery <FN 7>

- On Florida's Gulf Coast, the Crystal River power plant seriously reduces forage species and recreational and commercial landings (e.g., 23 tons per year);<FN 8>

- On Lake Michigan, the D.C. Cook nuclear plant killed one million fish during a three-week study period.<FN 9>

- On New York's Hudson River, entrainment at five power plants (Indian Point, Bowline, Roseton, Lovett and Danskammer) predicted year-class reductions of up to 79 percent, depending on fish species. The generators' 2000 analysis of three of these plants completed in predicted year-class reductions of up to 20 percent for striped bass, 25 percent for bay anchovy, and 43 percent for Atlantic tomcod, even without assuming 100 percent entrainment mortality. These losses could seriously deplete any reserve or compensatory capacity needed to survive unfavorable environmental conditions.<FN 10>

- The Brayton Point facility in Somerset, Massachusetts withdraws 1.3 billions gallons per day from Mt. Hope Bay and has apparently caused an 87 percent reduction in finfish abundance since a 50 percent increase in its cooling water withdrawal in 1985. <FN 11>

- At the San Onofre Nuclear Generating Station on the Southern California coast, in a normal (non-El Nino) yeas-, 121 tons of midwater fish are entrained, causing a 34-70 percent decline in Pacific Ocean fish populations within 3 kilometers;<FN 12>

- The Pittsburg and Contra Costa Plants in the San Francisco Bay Delta in northern California can impinge and entrain more than 300,000 endangered and threatened species per year, including Delta smelt, Sacramento splittail, Chinook salmon, steelhead trout. <FN 13>

- More than 1,300 endangered sea turtles entered enclosed cooling water intake structure canals at the St. Lucie plant in Florida, resulting in mortality over a 9-year period.<FN 14>

The massive toll on U.S. ecosystems and fisheries has aggrieved commercial and recreational fishermen and other citizens who value these natural resources. Environmental advocates around the country have devoted substantial time and energy monitoring and fighting these impacts in the thirty years since Congress enacted the Clean Water Act.

For example, on New York’s Hudson River, environmental groups and fishermen’s organizations, including Riverkeeper, Inc., the Hudson River Fishermen’s Association, (Riverkeeper’s predecessor), the Natural Resources Defense Council, and Scenic Hudson, Inc., have been fighting for more than 30 years to reduce the massive entrainment and impingement at the River's six large once-through plants. Decades of fish kills from these facilities, including reductions in some year classes up to an estimated 79 percent, has sapped the recovery of one of the most valuable estuaries on the eastern seaboard, once a word-class fishery.

Similarly, the Brayton Point Power Station in Somerset, Massachusetts has obliterated the fisheries of Mount Hope Bay, which forms the northeast arm of Narragansett Bay. Mount Hope Bay, a federally designated essential fish habitat and a critical spawning and nursery area for many marine species, had a long history as a productive fishing ground for flounder, lobster, and shellfish. The Bay's legendary fishing productivity crashed in the mid-1980's, after the power plant increase in cooling water withdrawals approximately 45 percent. Environmental organizations, such as Save the Bay and its Narragansett Baykeeper and the Conservation Law Foundation, and Bode Island public agencies including the state Attorney General and Department of Environmental Management, have fought for years to force the plant to reduce its water withdrawals to restore the ecological health of Mount Hope Bay.

The Salem Nuclear Generating Station, in Salem County, New Jersey approximately 30 miles southwest of Philadelphia, withdraws over 3 billion gallons per day, more cooling water than any facility in the country, from Delaware Bay. A study commissioned by the New Jersey Department of Environmental Protection estimated that the Salem cooling water intake annually kills 375,000 white perch, 281,746 herrings (alewife & blueback), 305,000 spot, 61,100 Atlantic croaker, and 3,239 striped bass, 842,000,000 bay anchovy and 1,120,000 weakfish -four times as many bay anchovy and weakfish each year than are commercially caught in the Delaware Estuary.<FN 15> The Delaware Riverkeeper Network and the American Littoral Society have been fighting for years to cause Salem to reduce its massive death toll.

Similarly large aquatic mortality tolls have occur at numerous other locations around the country, including but not limited to the Big Bend plant in Tampa, Florida, the Duke Energy Plants in Morro Bay and Moss Landing, California, the Portero Plant in San Francisco Bay, many plants on the Great Lakes, and a great many others where environmental advocates continue to devote substantial time and energy to monitoring and fighting these impacts.

EPA also has placed in the docket for the Phase II Proposal a large collection other studies of fish mortality by entrainment and impingement at cooling water intake structures.<FN 16> In all, EPA currently has a database of impingement and entrainment data from more than 100 different facilities, ranging from the relatively low flow Palisades Plant in Michigan, which -after its 1974 closed-cycle retrofit -takes in 19.7 million gallons per day (mgd), to the nation's largest user of cooling water, the Salem Nuclear Plant in New Jersey which withdraws more than 3 billion gallons per day.<FN 17> EPA acknowledges that even the massive reported death tolls fail to account for the full extent of mortality to aquatic organisms:

Studies like those described ... may provide only a partial picture of the severity of environmental impact associated with cooling water intake structures. ....[T]he methodologies for evaluating adverse environmental impact used in the 1970s and 1980s, when most section 316(b) evaluations were performed, were often inconsistent and incomplete.. . <FN 18>

Footnotes

3 Entrainment occurs when relatively small fish and shellfish organisms, eggs, and larvae are drawn through the cooling

water intake structure into the plant’s cooling system, pass through its heat exchanger, and are discharged out of the facility. As entrained organisms pass through the cooling system they are subject to mechanical, thermal, and toxic stress including physical impactsh the pumps and condenser tubing, pressure changes caused by diversion of the cooling water into the plant or by the hydraulic effects of the condensers, sheer stress, thermal shock in the condenser and discharge tunnel, and chemical toxemia induced by antifouling agents such as chlorine. Few, if any, entrained organisms survive. 67 Fed. Reg. at 17136; see also U.S. EPA, Guidancefor Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b), P.L. 92-500, p. 1 (1977) (hereinafter “1977 EPA Guidance Manual”).

4 Impingement occurs when fish and other aquatic organisms become trapped on screening devices or other barriers installed at the entrance of the intake structure to prevent debris from entering the facility’scooling system. Impingement is caused by the force of water passing through the intake structure and can result in starvation and exhaustion (when organisms are trapped against an intake screen), asphyxiation (when organisms are forced against an intake screen or other barrier at the entrance to the cooling water intake structure by velocity forces that prevent proper gill movement or when organisms are removed from the water for prolonged periods of time), and descaling (when organisms are removed from an intake screen by a wash system). 67 Fed. Reg. at 17136; see also 1977 EPA Guidance Manual, p.1.

5 US. EPA, Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact (April, 1976) (hereinafter, “1976 EPA Development Document”), at p. 9, Table 1-3 ;see also Clark & Brownwell, Electric Power Plants in the Coastal Zone: Environmental Issues (American Littoral Society Special Publication No. 7, 1973), at p. V-8, Table V-B.

6 1976 EPA Development Document, p. 7, Table 1-2.

7 67 Fed. Reg. at 17138.

8 Id.

9 Id.

10 Id., citing John Boreman and Phillip Goodyear,Estimates of Entrainment Mortality for Striped Bass and Other Fish Species Inhabiting the Hudson River Estuary, American Fisheries Society Monograph 4: 152-160, 1988.

11 Id., citing Gibson, Mark R., Comparison of Trends in the Finfish Assemblage of Mt. Hope Bay and Narragansett Bay in ReIation to Operations at the New England Power Brayton Point Station, R.I. Div. Fish and Wildlife (1996).

12 67 Fed. Reg. at 17139,citing S. Swarbrickand R.F. Ambrose (1988).

l3 Id. (numbers of fish expressed as age 1 equivalents).

l4 65 Fed. Reg. at 49072.

l5 Versar, Technical Review and Evaluation of Thermal Effects Studies and Cooling Water Intake Structure Demonstration of Impact for the Salem Nuclear Generating Station, 0 VI-4 (Jan. 1989) (Revised Final Report) (reported on an “equivalent adult” basis). 30 million pounds of bay anchovy and weakfish are lost each year due to entrainment and impingement at Salem compared to 6.8 million pounds of yearly commercial landings between 1975-1980.

16 See US EPA, 316(b) Docket. These include studies of particular water types (Inland Waters; Estuaries; and Coastal Waters), studies of particular regions or states (Michigan; Southwest U.S.; New York State), studies of particular waters (Lake Erie; Kanawha River; Great Lakes; Western Great Lakes; Lake Michigan; New River; Wabash River; Ohio River; Chesapeake Bay; Hudson River), and studies of particular power plants (Clifty Creek Station; Tanners Creek Power Plant; Bowline Point; Zion Nuclear Generating Station; Cardinal Plant; Kyger Creek Station; Gallatin Steam Plant), among others.

l7 US EPA, Facilities for Which EPA Has Impingement and Entrainment Data (undated 3-page table).

18 67 Fed. Reg. 17139.

EPA Response

This comment raises identical points as comment 316bEFR.206.001 by the same author. Please see the response to that comment.

Comment ID 316bEFR.404.002

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

CLOSED-CYCLE COOLING IS AN AVAILABLE TECHNOLOGY WHICH WOULD DRASTICALLY REDUCE FISH KILLS DUE TO ONCE THROUGH COOLING

The enormous aquatic mortality caused by power plants intakes is almost entirely unnecessary. Readily available, affordable and common technology can eliminate more than 90% of the impact for those facilities using “once through cooling,” which requires extremely large quantities of water. Once-through cooling simply transfers the waste heat to the receiving waterbody. “Closed-cycle” cooling, in contrast, substantially recirculates cooling water because it uses a cooling tower transfer heat to the atmosphere by evaporation and convection.

As a result closed-cycle cooling systems use dramatically less water than once-though cooling systems, and thereby impinge and entrain a fraction of the aquatic organisms. The precise volume of water withdrawn by closed cycle systems depends on the size of the plant, type of electricity generation technology, and the source water salinity. On fresh water, closed-cycle systems generally reduce water usage by about 95% over once through cooling. That is, a plant which would extract 1 billion gallons per day (1000 mgd) of water if cooled by a once-through system, will require only about 5% of that amount or 50 mgd if cooled by an evaporative cooling tower instead.<FN 19>

Footnotes

19 Where State water quality standards limit chloride to a maximum increase of 10 percent over background and therefore require a 1.1 cycle of concentration (as opposed to 2.0), closed-cycle cooling may reduce intake volume by a still significant 70%, rather than 95% or more. EPA Phase II Technical Development Document ("Phase II TDD") at p. 4-1

EPA Response

See responses to comments 316b.EFR.404.034 and 316b.EFR.404.018.

Comment ID 316bEFR.404.003

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 19.0
Dry Cooling

"Dry" closed-cycle (also known as air-cooled) systems are also available to reduce impacts even further. Dry-cooling uses radiator-type coils to transfer heat to air by convection. These systems recirculate virtually all their water. As a result, plants that use dry cooling have no visible plume or thermal discharge to waterways, and have much smaller water requirements. Hybrid cooling systems use both wet sections and dry sections in order to abate evaporation plumes present caused by wet cooling towers.

EPA Response

See "Energy Penalty Analysis of Possible Cooling Water Intake Structure Requirements on Existing Coal-Fired Power Plants" (June 14, 2002) for the Department of Energy's evaluation of the feasibility of dry cooling systems for existing power plants. The Agency agrees with the general findings of the Department of Energy's dry cooling evaluation. As such, dry cooling technologies are not appropriate to form any portion of the basis of this national rule. See response to comment 316b.EFR.022.002.

EPA notes that the commenter fails to distinguish that plume abating towers are similar to wet cooling towers in that they would face the same engineering hurdles of a wet cooling tower retrofit, but would exceed the cost of the wet cooling tower and increase the energy penalty marginally during periods of plume abatement. As such, the Agency generally refers to wet cooling towers throughout its response to comment and applies the same principles to hybrid wet-dry cooling towers about their unacceptable candidacy for forming the basis of the final rule.

Comment ID 316bEFR.404.004

Subject Matter Code 17.03.01

Ex. facilities converted to closed-cycle

Author Name Reed Super

Organization Riverkeeper, Inc.

Both the wet and dry closed-cycle cooling has been standard power plant technology for decades. As EPA reported last year, 100% of the combined-cycle plants built in the last 20 years and 88% of the coal-fired facilities built in the last 10 years have a closed-cycle recirculating cooling system. 66 Fed. Reg. at 28855-28856 (May 25, 2001). Retrofits of cooling towers on existing facilities are less frequent, but have been completed at a variety of power plants, including a gas-fired plant on a west coast estuary (Unit 7 of the 751 MW gas-fired Pittsburg Power Plant in Contra Costa County, California); a nuclear plant on a Great Lake (821 MW Palisades Nuclear Plant in Michigan), and coal-fired plants on eastern seaboard rivers (490 MW coal-fired Canadys Steam Plant and 346 MW Jefferies Coal Plant in South Carolina).<FN 20> Retrofits are also currently planned or underway at several other US facilities, including at the McDonough (520 Mw coal) and Yates (1250 MW, coal) plants on the Chattahoochee River in Georgia and at the Wateree Station (772 MW, coal) on the Wateree River in South Carolina. Several different retrofit options have been evaluated for some or all of the four units at the Brayton Point power station (1500 MW, coal/oil) in Somerset, Massachusetts, including unit-specific and/or multi-mode cooling towers.

Footnotes

20 67 Fed. Reg. 17155; Ohase II TDD, pp. 4-1 to 4-6

EPA Response

See response to comment 316b.EFR.404.034. EPA notes that the project of retrofitting a cooling tower to an existing facility is a much different engineering project than integrating the system into the construction of a new power plant. As such, the data provided by the commenter relating to the percentage of new power plants with closed-cycle cooling is irrelevant to this final rule, which applies to existing facilities.

Comment ID 316bEFR.404.005

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.03

Purpose of Rule (General, incl. bckgrd., history)

CWA SECTION 316(B) REQUIRES BEST TECHNOLOGY AVAILABLE

Section 316(b) of the 1972 Federal Water Pollution Control Act amendments ("Clean Water Act," "CWA" or the "Act") <FN 21> provides:

Cooling water intake structures

Any standard established pursuant to [Section 301 or Section 306 of the Act] and applicable to a point source must require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.<FN 22>

Congress enacted the BTA requirement in response to a number of well-profiled fish kills at power plants in the early 1970s. <FN 23> In fact, during debate over the Clean Water Act, Senator Buckley cited with approval two newspaper articles reporting a decision of the Atomic Energy Commission (AEC) to require Consolidated Edison to install closed cycle cooling at Indian Point.<FN 24> The articles noted that the plants withdrew massive amounts of water from the Hudson River, entraining thousands of organisms per minute, and that the AEC had ordered Con Ed to stop removing such large volumes of water from the River and to install cooling towers in order to abate these massive fish kills.<FN 25>

Footnotes

21 33 U.S.C. QQ 1251-1387.

22 33 U.S.C. 3 1326(b).

23 See supra p. 2-4. See also Clark and Brownell, Electric Power Plants in the Coastal Zone: Environmental Issues (1973), p. V-8, tbl. V-B. See also New York Times Abstracts, August 16, 1972,p. 4 1, col. 1 (“massive fish kill in Apr at Millstone Point nuclear power complex”).

24 Senate Com. on Pub. Works. A Legislative History of the WaterPollution ControlAct Amendments of 1972,93 d Cong:, Ist Session, at 196-197 (1973.) See also In the matter of Carolina Power & Light Company (Brunswick Steam Electric Plant), USEPA, Decision of the General Counsel, EPA GCO 41 (June 1, 1976) at fn. 10.

25 Id.

EPA Response

Please see the preamble to today's final rule and other documents in this record for an explanation of why EPA did not select the closed-cycle cooling for all facilities option.

Comment ID 316bEFR.404.006

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The integration of section 316(b)'s"best technology available" (BTA) requirement to minimize adverse environmental impacts with the effluent limitations under sections 301 and 306 indicates Congress's intent for national technology-based standards to control entrainment and impingement. EPA establishes industry-wide, nationally-uniform standards without regard to site-specific water parameters (such as receiving water quality) to govern the setting of individual NPDES permit limitations.<FN 26> Technology-based standards must bring all facilities up to state-of-the-art pollution control as quickly as possible (referred to as "technology forcing") and promote national consistency in NPDES permit limitations.<FN 27>

Congress chose the NPDES permitting program as the vehicle for minimizing adverse environmental impact by making the provisions of 316(b) applicable to any facility containing a point source.<FN 28> Section 316(b)'s explicit cross-reference to sections 301 and 306 further clarifies that cooling water intake standards are an integral component of the NPDES technology-based regulations. Section 301 mandates the "best available technology" for existing sources while the section 306 new source performance standard must reflect the "best available demonstrated control technology." 33 U.S.C. 1131l(b)(2)(A), 1316(a)(l). Congress' use of substantially similar statutory language in Section 316(b) underscores its intent to incorporate that section's limitations into the categorical standards of sections 301 and 306:

[T]he regulations issued under 316(b) are.. .closely related to the effluent limitations and new source performance standards of 301 and 306.. . It bears emphasis that 316(b)...requires 301 and 306 standards to deal with cooling water intake structures.. ..[The] regulations [are] issued at least in part under the same statutory sections, some of which limit intake structures, others, effluent discharges.<FN 29>

Significantly, the Court in the VEPCO case contrasted the similarity between Section 316(b) standards and effluent limitations with the fundamentally different statutory scheme for water quality standards.<FN 30>

EPA may comply with its Section 316(b) mandate in one of two ways. One option is to implement Section 316(b) by including national performance standards for cooling water intake structures in each national, industry-specific Section 301 and 306 standard. The other option is to implement Section 316(b) with a free-standing, overarching regulation that would apply to all categories of point sources subject to Sections 301 and 306 that utilize cooling water intake structures. Either of these two options is permissible <FN 31> EPA has chosen the latter.

But in either case, EPA's section 316(b) regulations specifying BTA for minimizing adverse environmental impact must be national, technology-based regulations effluent limitations under sections 301 and 306. The statutory integration of these sections, along with the spare and direct "best technology available" mandate, clearly indicates Congressional intent that EPA set nationwide technology-based standards for cooling water intake structures in the same fashion as for discharges of chemical pollutants.

Footnotes

26 See 40 C.F.R Parts 402-699. In waters which violate ambient quality standards, a more restrictive set of limitations may apply. See 33 U.S.C. $8 1312, 1313,40 C.F.R. Parts 130-131.

27 A primary objective of Congress in implementing nationally applicable standards was to avoid the “race to the bottom,” which commonly occurred in the absence of uniform national effluent limitations prior to the adoption of the Act, where states would compete to attract and maintain industries by relaxing control requirements. See Hines, Controlling Industrial Water Pollution: Color the Problem Green, 9 B.C. Indus. and Comm. L. Rev. 553,573 (1968); Grad, Treatise on Environmental Law, v.2, 0 303[a-1].

28 33 U.S.C. 1326(b).

29 Virginia Electric and Power Company v. Code (“VEPCO"), 566 F.2d 446,450 (4th Cir. 1977); see also Cronin v. Browner, 898 F.Supp. 1052,1059 (S.D.N.Y. 1995).

30 VEPCO, 566 F.2d at 450.

31 Cronin v. Browner, 898 F.Supp. at 1060.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.007

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 2.03
Purpose of Rule (General, incl. bckgrd., history)

HISTORY OF CWIS REGULATION

EPA has established effluent limitations under CWA Section 301 for existing sources in each of the industry categories which are major users of cooling water.<FN 32> However, none of these standards address cooling water intake structures. Unlike other sources of degradation to aquatic ecosystems controlled under the 1972 Clean Water Act amendments (such as discharges of pollutants), cooling water intake structures have uniquely avoided nationally uniform limitations. Instead, regulation of cooling water intake structures has long been relegated to ad hoc determination by individual permit writers exercising best professional judgment.

In 1976, EPA chose to promulgate a single regulation under Clean Water Act section 316(b), codified at 40 C.F.R. Part 402<FN 33> and applicable to all categories of point sources, rather than include a section 316(b) provision within all individual effluent limitations guidelines and new source performance standards under sections 301 and 306.

The operative section of the 1976 regulation, provided in full:

The information contained in the Development Document <FN 34> shall be considered in determining whether the location, design, construction and capacity of a cooling water intake structure of a point source subject to standards established under section 301 or 306 reflect the best technology available for minimizing adverse environmental impact.<FN 35>

In 1977, the United States Court of Appeals for the Fourth Circuit remanded the regulation back to EPA because EPA had violated the Administrative Procedure Act by failing to either publish the Development Document in the Federal Register or properly incorporate it by reference.<FN 36> As a result, the court did not address the validity of the regulation on substantive grounds. EPA subsequently withdrew the regulation, <FN 37> and although it reserved space in the Code of Federal Regulations, had not promulgated a new cooling water intake structure regulation until its December 18, 2001 publication of the Phase I new facility rule. The present proposal is EPA's first proposed rule for existing facilities since the 1976 regulation was set aside and then withdrawn in 1979.

In the absence of federal regulations, section 316(b) determinations have typically involved individualized ecological assessment and determination of best technology available for each proposed or renewed cooling water intake structure. The lack of categorical standards has resulted in uneven and conflicting regulation as well as enormous, unnecessary aquatic mortality, which runs contrary to the goals of the Clean Water Act and the direct mandate of section 316(b). The individualized assessments have typically relied on narrow and inaccurately applied population models, and have ignored other impacts on ecosystem health.

For 30 years, industry has used the threat of litigation and a variety of dubious interpretations of section 316(b) to avoid the imposition of BTA. A favorite strategy of industry is to threaten state permitting agencies with litigation in order to obtain a compromise settlement for limited mitigation or data gathering and study, rather than installing best technology. Even with extensive data collection, there has been continued disagreement among industry, permitting agencies, and environmental groups over ecological impacts.

The multiplicity of these individual determinations and the combination of ecological and mathematical/statistical expertise necessary to determine the complex population dynamics for individual species has granted industry a critical strategic advantage because of superior resources in these proceedings. This advantage is a key component in industry's strategy to avoid national technology based regulations. Industry's most common analytical tools in these individualized technical determinations are density-dependent models of fisheries populations. Cooling water users have for decades used arguments based on density-dependence to justify the destruction of large numbers of fish and crustaceans via impingement and entrainment at their CWISs. In many critical cases, mathematical models of density dependent compensation these models have been misapplied. As just one example, industry has misapplied commonly-used Ricker curves, originally developed for salmonid fisheries with intense competition for spawning space, is misapplied to the entrainment of other species which lack such intense competition.<FN 38> More fundamentally, typical compensation analysis relies on an ecologically baseless concept of "surplus production" which dismisses the ecological value of the tens of millions of fish which are a critical base of the food chain whether or not they grow to adulthood -even though their predators may be populated at far below their historic values.

On January 19, 1993, Riverkeeper, Inc.<FN 39> and a coalition of individuals and environmental organizations sued EPA in the United States District Court for the Southern District of New York, to obtain an order directing EPA to promulgate new cooling water intake regulations. Riverkeeper, Inc., et al v. Whitman, U.S.D.C.,

S.D.N.Y., Case No. 93 Civ 0314 (AGS).<FN 40> In 1995, plaintiffs and EPA agreed to a consent decree which among other things set forth a timetable by which EPA would take final action on regulations to implement Section 316(b).<FN 41> Under the consent decree entered by the court in 1995, EPA was required to propose regulations implementing Section 316(b) for all facilities no later than July 2, 1999, and to take final action with respect to the regulations no later than August 13, 2001.

EPA subsequently moved to amend the Consent Decree, claiming it was unable to meet the deadlines.<FN 42> Although the court found that EPA's "explanations for its previous delays do not justify modification of the Consent Decree," it extended the proposal deadline, on the ground that "the public interest does require that the decree be modified to enable EPA to produce a sound Regulation." <FN 43> The amended consent decree requires EPA to take final action on its Phase II regulation by February 16, 2004.

Footnotes

32 See, e.g., Steam andElectric Power Generating: 40 C.F.R. Part 423; Pulp, Paper and Paperboard: 40 C.F.R. Part 430, as amended 42 Fed. Reg. 13198 (January 6, 1977); Petroleum Refining: 40 C.F.R. Part 419.

33 Former 40 C.F.R. $0 402.10-402.12(1976).

34 USEPA, Development Documen tfor Best Technology Availablefor the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact, 1976.

35 Former 40 C.F.R. 5 402.12 (1976). The remainder of the regulations contained a statementof scope and certain definitions. Former 40 C.F.R. 402.10,402.1l(1976). See VEPCO, 566 F.2d at 448.

36 Appalachian Power Co. v. Train, 566 F.2d 451 (4th Cir. 1977).

37 See 44 Fed. Reg. 32956 (June 7, 1979).

38 See e.g. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permit Renewal for Bowline Point 1 & 2, Indian Point 2 & 3 and Roseton 1 & 2 Steam Generating Stations, December 1999, Appendix VI-4-B, relying on Ricker models to estimate the impact of entrainment on Atlantic tomcod young.

39 At that time, Riverkeeper was known as Hudson Riverkeeper Fund, Inc.

40 The plaintiffs in the lawsuit are Riverkeeper, Inc., Alex Matthiessen, a/k/a The Hudson Riverkeeper; Maya K. van Rossum, a/k/a The Delaware Riverkeeper; Terrance E. Backer, a/k/a, The Soundkeeper; John Torgan, a/k/a the Narragansett Baykeeper; Joseph E. Payne, a/k/a The Casco BayKeeper; Jonathan Kaplan, a/k/a The San Francisco Baykeeper; Sue Joerger, a/k/a The Puget Soundkeeper, Steven E. Fleischli, a/k/a the Santa Monica BayKeeper, Andrew Willner, a/k/a The New York/New Jersey Baykeeper, The Long Island Soundkeeper Fund, Inc., the New York Coastal Fishermen's Association, Inc. and the American Littoral Society, Inc. The case was previously captioned as Cronin v Browner.

41 Fifty-six individual power companies and three power industry associations sought to intervene in the lawsuit. Judge Allen G. Schwartz denied the utilities' motion to intervene, finding that they had failed to meet the standards for either mandatory or permissive intervention under Federal Rules of Civil Procedure 24(a)(2) and 24(b). Cronin v. Browner, 898 F.Supp. at 1056-1057.

42 Cronin v. Browner, 90 F.Supp.2d 364,368 (S.D.N.Y. 2000).

43 Id. at 372.

EPA Response

No response necessary.

THE CLEAN WATER ACT REQUIRES TECHNOLOGY-BASED AND TECHNOLOGY-FORCING STANDARDS TO RATCHET DOWN POLLUTION.

Congress enacted the Clean Water Act <FN 44>(CWA) in 1972 to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. 1251(a). The CWA establishes a comprehensive regulatory program requiring all dischargers, including power plants, to obtain National Pollutant Discharge Elimination System (NPDES) permits for point source discharges. 33 U.S.C 1311. The permits contain standards, which are established by EPA through a system of technology-based limitations, supplemented by water-quality related limitations, which protect specific bodies of water.<FN 45> 33 U.S.C. 1312. The NPDES permit takes the applicable effluent limitations and other standards and turns them into the obligations borne by the individual polluting entity. NRDC v. EPA, 822 F.2d 104, 110 (D.C. Cir. 1987).

The intended effect of the Clean Water Act permit and effluent limitation process is to gradually reduce pollution and adverse environmental impact to the point of elimination. Indeed, Congress set a “national goal that the discharge of pollutants into the navigable waters be eliminated by 1985.” 33 U.S.C. 1251(a)(l). Congress understood that compliance with the Act would have economic consequences to industry and, accordingly, adopted a phase-in compliance scheme. That scheme uses increasingly more stringent effluent limitation guidelines and NPDES permits to ratchet surface water pollution down to zero. As explained by the court in NRDC v. EPA:

[T]he [Clean Water Act’s] regulatory scheme is structured around a series of increasingly stringent technology-based standards (beginning with the implementation of the best “practicable” technology (BPT) and progressing toward implementation of pollution controls to the full extent of the best technology which would become available (BAT). New sources would, again, be subject to the most stringent technology-based standards of all, namely “new source performance standards”. ... [T]he most salient characteristic of this statutory scheme, articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing.... The essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies. This policy is expressed as a statutory mandate, not simply as a goal.

NRDC v. EPA, 822 F.2d 104, 123 (D.C. Cir. 1987) (emphasis added).

Congress’s plan to eliminate surface water impairment requires that NPDES permits be made more stringent over time. Thus, it devised a three-phase implementation plan:

- For permits issued before EPA had completed the limitation guidelines, EPA was to use its “best professional judgment” (BPJ).<FN 46>

- By 1976, industries had to use the “best practicable technology” (BPT).<FN 47> Later, amendments to the Act extended the deadline for use of BPT to 1979.

- By 1981, industries had to use the “best available technology” (BAT), a much more stringent standard.<FN 48>

CWA section 316(b) requires NPDES standards for cooling water intake structures.<FN 49> Like sections 301,304 and 306 of the Act, section 316(b) mandates a best technology standard. Congress used the locution, “best technology available” (BTA), which is unique in the Clean Water Act, but is substantially similar to the Section 301 “best available technology” (BAT) standard. On its face, it is stricter than the Section 301(b) requirement to impose the “best technology available economically achievable” (BAT)<FN 50> because its spare and direct mandate contains no explicit cost component and does it require the consideration of the other factors relevant to BAT.<FN 51> Given the practically identical language and the application of the Phase II Proposal only to existing sources, the BTA requirement is as least as stringent, and possibly more stringent, than the section 301 BAT standard.

Footnotes

44 33 U.S.C. 33 1251-1387. The CWA is officially known as the Federal Water Pollution Control Act. It was amended in 1977 and 1987.

45 “Whenever a technology-based effluent limitation is insufficient to make a particular body of water fit for the uses for which it is needed, EPA is to devise a water-quality based limitation that will be sufficient to the task.” 33 U.S.C. 1312(a); see also NRDC v. EPA, 822 F.2d 104, 111 (D.C. Cir. 1987).

46 “Best professional judgment” (BPJ): Where EPA has not yet promulgated national effluent standards for a particular category of point sources, the permit writer must use, on a case-by-case basis, his or her best professional judgment to impose “such conditions as the permit writer determines are necessary to carry out the provisions of the Clean Water Act.” 33 U.S.C. 0 1342(a)(l)(B);NRDC v. EPA, 863 F.2d 1420,1424 (9” Cir. 1988).

47 “Best practicable technology” (BPT): BPT represents the “average of the best existing performance by plants . .. within each industrial category.” Kennecott v.EPA, 780 F.2d 445,448 (4” Circ.1985).

48 33 U.S.C. p 131l(b) (2) (A), (C), (D) and (F). BAT uses “the optimally operating plant, the pilot plant which acts as a beacon to show what is possible.” Kennecott v. EPA, 780 F. 2d 445,448 (4” Cir. 1985). For new sources, the strictest standard, “best available demonstrated control technology” (BACT) is required. 33 U.S.C. 6 1316.

49 “Any standard established pursuant to [Section 301 or Section 306 of the Act] and applicable to a point source must require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” 33 U.S.C. 9 1326(b).

50 CWA 6 301(b)(2)(A); 33 U.S.C. 3 1311(b)(2)(A).

51 “Factors relating to the assessment of best available technology shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, nonwater quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate.”33U.S.C.4 1314(b)(2)(B)

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.009

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.01

Require closed cycle cooling

CLOSED-CYCLE COOLING REDUCES WATER WITHDRAWALS AND FISH KILLS BY AN ORDER OF MAGNITUDE OR GREATER AND IS THEREFORE NECESSARY TO MINIMIZE IMPACT.

Capacity is the Critical Factor in Minimizing Adverse Environmental Impact.

CWA section 316(b) requires minimization of adverse environmental impact (AEI):

the location, design, construction, and capacity of cooling water intake structures [must] reflect the best technology available for minimizing adverse environmental impact.<FN 52>

The amount of water withdrawn by an intake is directly related to -and is the critical determinant of -the extent of adverse environmental impact. Consequently, section 316(b) requires a minimization of intake capacity.

Footnotes

52 33 U.S.C 1326(b)(2)(A); U.S.C. 1311(b)(2)(A)

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.010

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 6.01

Overview of I & E effects on organisms

On November, 9, 2000, Riverkeeper submitted to EPA a report prepared by Drs. Peter A. Henderson and Richard M. Seaby of Pisces Conservation, Ltd., that reviewed and evaluated the ecological basis for the proposed Phase I regulation.<FN 53> Drs. Henderson and Seaby reviewed literature and data on cooling water intakes from many power plants in freshwater, marine and estuarine water bodies in the U.S. and Great Britain, and concluded that there is a direct relationship between the volume of water pumped and the number of fish impinged and entrained.<FN 54> The following regression equations summarize the average correlation for all of the plants studied:

$I = 0.023(G+340.25)^{1.844}$
$E = 1.816(G+340.25)^{1.628}$

where “I” represents the number of fish impinged per year, “E” is the number of fish entrained per year, and “G” is gallons of water per second. The power function indicates a particularly sensitive relationship: increases in water withdrawal will result in a greater proportional increase in entrainment and impingement mortality.

As the Pisces Report explains:

It is impossible to remove any significant volume of water from a lake, reservoir, river or the ocean without also removing some of the organisms that are living within it. When water is extracted from healthy natural waters, to an over-riding degree the number of organisms killed be they fish, crustaceans or members of the plankton increases with the volume of water pumped.<FN 56>

As Drs. Henderson and Seaby explain in the Pisces Phase I Report, mathematical analysis of data from a large number of U.S. and European power plants show “no appreciable difference in overall catch rate over a wide range of habitats and geographical position.”<FN 57> As such, “pumping rate is considerably more important than locality and intake configuration in determining the number of fish either entrained or impinged.”<FN 58>

Pisces has expanded on its assessment of the relationship between cooling water flows and impingement and entrainment by incorporating data from many more U.S. plants into its regression equations, and by conducting a full statistical analysis and calculating the confidence intervals for its impingement regression equations. As a result of that analysis, the Pisces Phase II and NODA Report <FN 59> contains the following equations for impingement and entrainment, as a function of water withdrawals, for power plants located on Great Lake, other freshwater and estuary/marine waterbodies:

Impingement/Flow Relationship

Great Lakes: $I = 1.7023V^{1.778}$

Other Fresh Water: $I = 6 \times 10-8V^{3.1444}$

Ocean and Estuary: I = 0.1704V^1.5943

All Waters Combined: I = 0.4719V^1.8699

(Where I is the number of fish impinged per year and V is volume withdrawn in cubic feet per second.)

Impingement/Flow Relationship

Fresh Water: En = 2E + 07V0.1924

Ocean and Estuary: En = 457475V 1.1405

(Where En is the number of fish impinged per year and V is volume withdrawn in cubic feet per second.) These equations and the entrainment data are plotted in Figures 1 and 2 in the Pisces Phase II and NODA Report.<FN 60>

Indeed, EPA has agreed that impingement and entrainment levels are directly related to the volume of water withdrawn.

Footnotes

53 Technical Evaluation of US Environmental Protection Agency Proposed Cooling Water Intake Regulations for New Facilities, prepared by Drs. P. A. Henderson & R. M. Seaby, Pisces Conservation Ltd., November 2000 (the "Pisces Phase I Report"). Pisces is a British environmental consulting firmthat has extensive experience consulting on the ecological impacts of power plants, including in particular the impacts of cooling water intakes and thermal discharges on the biota of surrounding waters. Key members of Pisces staff have worked for more than 30 years on power plant effects in many parts of the world. See Attachment A to the Pisces Report for a description of Pisces' experience in evaluating environmental impacts of power plants, including the curricula vitae of Drs. Henderson and Seaby.

54 Pisces Phase I Report, 3.

55 Id.

56 Pisces Phase I Report, 97 (emphasis added).

57 Pisces Phase I Report, 6 5.

58 Id.

59 Technical Evaluation of US Environmental Protection Agency's Proposed Phase II Cooling Water Intake Regulationfor Existing Facilities (including Comments on NODA), prepared by Drs. Henderson, P.A. and Seaby, R.M.H., and Somes, J.R., Pisces Conservation, Ltd., June 2003 ("Pisces Phase II and NODA Report")

60 Pisces Phase II and NODA Report, 1.1. Pisces' full statistical analysis is provided in 1.1.2.

EPA Response

Please see response to Comment 316bEFR.041.037 regarding the assumption used for EPA's benefits analysis that I&E are proportional to flow.

Comment ID 316bEFR.404.011

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Closed-Cycle Cooling Minimizes Capacity and Fish Kills.

The difference in capacity between once-through cooling systems and closed-cycle cooling systems is enormous. "Once-through" cooling systems take water from a local body of water, use it to absorb heat from the facility (in the case of electric power plants, from the steam condensers), and discharge it back at an elevated temperature. In a once-through system none of the cooling water is recirculated and extremely large volumes are required.

Once-through systems generally consume on the order of hundreds of millions or billions of gallons of water per day. The Salem Generating Station in New Jersey uses more than 3.3 billion gallons of water per day at peak operation. Each reactor at the Indian Point facility in New York uses more than 1.4 billion gallons per day at peak operation. Once-through systems at modern combined-cycle fossil fuel plants will use somewhat less water, but the volumes for large plants of that type are still in the hundreds of millions of gallons per day (mgd).

"Closed-cycle" cooling, in contrast, involves significant or complete recirculation of cooling water. The volume of water used by either of the two primary types of closed-cycle systems is dramatically lower than for once-through cooling. In closed-cycle wet cooling systems (ie., evaporative cooling towers), cooling water is circulated through cooling towers to transfer heat to the atmosphere by evaporation, and is then recirculated through the plant to absorb heat. In closed-cycle dry-cooling systems (aka. air cooling) radiator-type coils are used to transfer heat to air passing over the coils. In dry systems, there is no water evaporation and virtually all water is recirculated. As a result, plants that use dry cooling have no visible plume and have much smaller water requirements. Plants with dry cooling systems have no thermal discharge to watersheds, only to air, and need to add additional water only occasionally for periodic system maintenance and cleaning. Where steam plume abatement is desirable, hybrid cooling systems are available that use both wet sections and dry sections.

The precise volume of water withdrawn by any of these systems depends on the size of the plant and the type of electricity generation technology . Generally, the higher the output of a power plant, the more cooling water is required.<FN 61> Most critical for BTA purposes, however, is that water requirements for the different cooling system categories vary by orders of magnitude.

The differences in both capacity and mortality between once-through cooling and closed-cycle cooling are particularly dramatic. Closed-cycle systems generally require only 2-5% as much water as once-through cooling systems. That is, a plant which would extract 1 billion gallons per day (1000 mgd) of water if cooled by a once-through system, will require only about 2-5% of that amount or 20 to 50 mgd if cooled by an evaporative cooling tower instead. Retrofitting evaporative cooling towers on a power plant that currently uses once-through cooling will therefore reduce water usage by approximately 95-98%. The reduction in water use from saline sources may in some circumstances be lower, but is still highly significant, at 70% or more, depending on the extent to which State water quality standards limit chloride increases.

Most significantly, this dramatic reduction in intake volume will directly reduce the mortality of aquatic organisms by a correspondingly large amount. Thus, power plants which currently slaughter billions of larval fish will generally destroy less than 5% (and possibly as little as 2%) of that total.

Footnotes

61 Section 3 of the Pisces I Report contains regression functions to describe the relationship between power output and cooling water requirements.

EPA Response

EPA points out that the commenter has mistakenly used the word "consume" in reference to cooling water intake, especially in the case of once-through cooling. This could be a misleading word usage, as the term "consume" implies that the water is lost, when in fact it is returned to the waterbody. Although the elevated temperature of once-through system discharges will ultimately increase the rate of evaporation of the receiving water, this effect is small. In many cases, the local water authority may require a facility to account for this water "consumption", but confusing this accounting with water "withdrawal" may lead to issues related to water scarcity. In the case of recirculating wet cooling, there is some mounting concern in local communities over the small degree of water consumption that occurs in the cooling system (through evaporation) that is correctly termed "consumption." Granted, there is a significant misconception among the industry and local authorities about the comparative water consumption between once-through and recirculating wet cooling, but is measurably different.

The commenter repeats in this comment a common omission related to cooling tower water withdrawal compared to once-through systems (as compared to once-through systems) in marine environments. In fact, the data presented by the commenter about the supposed performance of cooling tower systems is optimistically high even for the likely case of a retrofit for a freshwater cooling system. For more discussion on this topic see response to comment 316b.EFR.404.034.

Comment ID 316bEFR.404.012

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 6.07

Documented facility examples of CWIS impacts

As just one example of the massive reduction on fish deaths from converting to closed-cycle cooling, in early 2002, the Albany Steam Station on the Hudson River received approvals from New York State to repower the once-through, steam-cycle plant and convert to closed-cycle cooling. The Bethlehem Energy Center project, as it is known, will convert the existing 400 MW oil-burning facility to a 750 MW combined-cycle natural gas facility. The project will reduce Hudson River water withdrawals dramatically, by 98-99%, from the current 500 mgd to a maximum of about 8 mgd. (It will also reduce air pollution rates by 98%). The plant's owner, PSEG Power New York, Inc., has estimated that the reduction in intake capacity will reduce entrainment by 9899% from the current annual totals of 420 million eggs, 460 million yolk-sac larvae, 210 million-post yolk-sac larvae, and 130,000 juveniles.<FN 62>

Footnotes

62 PSEG Power New York Inc.'s Bethlehem Energy Center, SPDES Modification, DEC Number 4-0122-00044-00005, Addendum A.10, Alternative Cooling Systems Study p. 7-10, Table 7-3

EPA Response

This is a duplicate comment. Author submitted this comment with the exact wording previously. Please see response to comment 316bEFR.206.020.

Comment ID 316bEFR.404.013

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

Author Name Reed Super

Organization Riverkeeper, Inc.

Retrofitting to closed-cycle cooling drastically reduces water usage and fish kills through impingement and entrainment. This ratcheting down of impacts is exactly what was contemplated by Congress when it established the NPDES permitting system and the technology-based limitation requiring best technology available.

EPA Response

See response to comment 316b.EFR.404.034.

Comment ID 316bEFR.404.014

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 7.03

Available I&E technologies

All Other Technologies Are Significantly Less Effective.

While other technologies exist to reduce entrainment and impingement, none of them afford anywhere near the level effectiveness and reliability of closed-cycle cooling. Such technologies include, for example, Ristroph screens and fish return systems; wedgewire screens; fine mesh traveling screens; barrier nets; louver screens; angled screens; velocity caps; porous dikes; behavioral barriers; variable speed pumps; and microfiltration.

As the Pisces Phase II and NODA Report, submitted with these comments, details, these technologies vary in their effectiveness, but none of them come close to achieving the effectiveness and reliability of closed-cycle cooling.<FN 63>

Footnotes

63 Pisces Phase II and NODA Report, 1.3.

EPA Response

Please see response to comment 316bEFR.404.014.

Comment ID 316bEFR.404.015

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 4.01

Source data used by EPA

In the NODA, EPA reports that it has collected additional studies on intake screen and diversion devices and has assembled a database of such studies.<FN 64>Pisces reviewed the database and new studies and concluded that:

The new database provided by the EPA does not materially improve the knowledge on these different technologies. Some are studies of well-known methodologies (traveling screens etc) others are of very experimental technologies.

One of the most obvious facts to come from the new data is that most of the technologies produce large between-sites and between-species variations in reduction of I&E. It its therefore impossible to produce a meaningful average figure for the decrease due to a particular technology. The only exception is the effect of reducing the total amount of cooling water used.<FN 65>

EPA acknowledges the superiority and certainty of cooling towers in reducing impingement and entrainment:

The only technology effectiveness that is certain is reductions in impingement and entrainment with cooling towers.<FN 66>

As a result, these technologies cannot be considered as BTA or as substitutes form closed-cycle cooling technology. They can, of course, be considered as supplements which when used in conjunction with closed-cycle cooling may offer additional environmental protection and further reduce impact.

Footnotes

64 68 Fed. Reg. At 13538-41

65 Pisces Phase II and NODA Report, 1.3.

66 67 Fed Reg. At 17192

EPA Response

Please refer to EPA's response to comment 316bEFR.330.009.

Comment ID 316bEFR.404.016

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 7.03.01

Sample facilities/technologies

In particular, one technology, the microfiltration device known as Gunderboom, is an experimental technology that cannot be considered as any component of a national BTA standard, certainly not in lieu of cooling towers. The only locations where Gunderboom has been tested are on the Hudson River at the Lovett Station Unit 3 and in an in-situ experiment in Bowline Pond conducted by Riverkeeper. Analysis of the monitoring reports of Gunderboom deployment at Lovett reports indicates that even after anchoring problems were corrected, the effectiveness of the filter fabric began to decline soon after deployment, and the material was ineffective after 5 to 6 weeks of use. The failure of the Gunderboom fabric at Lovett was likely related to biofouling, which blocks water flow through the material, thereby causing water and aquatic biota to overtop, tunnel under and/or rip through the fabric. As a result, exclusion rates comparable to the entrainment reductions offered by closed-cycle cooling cannot be achieved. Such success rate has never been achieved at Lovett or anywhere else. If anything, the Lovett reports demonstrate that Gunderboom material will foul and fail within a month or two of deployment.

As the Pisces Phase II and NODA Report explains, Gunderboom has never been proven to be effective at Lovett, except for very limited periods of time:

The only microfiltration system considered is the Gunderboom and the report makes it clear that the only data available come from the observations at Lovett GS. It is concluded that ‘Entrainment reductions up to 82 percent were observed for eggs and larvae and these levels have been maintained for extended month-to-month periods during 1999 through 2001.

This statement is a clear exaggeration of the observed effectiveness of the Gunderboom at Lovett GS. Overtopping, tunneling and rips have been observed during testing. For example, in the Lovett evaluation report for 1999 it is stated that “the divers documented a substantial gap along the bottom of the boom. The gap extended along the bottom of the boom for approximately 3 m and ranged in depth from 0.5 to 0.6 m".

It is clear in Table 2 of the Lovett 2000 report (above [in Pisces report]) that there was a gradual increase in entrainment through time. Further, there was also a series of events between May and August 2000 that resulted in short-term total failures. The efficiency of the Gunderboom was assessed by comparing the level of entrainment at unit 3 (protected by a Gunderboom) to that at unit 4 (unprotected). Thus a ratio above 1 for the number of fish entrained at unit 3 to unit 4shows that the boom was offering no protection. To achieve 82% effectiveness or better the ratio would need to be smaller than 0.18. As shown in the figure below this level of efficiency was only achieved for a short period during May 2000. It is therefore incorrect to conclude that it was achieved for extended month-to-month periods during 1999 through 2001. In fact from late July 2000 the Gunderboom was completely ineffective at reducing entrainment.<FN 67>

Because Riverkeeper suspected that the declining efficiency of Gunderboom has was related to biofouling, we commissioned original research on Gunderboom fabric with intervenor funds in the New York State Article X power plant siting proceeding for the proposed Bowline 3 facility (Case

No. 99-F-1164).<FN 68>The in situ experiment conducted in Bowline Pond by Pisces Conservation, with assistance from Carpenter Environmental Associates, demonstrated that when exposed to the Hudson River environment during the spawning season, the permeability of Gunderboom material progressively declines as a result of the growth of a biological community on the surface.<FN 69> In fact, after 29 days in the water, Gunderboom material which was subjected to an airburst cleaning system (as proposed for BEC) had only 4% of the permeability remaining, as compared to clean material.<FN 70> Fouling of the filter fabric can result in at least three biological problems: (1) fouling of the surface might reduce the area through which water can flow leading to velocity 'hot spots' where delicate animals may be pinned or pulled through the mesh; (2) increased flow resistance causes water to force another path across or around the barrier; and (3) establishment of a predatory community adapted to feed on any small animals drawn close to the fabric. <FN 71>

Because Gunderboom is an experimental technology, and has not been shown to be an effective substitute for closed-cycle cooling, it cannot be considered BTA.

Footnotes

67 Pisces Phase II and NODA Report at 9 1.3.5.

68 See Biofouling Studies in Bowline Pond, July 2001, P.A. Henderson. R.M. Seaby, C. Cailes, and J.R. Somes, previously submitted to EPA.

69 Id.

70 Id.

71 Id.

EPA Response

See comment 316bEFR.206.023.

Comment ID 316bEFR.404.017

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.01.02.04

Assumptions about I&E survival

Assuming 100 Percent Mortality of Entrained Organisms Is The Only Defensible Approach for These Regulations.

EPA is requesting comment on whether the current state of knowledge supports a defensible assumption of the extent of entrainment survival above zero percent to be used to calculate national benefits estimates.<FN 72>Entrainment survival is also an issue that permit applicants use, in part, to justify their use of once-through cooling, on the theory that a great percentage of entrained organisms will survive once-through cooling than would survive a cooling tower.

The only assumption consistent with the research to date on the subject is that organisms do not survive entrainment intact. As EPA correctly acknowledges:

[Existing studies entrainment survival] are characterized by significant uncertainty and variability.. . [T]he proportion of the organisms that are alive in the samples is highly variable and unpredictable.<FN 73>

Pisces has reviewed material on entrainment mortality in the record concludes that "the only safe assumption for the mortality of fish entrained in the cooling water flow is 100%."<FN 74> Among other things, Pisces explains that there is a paucity of studies on entrainment survival and much of the data is limited in significant ways. Further, while some studied organisms may not immediately perish upon being entrained, they are compromised and subject to latent mortality which often not captured in the studies conducted to date:

In other words, fish can take many days to die from the effects of entrainment. Most studies only present the immediate and 48 hour survival times, whereas the effect on larvae might be apparent over a much longer period than this. No experiment has ever shown exposed fish to recover to a mortality rate as low as the controls. <FN 75>

Moreover, entrained organisms are more subject to predation and, even if they survive entrainment, may be subject to long-term sub-lethal damage.<FN 76>

As Pisces explains, quantifying the mortality of eggs and larval fish caused by entrainment is very difficult. Mortality caused by entrainment is certain. The long-term survivorship of eggs and larvae is not. While some fish are alive after entrainment, it is not known unknown but how many will survive the longer-tern effects of increased predation, affected growth and disease. Given the amount of acute damage and the steady mortality subsequently observed, the increased likelihood of predation, and the long-term impacts of poor growth following trauma, all available evidence points to a very poor likelihood of reaching adulthood. The entrained fish are effectively lost to the population even if not immediately after the entrainment event. Combined with the difficulty of using existing survival data to predict the survival rates at another plant on a different water body, it is clear that the only path the EPA can follow with any degree of certainty is to assume 100% mortality for any entrained fish. <FN 77>

Footnotes

72 68 Fed. Reg. at 13541.

73 Id.

74 Pisces Phase II and NODA Report, 5 1.4

75 Id.

76 Id.

77 Id.

EPA Response

Please see response to comment 316bEFR.330.011.

Comment ID 316bEFR.404.018

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

CLOSED-CYCLE COOLING IS AVAILABLE AND AFFORDABLE FOR EXISTING FACILITIES, AND WILL NOT ADVERSELY AFFECT ENERGY SUPPLY, RELIABILITY OR PRICES.

Closed-Cycle Cooling Is Virtually Ubiquitous For Modern Power Plants, and Has Been Retrofit on Numerous Older Plants.

Closed-cycle cooling is available technology for both new and existing facilities. For new plants, it is overwhelmingly the standard technology. In conjunction with the Phase I regulation for new facilities, EPA reported that 100% of the combined-cycle plants built in the last 20 years have a closed-cycle recirculating cooling system.<FN 78> For coal-fired facilities, 88% of the facilities built in the last 10 years have closed-cycle cooling.<FN 79> Likewise, for existing plants, EPA acknowledges that:

A closed-cycle recirculating cooling system is an available technology for facilities that currently have once-through cooling water systems.<FN 80>

In the 1970s, 1980s, and 1990s, facilities of various sizes and fuel types converted from once-though cooling to closed-cycle cooling. Specifically, EPA has reported the following cooling system retrofits: The 821 MW Palisades Nuclear Plant in Michigan converted to closed-cycle cooling in 1974;the 490 MW coal-fired Canadys Steam Plant in South Carolina, converted its once-through cooling system to a closed-cycle recirculating system in two steps, first Unit 3 in 1972 and then Units 1 and 2 in 1992; in 1985, the 346 MW Jeffries Coal Plant also South Carolina converted from once-through cooling to recirculating cooling towers; and finally, Unit 7 of the 751 MW gas-fired Pittsburg Power Plant in Contra Costa County, California, has converted to closed-cycle.<FN 81>

Retrofits are also currently planned or underway at several other US facilities, including at the McDonough (520 MW coal) and Yates (1250 MW, coal) plants on the Chattahoochee River in Georgia and at the Wateree Station (772 MW, coal) on the Wateree River in South Carolina. Several different retrofit options have been evaluated for some or all of the four units at the Brayton Point power station (1500 MW, coal/oil) in Somerset, Massachusetts, including unit-specific and/or multi-mode cooling towers.

In addition, other plants have converted from once-through cooling to closed-cycle cooling, or are planning to do so, while repowering and simultaneously improving the efficiency, air pollution rates, and total capacity of their plants. For example:

Reliant Astoria Repowering Project and the Bethlehem Energy Center in New York State are evidence that firms will seek to repower older, less efficient generating facilities and that such repowerings can include cooling towers as part of the repowered facility in place of once-through cooling. Such projects will provide significant environmental benefits in terms of reduced water usage and lowered air emissions and will offer substantial economic benefits for their owners.<FN 82>

Footnotes

78 66 Fed. Reg. at 28855-28856.

79 66 Fed. Reg. at 28856.

80 67 Fed. Reg. at 17154.

81 67 Fed. Reg. at 17155;Phase I1 TDD, pp. 4-1 to 4-6.

82 Synapse 2002 Phase II Report at p. 7.

EPA Response

The commenter confuses the term “available technology” with “best technology available,” in the Agency’s view. Simply because many cooling tower systems exists where they have been integrally constructed from the ground up along with a facility or during the extended process of repowering the facility has no bearing on the ultimately availability of this technology through retrofit to existing, operating plants. The Agency based its determination on best technology available on those candidates that could reliably be retrofitted to existing facilities and would not cause the potential 10 month construction downtimes as could the mandate of cooling towers to the facilities within the scope of the rule. As such, the technology of wet cooling towers, in addition to being appreciably less cost-effective in minimizing adverse environmental impact, would not be the “best technology available.”

The commenter provides no evidence that “numerous” examples of cooling tower retrofits have been conducted. Despite the fact that a handful of new examples exist of cases where cooling towers have been evaluated does not a robust data set make. In addition, the example cases referenced by the commenter are potentially being driven primarily by forces outside of impingement and entrainment by cooling water intakes, such as thermal discharge or water reliability/availability. In addition, the commenter does not provide persuasive evidence of the ultimate costs that could be realized by these planned or considered projects, nor evidence that the potential connection outages would ultimately be reasonable. As such, the commenter’s examples provide little information that supports their illogical viewpoint that cooling tower retrofit projects at existing facilities is the default best technology available.

Comment ID 316bEFR.404.019

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 9.03

Mkt-level impacts/Reliability/EO 13211: Energy Effects

A Retrofit Mandate Will Not Cause Energy Shortages.

A regulation requiring closed-cycle cooling for all existing facilities would not significantly affect U.S. energy supplies in the short-or long-term. Submitted with our August 2002 comments was a report by Synapse Energy Economics of Boston, Massachusetts. In its 2002 report, the “Synapse 2002 Phase II Report”, Synapse analyzed the energy impact of an all closed-cycle cooling rule, and concluded that there would be no adverse energy reliability impact from the implementation of an all-cooling tower regulatory option.<FN 83>

Adverse energy effects of such a regulation could conceivably result from one of three causes: plants going temporarily off-line to retrofit to cooling towers; reduced energy generating efficiency (sometimes called an “energy penalty”) from operating with a cooling tower; or the retirement of facilities. Synapse carefully analyzed each of these possibilities, and determined that none presents a significant problem.

First, Synapse calculated the percentage of national power capacity that would be off-line for retrofit at any one time. As EPA acknowledged in its Phase II proposal, the new cooling towers could be built while an affected facility is operating and the attachment of the new tower to the existing cooling system would have only a one-time effect, extending a planned maintenance outage by one month.<FN 84> Based on EPA’s estimates, Synapse notes that a national closed cycle cooling rule would cause 416 facilities, representing 33.1 percent of U.S. generating capacity, to add cooling towers. Since power plant cooling technology is dictated by 5-year NPDES permits, and since the design and construction of cooling towers can take several years, it is reasonable to assume that the facility outages required to connect these new cooling towers could and would be scheduled to occur throughout a five-year transition period. As a result, on average, only 0.5 percent of the nation’s electric generating capacity would be out of service at any one time as a result of the implementation of a national closed-cycle cooling rule.<FN 85>

The same would be true on a regional basis. Only 0.75 percent of the generating capacity in the ECAR and NPCC regions, on average, would be out of service at any one time. Again, this assumes that the extra month of downtime needed to connect the new cooling towers would occur randomly throughout the year. It is far more likely, however, that the extra downtime would be preferentially scheduled to occur during the off-peak seasons when capacity reserve margins are much higher. As a result, the implementation of a national closed-cycle cooling regulation would have even less of an effect on electric system reliability than these figures would suggest.<FN 86>

Second, the energy penalties will be minor. Even assuming EPA has correctly estimated the energy penalty at 1.7 percent, this is a minor reduction considering in light of existing and predicted reserve margins, and the additional capacity expected to come on line in the near future. Moreover, EPA has significantly overstated the energy penalty, as Synapse explained in detail. <FN 87>

Third, no generating capacity will be retired as a result of the implementation of the closed-cycle cooling rule. As explained below, based on the extremely high profitability of existing nuclear and fossil fuel plants, and the relatively minor costs of retrofitting cooling towers, it is unreasonable and unrealistic to assume that any facilities will close as a result of such regulation. If anything, a cooling tower mandate might cause some retrofitting facilities to simultaneously repower from older, less efficient single-cycle generating technology to modern, more efficient combined-cycle technology. On the Hudson River, the owner of the Albany Steam Station recently received approval to repower the plant, and in so doing will reduce cooling water intake by 98-99% percent, reduce air pollution rates by a similar percentage, while nearly doubling capacity. Thus, a closed-cycle regulation may cause an increase in capacity. <FN 88>

Even apart from repowerings that might be caused by such a rule, there are a number of other sources of additional, new capacity which will more than compensate for any reductions in available capacity. Thus, the extremely minor capacity reduction totals discussed above overstate the effect that the implementation of a closed-cycle cooling the regulation would have on electric system reliability. A significant amount of new capacity is scheduled to come on line nationwide in the next few years. - Further, there will be additional capacity available from already-scheduled repowerings of oil-, gas- and coal-fired facilities to combined-cycle plants. Synapse is aware of at least 17 coal-fired facilities have been or are planned to be repowered to use combined-cycle technology, in addition to many more repowerings from oil or gas, which EPA has reported. These repowerings could add thousands of additional megawatts of generating capacity to the national electric system and, thereby, improve system reliability while reducing water usage. Similarly, condenser upgrades improve performance in terms of fewer tube failures and lower forced outage rates. Thus, the facilities that have implemented condenser upgrades should be available for service for more of the year than they previously had been. This additional capacity can be expected to further enhance electric system reliability. <FN 89>

Moreover, there will be additional capacity available from the implementation of power uprates at nuclear power plants. A power uprate means increasing the thermal power produced by the plant. A power uprate increases the output of the plant at a relatively low cost. The U.S. Nuclear Regulatory Commission has approved more than 60 such power uprates of between 5 and 20 percent. Requests for additional uprates are currently under review by the NRC or are planned for submission in the near future. An average increase of 10 percent in the power levels of the nation's nuclear plants would add approximately 9,000 megawatts of additional capacity to the electric system. Likewise, many nuclear power plants will be extended beyond the current 40 year terms of their Nuclear Regulatory Commission-issued operating licenses. Therefore, there may be more generating capacity available over the next 30 to 50 years than has been assumed in the EPA analyses. <FN 90>

Footnotes

83 Synapse 2002 Phase II Report at p. 2.

84 In the NODA, EPA revised its estimate of the net downtime for retrofitting cooling towers at nuclear plants from 4 weeks to 7 months, and has apparently based this revision solely on the time it apparently took to retrofit the Palisades nuclear power plant in 1973-1974. 68 Fed. Reg. at 13525. Synapse analyzed EPA's net downtime revision and concluded that basing current retrofit downtime estimates on the experience at the Palisades plant 30 years ago is unjustified because, among other things: (1) the durations of refueling/maintenance outages at nuclear power plants have been significantly reduced during the past decade; (2) contrary to what the plant owner told EPA, it appears that the extended outage of Palisades was primarily due to factors other than the installation of the new circulating water system; (3) the Palisades retrofit could have been completed in significantly less time than it took; (4) the U.S. Department of Energy's National Energy Technology Center October 2002 retrofit report, prepared by Parsons Infl-astructureand Technology Group, concluded that, with proper planning and coordination with other planned outages, cooling tower retrofits at nuclear plants could be accomplished without loss of generating time. See Synapse NODA Comment, submitted herewith. Thus, EPA should not have revised the

estimated downtime to 7 months and should instead continue to base its calculations on a 4-week net downtime.

85 Synapse 2002 Phase II Report at p. 6.

86 Id.

87 Id. at 11-12.

88 See Synapse 2002 Phase II Report.

89 Id.

90 Id.

EPA Response

Please refer to the responses to comments 316EFR.306.412, 316EFR.306.414, 316EFR.306.416, 316EFR.061.013, and 316bEFR.087.010.

Comment ID 316bEFR.404.020

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 9.01
Facility & firm-level costs/Econ. Practicability

The Cost of Closed-Cycle Cooling is Minimal to Industry, Would Not Cause Facilities to Close, and is Only Pennies per Month Per Household.

In the Phase II Synapse Report, Synapse analyzed and the costs of complying with regulatory options that require closed-cycle recirculating cooling systems and concluded that such costs would be extremely minor.

Based on EPA's own calculations, the compliance costs of an all cooling tower rule, would add cooling towers at 416 facilities, would increase the average price of generating electricity at the affected facilities by about one-tenth of one cent (known as a mill) per kilowatt hour. Since retail energy costs average about 8.5 cents per kilowatt hour, this represents only a 0.66 percent increase.<FN 91>

Whether the owners of affected facilities can pass these cost increases along to their customers is not certain in a deregulated market, although where a market clearing price system is in place, it is like they can. To the extent costs are passed on, the overall price paid by consumers for the electricity they use would reflect a blend of both the price of generating electricity at affected facilities and the price of generating electricity at nonaffected facilities. Consequently, the price of electricity actually paid by consumers would increase by less than the tenth of a cent per kilowatt hour. Indeed, as demonstrated by Synapse the average price increases to consumers caused by an all-cooling tower rule would be only one-twentieth of a cent (one-half mill) per kilowatt hour. As a result, an average consumer who uses 500 kilowatt hours per month would see his/her bill increase by only 28 cents per month if a closed-cycle regulation were adopted.

These extremely minor cost increases would also not cause any facilities to close. Based on its experience and previous work with power plants, Synapse believes that it is extremely unrealistic to expect that currently operating nuclear power plants will be retired as a result of the adoption of a flow reduction technology based regulatory options. This conclusion is based on (a) the improved performance and reduced O&M costs achieved at nuclear plants since the mid-l990s, (b) the fact that nuclear plants' low operating and fuel costs allow them to compete successfully in bid-based wholesale markets, and (c) the significant economic benefits that are available from relatively low cost investments in plant power uprates and operating life extensions.

For example, a recent Synapse analysis concluded that a $36 million investment in increasing the power level of the Vermont Yankee Nuclear Plant by 13 percent would result in a net present value benefit of $56 million (in 2001 dollars). A similar investment in extending the unit's operating life by twenty years would produce a net present value benefit of $253 million. With the opportunity for potential economic benefits of this magnitude, it is unlikely that any nuclear plant would be retired as result of the adoption of a closed-cycle retrofit mandate from the EPA.

Footnotes

91 Synapse 2002 Phase II Report at p.8.

EPA Response

Please refer to the response to comment 316bEFR.206.026 in subject matter code 9.01.

Section 316(b) Requires Closed-Cycle Cooling as BTA because it is the Best Technology in Use.

As explained above, the Clean Water Act's technology-based limitations were designed to force the iterative development of more protective technologies, and to ratchet down discharges and other impairments to water quality until they could be eliminated. Congress and numerous federal courts have emphasized this "technology forcing" character of the Act's categorical standards within the context of the section 301 BAT requirement. It is therefore well-settled law that BAT standards must require all existing facilities to match the environmental performance of the best performing, i.e., least polluting, least harmful, facility.

BAT must be "at a minimum, established with reference to the best performer in any industrial category." Conf. Rep. On S. 2770 (October 4, 1972), Legislative History of the Federal Water Pollution Control Act of 1972 at 170. "The BAT standard reflects the intention of Congress to use the latest scientific research and technology in setting effluent limits, pushing industries toward the goal of zero discharge as quickly as possible. In setting BAT, EPA uses not the average plant, but the optimally operating plant, the pilot plant which acts as a beacon to show what is possible." Kennecott v. EPA, 780 F.2d 445,448 (4th Cir. 1985), citing legislative history See A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 798 (hereinafter "Leg. Hist."). See A Legislative History of the Water Pollution Control Act Amendments of 1972, 93d Cong., 1st Sess. (Comm. Print 1973), at 798 (hereinafter "Leg. Hist.").;

"[I]t is clear that Congress did not intend by that phrase [i.e., BAT] to limit the technology to that which is widely in use. ... 'It will be sufficient, for the purpose of setting the level of control under available technology, that there be one operating facility which demonstrates that the level can be achieved or that there is sufficient information and data from a relevant pilot plant.'" American Iron & Steel Inst. v. EPA, 526 F.2d 1027, 1058 (3d Cir. 1975), quoting legislative history. BAT must "utilize the latest technology to reach 'the greatest attainable level ... which could be achieved. NRDC v. EPA, 863 F.2d 1420, 1431 (4thCir. 1988).<FN 92>

The best-performer/optimally-operating-plant essence of BAT standards is illustrated by contrast with or "best practicable technology" or BPT standards.<FN 93>BPT was an intermediate technology standard which, under the CWA's three-step phase-in process, were completely replaced by the BAT standards in 1979. Under the obsolete BPT mandate, EPA set standards which represented the "average of the best existing performance by plants of various sizes, ages and unit processes within each industrial category or subcategory. This average is not based upon a broad range of plants within an industrial category or subcategory, but is based upon performance levels achieved by exemplary plants.'' Kennecott v. EPA, 780 F.2d 445,448 (4th Circ. 1985) citing EPA v. Nat'l Crushed Stone Ass'n, 449 US. 64,76 n. 15, 66 L. Ed. 2d 268, 101 S.Ct 295 (1980) (1980) quoting 39 Fed. Reg. 6580 (1974). "The distinction between 'best practicable' and 'best available' is intended to reflect the need to press toward increasingly higher levels of control. Kennecott v. EPA, 780 F.2d 445,448 (4th Cir. 1985)' citing legislative history.

Section 316(b)'s BTA mandate, which is at least as strict as BAT standards and clearly stricter that BPT, requires EPA to set extremely technology-forcing cooling water intake standards that reflect state-of-the-art controls. As with BAT, BTA requires EPA to look to the optimally-operating plant, Le., the best performer, and to bring all facilities up to the "best of the best" level. EPA has done this for many years for most industrial dischargers, including new and existing power plants.<FN 94> The Clean Water Act requires the same for cooling water intakes at power plants.

Footnotes

92 See also Texas Oil & Gas Ass'n v. Unitedstates EPA, 161 F.3d 923,928 (5&Cir. 1998) (BAT limitations to be based on the performance of "the single best-performing plant.") American Iron & Steel, 526 F.2d at 1061;National Ass'n ofMetal Finishers v. EPA, 719 F.2d 624, 657, n. 51 (3d Cir. 1983); FMC Corp. v. Train, 539 F.2d 973,983 (4th Cir. 1976);American Frozen Food Inst. v. EPA, 526 F.2d 107, 117 (D.C. Cir. 1976).

93 33 U.S.C. 5 131l(b)(l)(A). EPA defines BPT as "the average of the best existing performance by plants of various sizes, ages and unit processes within each industrial category or subcategory. This average is not based upon a broad range of plants within an industrial category or subcategory, but is based upon performance levels achieved by exemplary plants." EPA v. Nat? Crushed Stone Ass'n, 449 U.S. 64,76 n.15, 66 L. Ed. 2d 268, 101 S. Ct. 295 (1980), quoting 39 Fed. Reg. 6580 (1974).

94 40 C.F.R. Part 423 (Steam and Electric Power Generating industry).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.022

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.01

Require closed cycle cooling

Because closed-cycle cooling is the best technology for minimizing adverse environmental impact, is widely available for both new and existing plants, and will not cause adverse energy impacts, it is BTA for existing facilities. EPA has no discretion to determine otherwise. Indeed, for EPA to determine that a once-through plant is the “optimally operating plant, the pilot plant which acts as a beacon to show what is possible,’’ (Kennecott v. EPA, 780 F.2d at 448) would be arbitrary and capricious and not in accordance with law.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.023

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

COMPLIANCE COSTS ARE ONLY MARGINALLY RELEVANT TO THE DETERMINATION OF BTA.

The fact that closed-cycle cooling may cause facilities to incur higher compliance costs does not change the BTA determination. “Congress foresaw and accepted the economic hardship, including the closing of some plants, that [Clean Water Act] effluent limitations would cause.” EPA v. National Crushed Stone, 449 U.S. 64, 79 (1980). As the Supreme Court explained, Congress devised the Act with the economic consequences in mind:

Prior to the passage of the [Clean Water] Act, Congress had before it a report jointly prepared by EPA, the Commerce Department, and the Council on Environmental Quality on the impact of the pollution control measures on industry. That report estimated that there would be 200 to 300 plant closings caused by the first set of pollution limitations. Comments in the Senate debate were explicit: ‘There is no doubt that we will suffer some disruptions in our economy because of these efforts; many marginal plants may be forced to close.

Id. at 80.

Section 316(b) does not explicitly provide that EPA may take compliance costs into consideration at all when establishing national standards requiring that cooling water intake structures reflect the best technology available. In contrast, other provisions of the Act that mandate the establishment of technology-based standards, such as Sections 304 and 306, require EPA to consider costs, and those provisions further specify how costs are to be considered. <FN 95> Significantly, the United States Court of Appeals for the D.C. Circuit has consistently held that, without specific statutory authorization for considering costs, “the EPA is not permitted to consider the cost of implementing those standards” under the Clean Air Act. American Trucking Associations v. US EPA, 175 F.3d 1027, 1040 (D.C. Cir. 1999); see also Lead Industries Assoc. v. EPA, 647 F.2d 1130, 1148 (D.C. Cir. 1980). This is especially true where the other provisions of the same statute direct EPA to consider costs, as certain sections of the Clean Water Act do. In such cases, courts conclude that Congress only intended EPA to consider costs where it has explicitly so provided. Lead Industries Assoc., 647 F.2d at 1148. Under this authority, which applies with equal force to the Clean Water Act, EPA is statutorily precluded from considering compliance costs in the setting of Phase II BTA standards.

Despite the lack of explicit reference to costs in section 316(b), EPA has EPA has stated that “best technology available”’ should be interpreted as “best technology available commercially at an economically practicable cost"<FN 96> EPA appears to be equating role of costs under the BTA standard with the BAT standard, which is “best available technology economically achievable.” If EPA’s interpretation is correct, however, then EPA’s consideration of costs for BTA can be no more extensive than is permitted for BAT.

Congress’ goal to impose the strictest controls for existing facilities is manifested in the extent to which EPA may consider costs. In setting BAT standards, EPA may consider, among other factors, “the cost of achieving such effluent reduction,” 33 U.S.C 1314(b)(2)(B),but it cannot perform a cost-benefit analysis: “[I]f the effluent reduction is technologically feasible and economically achievable [to the industry as a whole], it must be employed.” 92 Cong. Rec. S.2770 (1972)(emphasis added).

Footnotes

95 See, e.g., Section 304(b)(l)(B): “Factors relating to the assessment of best practicable control technology currently available ... shall include consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved,” Section 304(b)(2)(B): “Factors relating to the assessment of best available technology shall take into account ...the cost of achieving such effluent reduction,” and Section 306: “In establishing ... Federal standards of performance for new sources.. .the Administrator shall take into consideration the cost of achieving such effluent reduction.”

96 EPA’s interpretation lacks support because it is not based not on any judicial authority or a reading of the plain language of the Act. Instead, it rests on a single statement in the legislative history and on EPA’s own preamble to the 1976 rule.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.024

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 9.01
Facility & firm-level costs/Econ. Practicability

Technology is economically achievable if affordable by an industrial category as a whole. See Du Pont v. Train, 430 U.S. 112, 126-30 (1977). “In promulgating nationwide pollutant effluent limitations the EPA need not consider the hardship faced by a particular plant.” Chemical Mfrs. Ass’n v. EPA, 870 F.2d at 236. Nor should it. See Du Pont, 430 U.S. at 128-30; American Iron & Steel Inst. v. EPA, 526 F.2d 1027, 1051 (3d Cir. 1975).

EPA Response

Please refer to the response to comment 316bEFR.087.004.

Comment ID 316bEFR.404.025

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.04

Use cost-benefit tests

Several major U.S. industries, including the steel, chemical and mining industries, have filed lawsuits against the EPA's promulgation of effluent limitation guidelines, claiming that the agency had been unreasonable by failing to consider environmental compliance costs either in establishing technology guidelines or refusing to issue variances to such standards. In each instance, the EPA's steadfast refusal to give undue consideration to pollution control compliance costs was upheld by the courts.

Courts have upheld the BAT selected by EPA for a variety of industrial categories, even though EPA predicted that the BAT would cause economic displacement, including plant closures, associated job losses and other significant impacts. For instance, the Third Circuit upheld performance standards for existing sources, which are set in accordance with the procedures for BAT standards, even though "EPA estimated that compliance with the [standards] would force 14% of all indirect discharging plants to close and cause a 1.2% reduction in total industry employment." Chemical Mfrs. Ass 'n,870 F.2d at 250. As the court explained, "Congress clearly understood that achieving the CWA's goal of eliminating all discharges would cause 'some disruption in our economy,' including plant closures and job losses." Id. at 252. The Ninth Circuit has also upheld BAT that was projected to cause plant closures, observing, "Congress contemplated the closure of some marginal plants." See Association of Pacific Fisheries v. EPA, 615 F.2d 794, 818 (9th Cir. 1980);Rybacheck, 904 F.2d at 1291.

Furthermore, the BAT standard should represent "a commitment [by an industrial category] of the maximum resources economically possible to the ultimate goal of eliminating all polluting discharges." See EPA v. Nat' Crushed Stone Ass'n, 449 U.S. 64,74 (1980); see also NRDC v. EPA, 863 F.2d. at 1426.

The role of costs in BAT can be illustrated in contrast to the now-defunct BPT standards. To determine "best practicable technology," a cost/benefit analysis was appropriate. For such BPT standards, the Clean Water Act allowed EPA to consider, among other factors, "the total cost of application technology in relation to the effluent reduction benefits to be achieved from such application." 33 U.S.C. 0 1314(b)(l)(B). Thus, under the BPT standard, EPA considered cost as a function of effectiveness; when the cost to reduce additional effluent became disproportionate to the amount of reduction, the additional reduction was not required. Reynolds Metals Co. v. EPA, 760 F.2d 549, 554 (4 Cir.1985). As explained above, BPT was determined by averaging the best performing plants of various sizes, ages, and processes, and applying that average as the BPT standard for each industry at that time. Organic Chemicals and Plastics and Synthetic Fibers Category Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards, 52 Fed. Reg. 42522 (III)(A)(1) (to be codified at 40 C.F.R. 414,416.) This was Congress' concession to industry to allow facilities to update and comply with approaching BAT requirements.

However, even under the less stringent BPT standard, an industrial polluter could not escape complying with the regulations based solely on inability to bear compliance costs:

Because the 1977 limitations were intended to reduce the total pollution produced by an industry, requiring compliance with BPT standards necessarily imposed additional costs on the segment of the industry with the least effective technology. If the statutory goal is to be achieved, these costs must be borne or the point source eliminated.

EPA v. National Crushed Stone, 449 U.S. 64,78 (1980).

Thus, even under the less stringent BPT standard, costs must have a minor role and a strict cost-benefit test was not required. In Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177 (5th Cir. 1989), chemical manufacturers maintained that the cost-effectiveness of Best Practicable Technology rulemaking should be measured by a "knee-of-the-curve" test to determine the point at which costs rise steeply per pound of pollutant removed. Under such a test, they argued, the BPT rules were not cost-effective. In supporting EPA's interpretation of cost-benefit analysis and rejecting the chemical manufacturers' argument, the Court stated,

Congress intended Section 304(b) to give the EPA broad discretion in considering the cost of pollution abatement in relation to its benefits and to preclude the EPA from giving the cost of compliance primary importance.

Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177,204 (5th Cir. 1989) (emphasis added).

Senator Muskie, the principal Senate sponsor of the Clean Water Act, described the "limited cost-benefit analysis" employed in setting BPT standards as being intended to "limit the application of technology only where the additional degree of effluent reduction is wholly out of proportion to the costs of achieving such marginal level of reduction .. .."I Remarks of Senator Muskie reprinted in Legislative History of the Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress) Ser No. 93-1, p. 170 (1973) [emphasis added].

Following the phase-out of BPT, cost could be considered only if the total elimination of discharge is impossible and, even then, only with regard to establishing the appropriate level of reduction for the best within the industry-the BAT standard. Reynolds Metals Co. v. United States EPA, 760 F.2d 549,553 (4th Cir. 1985); Texas Oil & Gas Ass'n v. EPA, 161 F.3d 923,928 (5th Cir. 1998), quoting Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177,226 (5th Cir. 1989). Thus, for BAT (best available technology economically achievable) under Section 301, EPA must consider costs but no full cost/benefit test is permitted.

Because the standard applicable here is akin to the higher BAT standard, compliance cost is given even less weight. In American Iron & Steel Institute v. EPA, 526 F.2d 1027 (3rd Cir. 1975),members of the steel industry sought variances from BAT standards set by the EPA, claiming the cost of compliance was prohibitive. The Court, again relying on congressional intent, explained the standard for compliance cost analysis under BAT as follows:

In making the determination of 'best available' for a category or class, the Administrator is intended to apply the same principles involved in making the determination of 'best practicable' (outlined above), except as to cost-benefit analysis . . .While cost should be a factor in the Administrator's judgment, no balancing test will be required. The Administrator will be bound by a test of reasonableness. . . the reasonableness of what is 'economically achievable' should reflect an evaluation of what needs to be done to move toward the elimination of the discharge of pollutants and what is achievable through the application of available technology-without regard to cost.

Remarks of Senator Muskie reprinted in Legislative History of the Water Pollution Control Act Amendments of 1972 (Committee Print compiled for the Senate Committee on Public Works by the Library of Congress) Ser. No. 93-1, p. 170 (1973) (emphasis added). Finally, EPA must filly explain its cost analysis. See Kennecott, 780 F.2d at 456.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.026

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 9.01

Facility & firm-level costs/Econ. Practicability

Because the costs of closed-cycle cooling are minimal, and could readily be absorbed by the energy industry or passed on to consumers <FN 97> are marginal. In other words, closed-cycle cooling is economically achievable. That ends the cost inquiry.

Footnotes

97 As explained above, an all cooling tower rule would raise electricity prices by one-tenth of one cent per kilowatt hour, or 0.66 percent over current prices

EPA Response

Please refer to the response to comment 316bEFR.087.004.

Comment ID 316bEFR.404.027

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Technology years ago advanced to the point where impacts on waters of the U.S. from cooling water intake structures at existing power plants can be drastically reduced, as was both anticipated and required by the Clean Water Act. <FN 98> Aquatic and other environmental impacts from closed-cycle cooled stations are negligible. By reducing cooling water intake volume and fish kills by more than an order of magnitude, closed-cycle cooling clearly represents the best capacity technology available for minimizing adverse environmental impact, and the key component of the BTA determination. EPA has no discretion to disregard such an effective and proven technology in determining BTA.

Footnotes

98 33 U.S.C. 1251(a)(1)(goal to eliminate discharges into waters of the United States by 1985).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.028

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

THE PHASE II PROPOSAL FAILS TO MINIMIZE DAMAGE TO THE NATION'S AQUATIC AND MARINE RESOURCES IN VIOLATION OF THE CLEAN WATER ACT

The Clean Water Act requires EPA to determine the best technology available for minimizing the adverse environmental impact of cooling withdrawals, and set such technology as a national standard. The Phase II Proposal does neither. The performance standards fail to reflect the best technology available-in fact they recognize and permit the worst technology by far with respect to water withdrawal capacity-and the proposed site specific option obviates the national applicability of any such standards.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.029

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 7.02
Performance standards

The proposed BTA standard for in-scope facilities (i.e., those with intake flows of at least 50 mgd) is as follows:

- All facilities must reduce impingement 80 to 95 percent from the "calculation baseline";<FN 99> and

- Facilities must also reduce entrainment 60 to 90 percent from the "calculation baseline," unless their capacity utilization rate is less than 15 percent, or their design intake flow is less than five percent of the mean annual flow from a fresh water river or stream, in which case they have no entrainment standard.<FN 100>

These standards, however, apply only to facilities that choose the compliance alternatives referred to as Track I and Track II.<FN 101> Permit applicants may instead seek a site-specific BTA determination under Track III.<FN 102> Furthermore, under any of the three tracks, applicants may meet the applicable performance standard with "restoration measures" in lieu of technologies, if the restoration will result in comparable increases in fish and shellfish in the watershed. <FN 103>

Footnotes

99 The calculation baseline was defied at proposal as a once-through cooling system with no impingement or entrainment coqtrols. 67 Fed. Reg. at 17141. In the NODA, EPA has proposed a revised definition, which is discussed below.

100 Id. There are slightly different standards for lakes and reservoirs, other than the Great Lakes. 40 CFR Q 125.94(b)(4) [proposed].

101 Under Track I, an applicant may demonstrate that existing "design and construction technologies, operational measures, and/or restoration measures meet the performance standards." 40 CFR Q 125.94(a)(l) [proposed]. Under Track II, an applicant may demonstrate that existing and proposed "design and construction technologies, operational measures, and/or restoration measures meet the performance standards." 40 CFR 125.94(a)(2) [proposed].

102 40 CFR Q 125.94(a)(3)and (c)(l) [proposed]. To get a site-specific BTA determination, applicants must show that either (1) their compliance costs would be "significantly greater" than those EPA considered in promulgating these regulations; or (2) their costs would be "significantly greater" than the benefits afforded.

103 40 CFR 125.94 (d)[proposed].

EPA Response

For a discussion of the available compliance alternatives authorized by today's rule, please see the preamble.

Comment ID 316bEFR.404.030

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Author Name Reed Super

Organization Riverkeeper, Inc.

This proposed BTA "standard" is illegal, both in the approach EPA took to select it and in the result. Furthermore, the compliance options negate any semblance of a national technology standard. EPA's Phase I1 Proposal violates the law and is unsound environmental regulation in at least the following respects:

- The "performance standard" is set with reference to technologies less protective than the best available, in contravention of CWA section 316(b) BTA requirement and the Clean Water Act's technology-forcing mandate.

- EPA employed a cost-benefit test (the "maximize net benefits" approach) to select BTA, thereby violating the Clean Water Act and Executive Order 12866,which require minimization of environmental impacts and prohibit cost-benefit analyses.

- Restoration measures cannot be used in lieu of technologies in a Clean Water Act technology-based requirement because they are not technologies that minimize impacts and they cannot reverse the damage caused by CWISs.

- Track III, which includes both an economic and a ecological variance, is unauthorized and illegal.

EPA Response

EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.404.031

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA must substantially revise its Phase II regulation to require facilities to reduce their cooling water intakes capacity to a level commensurate with closed-cycle cooling, must not allow restoration measures as a compliance option, and must only allow variances consistent with statutory and Supreme Court precedent. Any other result would be an abuse of discretion and not in accordance with law.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.032

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

Author Name Reed Super

Organization Riverkeeper, Inc.

THE NATIONAL TECHNOLOGY-BASED PERF'ORMANCE "STANDARD" DOES NOT REFLECT BTA IN PROCESS OR PRODUCT.

The 60 to 90 Percent Entrainment Reduction and 80 to 95.Percent Impingement Reduction Standards Are Based on Less Protective Technologies than the Best Available.

The proposal violates the Clean Water Act by basing the national BTA performance standard on technologies less effective than closed-cycle cooling, i. e. by continuing to allow once through cooling. EPA purports to require a 60 to 90 percent reduction in entrainment from the calculation baseline,"<FN 104> but the operative standard is the bottom of the range, i.e., 60 percent. This is because the proposed rule requires only technologies within or above the range, so any level of performance within the range, including 60 percent, would suffice.<FN 105>

Footnotes

104 40 CFR 125(b)(3) [proposed]. For facilities with a capacity utilization rate of less than 15 percent, and for facilities whose design intake flow is less than five percent of the mean annual flow of a fresh water river or stream, there is no entrainment standard at all. 40 CFR Q 125(b)(2) [proposed].

105 EPA set the lower end of the range (60 percent) to account for sites where the fragility of species would make them susceptible to perishing when coming in contact with the very technologies designed to protect them. The upper end of the range (90 percent) represents the maximum achieved with the technologies on which the standard is based. EPA is considering, but has not included in the Phase II Proposal, a requirement that.facilities achieve the greatest reduction, within the range, that is possible at their site. 67 Fed. Reg. 17141-17142. Unless and until such requirement is included in the rule, facilities have no requirement to reduce entrainment by more than 60 percent. EPA's anticipation that "facilities will select technologies or operational measures to achieve the greatest cost-effective reduction possible (within today's proposed performance range)," 67 Fed. Reg at 17142, is naive. As they have for decades, generators will much more likely seek to minimize section 316(b) compliance costs as much as possible.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.033

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 17.03.03
Benefits of reduced intake capacity

EPA acknowledges that closed-cycle cooling would reduce entrainment significantly more than the 60 percent standard:

[C]losed-cycle, recirculating cooling systems (e.g. cooling towers or ponds) can reduce mortality from impingement by up to 98 percent and entrainment by up to 98 percent when compared with conventional once-through systems.<FN 106>

Furthermore, cooling towers are not only more effective, but are also more reliable (i.e., more certain in their effectiveness), as EPA has also acknowledged:

Installed technologies may not operate at the maximum efficiency assumed by EPA in its estimates of technology effectiveness.<FN 107>

The only technology effectiveness that is certain is reductions in impingement and entrainment with cooling towers.<FN 108>

Footnotes

106 67 Fed. Reg. 17142.

107 67 Fed. Reg. 17192.

108 Id.

EPA Response

See response to comment 316b.404.034.

Comment ID 316bEFR.404.034

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 17.03.02

RFC: EPA rationale to not require closed-cycle

Despite the clear superiority of cooling towers, EPA did not set the performance standard based on a closed-cycle recirculating cooling system.<FN 109> In light of the significant difference in effectiveness (98 percent <FN 110> compared to 60 percent), and the certainty afforded by cooling towers (fish kills are reduced in proportion to volume; other technologies are affected by a variety of poorly-understood factors), the 60 percent standard violates the Clean Water Act's best technology mandate.

The entrainment performance standard in the Phase II Proposal violates the Clean Water Act because EPA based it on technologies far more destructive than those in place at the best performing plants. In other words, the standard does not reflect BTA. Simply put, cooling towers are the best technology, while filter barriers, screens, and the like, are not. In fact, such barriers and screens do not address withdrawal capacity, the critical factor in entrainment, at all; instead they may be and should be a component of BTA in conjunction with closed-cycle cooling, as many U.S. power plants already do. Instead, the Phase II proposal would continue to allow once through cooling-the worst technology with respect to capacity-at all in scope facilities.

Footnotes

109 67 Fed. Reg. 17142. EPA based the entrainment standard on aquatic filter barrier systems, fine mesh wedgewire screens, fine mesh traveling screens with fish return systems, seasonal flow restrictions, variable speed pumps and other operational measures. EPA admits that full-scale performance data are not available for entrainment reduction. Id. While a closed-cycle cooling tower would meet the performance standard (see 40 CFR § 125(b)(l) [proposed] and 67 Fed. Reg.17142), it is not required.

110 Even the lower bound of cooling tower effectiveness, 70 percent in saline waters where State regulations limit recirculation, is still significantly better than 60 percent. And as Pisces notes, the saline waters where cooling towers reduce withdrawals less also limit the effectiveness of the alternate technologies EPA relies on. Pisces Phase II Report at pp. 39-45.

EPA Response

The commenter misrepresents the range of entrainment reduction typical of cooling towers in marine environments and of those technologies forming the basis of the final rule. The technologies forming the basis of the final rule will realize an entrainment reduction in the range of 60 to 90 percent, as documented and described in the efficacy discussion of the Technical Development Document for the final rule. The typical recirculating wet cooling tower will realize a reduction in entrainment ranging from 85 to 95 percent (see EPA-821-R-01-036), dependent on the waterbody type. And therein lies a flaw in the commenter's logic: they fail to consider that in estuarine and ocean environments that cooling towers do not always operate at a comparable level as in freshwater. As such, in the areas in most need of entrainment reduction, in the Agency's opinion, the comparison of cooling towers to those technologies forming the basis of this final rule is dramatically different than the unscientific and misleading comment. For marine environments, the true comparison of the range of expected entrainment reductions is 85 to 92 percent for cooling towers versus 60 to 90 percent for the intake technologies forming the basis of the final rule.

See response to comment response 316b.EFR.404.018 for more discussion of why cooling towers are not the best available technology for retrofitting to existing plants.

Comment ID 316bEFR.404.035

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 7.02

Performance standards

The proposal's impingement reduction standard of 80-95%, which is effectively an 80% standard, also falls short of BTA for several reasons including, but not limited to, that by optimizing just one factor, capacity, closed-cycle cooling towers reduce impingement of all species by approximately 98% or more. In addition to closed-cycle cooling other impingement controls in the form of protective screening and fish return systems can be installed-as they already are at many closed-cycle facilities-which will reduce impingement by a far greater percentage than EPA's proposed performance standard.

EPA Response

EPA agrees with the commenter that minimizing flow will often achieve the greatest reduction of both impingement and entrainment. EPA has not, however, selected closed-cycle cooling as a component of today's final rule. EPA believes the performance standards in today's final rule are both economically and technologically achievable by most Phase II existing facilities while achieving the desired level of protection for aquatic communities.

Comment ID 316bEFR.404.036

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 21.04

Determination of compliance

EPA's Calculation Baseline Is Problematic.

In the NODA, EPA proposes the following new regulatory language:

Calculation baseline means an estimate of impingement mortality and entrainment that would occur at your site assuming (1) the cooling water system has been designed as a once-through system; (2) the opening of the cooling water intake structure is located at, and the face of the standard 3/8-inch mesh traveling screen is oriented parallel to, the shoreline near the surface of the source water body; and (3) the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment.<FN 111>

No calculation baseline is necessary for the Phase II rule. In fact, none was included in then Phase I rule, which properly expressed its BTA standards in terms of (1) maximum intake capacity commensurate with a closed cycle cooling system; and (2) a maximum intake velocity of 0.5 feet per second. See Phase I Rule, Track I. Likewise, in the Phase II rule, EPA should establish BTA capacity and velocity limits based on closed-cycle cooling with low velocity intakes, which would comply with the Clean Water Act and would obviate the calculation baseline. Closed-cycle cooling reduces impingement and entrainment by approximately 95% at every facility, as compared to operation of the same facility with once-through cooling. Thus, it is not necessary to define a hypothetical baseline facility for comparison.

Nevertheless, if EPA promulgates Phase II BTA standards in terns of percentage reductions, as it proposes, then some baseline is necessary from which to calculate the percentage reductions. In defining this baseline, for equity and consistency purposes, it is crucial not to give facilities credit for illusory reductions. For this reason, the new operational definition is a good one: “the baseline practices and procedures are those that the facility would maintain in the absence of any operational controls, including flow or velocity reductions, implemented in whole or in part for the purposes of reducing impingement mortality and entrainment.” If EPA’s hypothetical baseline plant could be assumed to be withdrawing cooling water at full capacity 24 hours a day, 365 days a year (whereas even many baseload plants run only 55 -70% of the time), then applicants could take substantial impingement and entrainment reduction credit (as much as 50% or more) for doing nothing other than operating according their normal business practices. That would further skew comparisons with closed-cycle cooling, which reduces impacts by 95% at every operational level. However, in practice it may be difficult to.

The baseline issues of intake location, orientation and screens are more complicated. As the Pisces Phase II and NODA Report points out, many facilities locate their intake structures below the surface and/or offshore for reasons other then reducing impingement and entrainment, such as to withdraw colder water, to maintain cooling flows during low water, or to account for significant tides.<FN 112> Thus, EPA’s definition will allow for impingement and entrainment reduction credit for what is nothing more than normal plant design. (Note that reductions from offshore intakes are not certain, as it is feasible for offshore intakes to catch as many, if not more, fish than an onshore intake, particularly in marine environments.)<FN 113> The problem is best illustrated with comparison to the reductions offered by closed-cycle cooling. Cooling towers will reduce impingement and entrainment by 95% at plants with onshore, offshore, deep water, shallow water intakes and at those with 3/8-inch traveling screens and every other kind of screen. Thus, there is no issue as to whether or not to credit the other various design and operational features which may cause reductions in impact.

Moreover, in addition from these import conceptual problems, there is a very tangible practical problem which makes EPA's calculation baseline impossible (or at least extraordinarily difficult) to implement in the context of a permitting proceeding. Unless a facility has been in fact built exactly like the hypothetical baseline facility, there is no way to accurately or reliably determine baseline impingement and entrainment. As Pisces explains, the variations caused by small changes in intake configuration can be very large or negligible and are very difficult to quantify, requiring considerable background knowledge of the local fisheries populations. Consider a facility with a deep water, offshore intake with Ristroph screens. Implementation of the performance standard and calculation baseline approach set forth by EPA will require permit writers to ascertain what the hypothetical baseline facility with an on-shore surface intake with 3/8 inch traveling screens would be. It addition, the permit writer would have to determine what operational characteristics the facility ''would maintain in the absence of any operational controls," which may also be difficult or impossible to determine. Then the permit writer must calculate the percentage reductions in impingement and entrainment resulting from the differences in plant configuration and operation (if any). If these reductions do not meet the performance standards, then the permit writer must determine whether proposed technologies or measures will provide the additional reduction (which, as we explain elsewhere, is in itself an impossibly difficult and uncertain task).

The "as built" approach EPA is considering would be an improvement in that it would not rely on hypothetical calculations. In addition, since cooling towers would reduce impingement and entrainment by 95% of all once-through facilities as they are currently built, a logical and consistent approach would be to require the percentage reductions as compared to the "as built" condition for all once-through facilities. In such approach, the facilities would simply conduct impingement and entrainment monitoring and then be required to reduce those levels by the performance standard percentages. Although it would not give credit for intake structure location or configuration, this would provide a consistent basis for comparison with cooling towers which provide roughly the same percentage reductions at all plants.

Footnotes

111 68 Fed. Reg. At 13581.

112 Pisces Phase II and NODA Report 1.2.

113 Id.

EPA Response

As discussed in the NODA, EPA considered many suggestions for the approach to determining the calculation baseline, and has clarified its definition of calculation baseline in today's final rule (see §125.93). For additional explanation of EPA's definition of calculation baseline, please refer to EPA's response to comment 316bEFR.034.013. EPA agrees that the "As-Built" approach is an acceptable method for establishing the calculation baseline. Therefore, a facility may choose to use the current level of impingement mortality and entrainment as the calculation baseline (see EPA's definition of calculation baseline at § 125.93).

Comment ID 316bEFR.404.037

Subject Matter Code 2.04.04

Use cost-benefit tests

Author Name Reed Super

Organization Riverkeeper, Inc.

EPA and OIRA's Cost-Benefit Analysis Is Fundamentally-Flawed and Such Analysis May Not Legally Be Used as the Decision Criteria for BTA Determinations.

EPA Phase II Proposal, as modified by the NODA, relies heavily on cost-benefit analysis. At proposal, after attempting to estimate the total benefits and compliance costs of the proposed alternatives, EPA chose the option predicted to have the greatest net benefit. EPA thus replaced the Clean Water Act's BTA mandate with a cost-benefit decision-making criterion. Such use of cost-benefit analysis is not authorized by law; in fact, it is prohibited for BTA determinations. In determining BTA standards, EPA is required to give compliance costs no more than a minor role and may not use a cost-benefit analysis to mandate technologies less than the best available.

Furthermore, EPA's benefits analysis is deeply flawed in principle and in its lack of completeness. It significantly undervalues the environmental benefits of preventing fish kills. Indeed, it is impossible to represent environmental conservation in solely monetary terms.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.038

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Cost-Benefit Analyses Are Inappropriate for Environmental Harms and Benefits.

Cost-benefit analysis for environmental regulations is deeply flawed and invariably produces biased and misleading results. Unlike compliance costs, which can be readily estimated, the environmental benefits-preventing the needless diminution of aquatic and marine fauna, and all the ecosystem effects-cannot and should not be monetized. Any attempt at monetizing environmental benefits will necessarily suffer from several systemic problems.<FN 114>

First, it is not possible to realistically value the benefit of healthy marine and aquatic faunal populations. Ecosystems are immensely complex systems. There is insufficient data to fully understand these systems and identify the benefits they provide, let alone to quantify them. It is an absurd conceit to attempt to accurately estimate the value of ecological integrity given the geologic time frame for the contribution and longevity of functioning ecosystems. Instead, if something cannot be quantified, cost-benefit practitioners ignore it and therefore assume it is equal to zero, as EPA has repeatedly done in the proposed rule.

Similarly, some environmental benefits such as support for human life and civilization, as well as goals such as happiness, security and aesthetic pleasure are impossible to monetize. Failing to account for such assets leads to absurd results. Cost-benefit analyses have been used to argue that cigarette smoking should be subsidized because shorted lives would decrease national health care costs for an aging population, and that standards for preventing exposure to lead by children are too high.<FN 115>

Third, by discounting long-term benefits, cost-benefit analyses trivialize the future and make environmental restoration seem cost-ineffective. But the very nature of environmental protection is to invest now to protect resources for coming generations as well as the present. But by discounting future benefits, cost-benefit analyses make any project that does not have an immediate payoff worthless. For example, some benefits of planting a tree will not come for many years until the tree had grown enough to provide fruit, shade, habitat, aesthetic pleasure, etc. But discounting those benefits may make them so small in present dollars that it never seems cost-effective to plant a tree, when it is obvious that such is not true.

Fourth, basing regulations on cost-benefit ignores transfers of costs and therefore misallocates social resources. Comparing total costs to total benefits without regarding who pays the costs and who gets the benefits allows the power industry to continue transfer its costs on the rest of society and the environment. One result of killing fish is that fisheries become stressed, and commercial fishers are put out of work. Cost-benefit analysis does not take this into account.

Finally, the cost-benefit analysis ignores the determination, reflected in repeated Clean Water Act mandates including section 316(b), that degradation of aquatic and marine ecosystems is unnatural and unnecessary for our survival and prosperity. Instead, it presumes the massive aquatic mortality caused by power plants as the baseline, and requires a demonstration of effectiveness simply to avoid unnecessary destruction and restore a more natural ecological function. The burden should be on power plants to prove why they should be allowed to appropriate wildlife from that system for their own purposes.

Thus, cost-benefit analysis of environmental degradation is fundamentally flawed conceptually. But even assuming arguendo that such analysis could be useful, EPA's estimate for the Phase II Proposal is hopelessly incomplete and inaccurate.

Footnotes

114 For a more detailed critique of cost-benefit analysis of environmental degradation, see Heinzerling & Ackerman, Pricing the Priceless: Cost-BenefitAnalysis of Environmental Protection, Georgetown Environmental Law and Policy Institute (2002).

115 Id. citing W. Kip Viscusi, "Cigarette Taxation and the Social Consequences of Smoking," Working Paper No. 4891,33 (National Bureau of Economic Research, October 1994); and Randall Lutter, "Valuing Children's Health: A Reassessment of the Benefits of Lower Lead Levels" AEI-Brookings Joint Center for Regulatory Studies Working Paper 00-02, at 3 (March 2000).

EPA Response

See EPA's response to comment #316bEFR.206.047 on incompleteness of EPA's analysis of the benefits of reduced cooling water intake.

See EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.404.039

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

EPA's Cost-Benefit Analysis is Hopelessly Biased, Inaccurate and Useless.

As Dr. Ackerman explains in two comment letters on the Phase II Proposal and NODA, respectively, EPA's analysis of the benefits of reduced cooling water intake is seriously incomplete, and can be considered as no more than an extreme lower bound on the complete benefits. Cost-benefit analysis is designed to weigh the relevant costs of a proposal against the corresponding benefits. This process cannot yield a meaningful result unless the calculations of costs and benefits are both complete. In the private sector, a balance sheet that weighs all of a company's income against some of its expenditures does not provide a useful picture of the company's true financial condition. Likewise, in the public sector, a comparison of complete costs and incomplete benefits does not provide an accurate picture of net benefits to society. <FN 116>

EPA has, however, produced a comparison of complete costs and incomplete benefits in this case. The costs of reducing the impacts of cooling water intake are monetary costs for marketed goods and services, such as production and installation of screens, cooling towers, and other equipment, and as a result there are no categories of costs which are intrinsically difficult to express in monetary terms. <FN 117>

In stark comparison, the calculation of the benefits of reducing cooling water intake consists of reduced damage to aquatic ecosystems, which is difficult to measure and monetize. EPA's analysis focuses only on valuing the benefits of killing fewer fish, which is itself a complex problem. Market prices are available only for a few commercially valuable fish species, and commercial prices do not necessarily capture all the value of avoided fish mortality. Furthermore, avoided fish kills are far from the only significant benefits of reduced ecosystem damages, since many other organisms and environmental services are also affected. <FN 118>

In the preamble to the Phase II Proposal and in the supporting Economic Benefit Analysis (EBA), EPA lists the categories of benefits that have been omitted, and the reasons why the environmental impacts of cooling water intake structures the benefits of regulating them have been significantly underestimated:

- Facility-provided monitoring data, the basis for EPA's analysis, typically focus on only a subset of the species impacted by impingement and entrainment (&E), thus underestimating total losses.

- Monitoring data often pertain to conditions existing many years ago, before the Clean Water Act had improved aquatic conditions; if the numbers and diversity of fish were depressed by degraded water quality, estimates of I&E losses would be similarly low.

- Cumulative impacts of multiple facilities on the same fish population are often important, but have been considered only to a limited extent.

- Estimated recreational and commercial values include only the proportion of I&E losses that would have been caught, typically less than 20 percent of I&E mortality of recreationally and commercially valuable species.

- Secondary economic impacts such as effects on marinas, bait sales, and property values have not been included.

- Losses of invertebrate species such as lobsters, mussels, crabs, and shrimp were not included, even though these include commercially valuable species.

- Effects on fish-eating (piscivorous) birds were not included.

- Current fishing mortality rates often reflect already-depleted fisheries, as for example in the case of winter flounder near the Brayton Point facility, one of the EBA case studies.

- Forage species, accounting for the predominant share of I&E losses, are poorly documented, and their full ecological value to the food web is not considered.

- Non-use benefits are estimated only for recreational users, not for the population as a whole.

- Thermal impact reductions are not accounted for in some options, such as replacement of once-through cooling with cooling towers.<FN 119>

In addition, another portion of the EBA, Case Study Chapter A11, re-examines the areas of incompleteness from a different perspective, focusing on the ecological services that are disrupted by I&E, but are not addressed by conventional valuation methods. As explained in the EBA, those omitted or undervalued services include:

-decreased numbers of ecological keystone, rare, or sensitive species; decreased numbers of popular species that are not fished, perhaps because the fishery is closed;

- decreased numbers of special status (e.g., threatened or endangered) species; increased numbers of exotic or disruptive species that compete well in the absence of species lost to I&E;

- disruption of ecological niches and ecological strategies used by aquatic species;

- disruption of organic carbon and nutrient transfer through the food web; disruption of energy transfer through the food web;

- decreased local biodiversity;

- disruption of predator-prey relationships.

- disruption of age class structures of species;

- disruption of natural selection processes;

- disruption of public uses other than fishing, such as diving, boating, and birding; and

- disruption of public satisfaction with a healthy ecosystem.<FN 120>

In addition to these admissions by EPA, the scientists at Pisces have identified other areas of undervaluation in EPA’s benefits analysis. These issues are explained in the Section 3 of the Pisces Phase II and NODA Report, submitted herewith, and in Part IV .of these comments, below. The lists of omissions and underestimates presented here clearly demonstrate the incompleteness of the benefits analysis in this case. Complete costs are being compared to a limited subset of benefits, causing environmental protection to appear as though it is not cost effective, when in fact it is. As Dr. Ackerman explains, “All that can be concluded from this misleading, incomplete comparison is that true, complete benefits must he larger, and net social benefits larger as well, for each of the various options under consideration."<FN 121>

In the NODA, EPA has discarded much of its previous methodology for calculating monetized environmental benefits. In fact, most of the NODA is devoted to explaining EPA’s proposed new benefits methodology. As Dr. Ackerman explains in his NODA Comments, submitted contemporaneously herewith, while some of the NODA’s adjustments respond directly to Dr. Ackerman’s criticisms of the original analysis, additional methodological problems introduced in the NODA make it difficult to draw clear conclusions about whether EPA’s analysis has, on balance, improved.

Among other problems with the NODA methodology, Dr. Ackerman notes that EPA’s nonuse valuation of fish affected in the Peconic Bay estuary is highly incomplete; EPA inappropriately limits the geographic scope of its nonuse benefits analysis; and the NODA fails to consider key biological facts, including interdependence among species and precarious stock status for many populations. Minimal requirements for completing the analysis EPA has begun should include developing a use value for unharvested fish and completing the meta-analysis of existing studies on nonuse value. In addition, EPA must avoid placing an effective value of zero on categories of value the Agency does not have time or resources to analyze in detail. <FN 122> After careful review of the NODA, Dr. Ackerman concludes:

even if one accepts cost-benefit analysis as an appropriate means to determine the appropriate level of regulation for power plant cooling water intake systems, the magnitude of the omissions in the NODA renders the exercise meaningless. The difficulties encountered in the attempt at monetization of benefits underscore the need for other approaches to evaluation of policy options.

the shortcomings of the NODA illustrate the flaws in the methodology that EPA is now pursuing. The task of quantifying benefits will require significant further analysis, and involves methodological quandaries that will not be resolved easily. In our opinion, by converting its regulatory mandate into a lengthy and methodologically questionable program of data collection and analysis, EPA has failed to meet its responsibilities under the Clean Water Act.<FN 123>

Footnotes

116 Ackerman Phase II Comments, Section 1.

117 Id.

118 Id.

119 Id. at pp. 4-5 citing EBA Chapter C1.

120 Id., citing EBA Case Studies, p. A1 1-2. In addition, though not acknowledged by EPA, its benefits analysis is also incomplete in that it makes no attempt to analyze or quantify the monetary benefits to the economy resulting from the investment by regulated companies in the environmental protection goods and services sector of the economy. In other words, if a company spends $1 million dollars to protect wildlife, that cost not only produces the wildlife protection benefits, but also provides jobs and income to the employees and firms that will design and build cooling towers, install other protective devices, and monitor their performance. It will also spur technological innovation and the development of new products and services that can be marketed worldwide.

121 Id at p. 6.

122 Ackerman NODA Comments

123 Id., at 1-2

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of reducing environmental impacts from CWIS. It was not possible to develop a comprehensive value of entrained and impinged fish to an ecosystem due to the lack of available monitoring data by many facilities, the difficulties in characterizing all biological effects relevant to the affected ecosystems and the limited availability of valuation data. EPA attempted to reduce any potential misinterpretation of its benefits results by conducting a careful qualitative assessment of potential benefits and characterizing inherent limitations and uncertainties present in the benefits analysis prepared for the final Section 316(b) regulation. For detail, see Chapter A9, Economic Benefit Categories and Valuation Methods, in the regional study document prepared for the analysis for the final Phase II rule (DCN #6-0003). See also response to comment 316bEFR.206.047.

EPA also agrees with the commenter that comprehensive, appropriate estimates of total resource value should include both use and non-use values, such that the resulting total value estimates may be compared to total social cost. For the final 316b rule analysis, the Agency has provided several measures that indicate the potential magnitude of non-use values, including a peer-reviewed meta-analysis, the benefit transfer method, and break-even analysis. For detail on non-use valuation methods considered in the context of the final 316(b) regulation, see Chapters A12, C6, D6, and G6 in the final Phase II Regional Studies Document (DCN #6-0003); Chapter D1 of the final Phase II EBA document (DCN #6-0002) presents the break-even analysis. EPA has not included quantitative measures of nonuse values in the final 316(b) rule benefits cost analysis due to unavoidable uncertainty in monetizing non-use values for this rule.

Comment ID 316bEFR.404.040

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The Use of Cost-Benefit as the Decision-Making Criterion Violates the CWA and EO 12866 Because the Law Requires Minimization of Adverse Environmental Impact, Not Maximization of Economic Benefit.

As explained above, Clean Water Act Section 316(b) requires EPA to adopt section 301 and 306 standards (ie., mandatory limitations to be included in NPDES permits) governing cooling water intake structures. Further, these standards must reflect best technology available to minimize adverse environmental impact. This is the approach mandated by the relevant statutory authority.

In contravention of that statutory authority EPA, at the behest of OIRA, used the “maximize net benefits” approach instead of the statutorily-mandated approach. It is apparent that this was the approach used, because EPA rejected an alternative option (Federal Register Option 3 / EBA Options 1 and 2) even though it reduced impacts to a greater degree than the proposed option and was cost-effective, i.e.,, benefits outweighed costs by a 3:2 margin, yielding net benefits of $255 million.<FN 124> EPA’s stated rationale for rejecting this option was as follows:

EPA notes that the incremental costs of this option relative to the proposed option ($413 million) significantly outweigh the incremental benefits ($146 million).<FN 125>

Put another way, EPA chose the proposed option because it had greater net benefits (using EPA’s flawed calculations) that the waterbody/capacity based closed-cycle option. That is the maximize net benefits approach.

Furthermore, it is clear that EPA adopted that approach because OIRA insisted upon it. The record clearly demonstrates that EPA had intended to propose the waterbody/capacity based closed-cycle option (Federal Register Option 3 / EBA Options 1 and 2), but was prevented from doing so by OIRA.<FN 126>

The fact the OIRA would seek to apply a “maximize net benefits” approach is perhaps not surprising since OIRA acts pursuant to Executive Order 12866, which refers to such an approach in its “Statement of Regulatory Philosophy and Principles.” However, what this section of the Executive Order says is:

In choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts and equity), unless a statute requires another regulatory approach.<FN 127>

In this case, the statute clearly requires another regulatory approach. As explained in great detail in Part II, above, the Clean Water Act requires the imposition of a series of increasingly-stringent, technology-based controls to ratchet down water quality impairments as close to zero as possible. Costs play a minor role in EPA’s best technology determinations. In promulgating BTA standards, EPA must minimize adverse environmental impacts, and costs are only relevant to the determination of whether the technology that minimizes impacts is economically achievable, or wholly disproportionate to the benefit. Since that is the regulatory approach mandated by Congress in the Clean Water Act, the statute trumps the Executive Order and the maximize net benefits principle of the EO 12866 is-by its own terms-inapplicable to Section 316(b) regulations.

As a result, EPA has, at the direction of OIRA, violated not only the Clean Water Act, but the Executive Order as well. Furthermore, the Phase II Proposal violates Section 1(b)(7) of Executive Order 12866 which states that the Agency "shall base its decisions on the best reasonably obtainable scientific, technical, economic, and other information.. ." because much of the biological data and some of the economic literature (e.g., on non-use benefits) is decades out-of-date.

Lastly, despite its claims of transparency, OIRA is concealing documents concerning its evisceration of the rule in violation of Section 6(b)(4)(D) of the Executive Order which requires OIRA to make available to the public, after a notice of proposed rulemaking is published in the Federal Register, "all documents exchanged between OIRA and the agency during review by OIRA under this section." (Emphasis added.) OIRA has failed to place all documents exchanged between OIRA and EPA in its public docket, claiming that OIRA interprets "all documents" to mean only those documents exchanged between officials at SES-level or higher. <FN 128>

Footnotes

124 67 Fed. Reg. at 17158.

125 Id.

126 See Docket W-00-32, DCN # 4-4005 (OMB Review Draft for the Proposed Section 316(b) Rule for Large Cooling Water Intake Structures at Existing Power Generating Facilities) and Docket W-OO32, DCN # 4-4019 (Summary of Major Changes During Interagency Review).

127 Executive Order 12866 (September 30, 1993), 8 l(a) (emphasis added).

128 June 20, 2002 letter from OIRA Deputy Director Donald Arbuckle to Reed Super.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents. EPA has coordinated with OIRA in accordance with Executive Order 12866 and will complete any associated docketing requirements. EPA's final decisions with respect to this rule were made pursuant to, and consistent with the Clean Water Act. EPA has complied with all Administrative Procedure Act requirements regarding ex parte contacts during an informal rulemaking.

Comment ID 316bEFR.404.041

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 7.01.03

Option 3--Site-specific determination

THE COMPLANCE OPTIONS ARE ILLEGAL AND UNSOUND.

Despite describing the rule as a “national minimum ...technology-based performance requirement,"<FN 129> EPA has failed to set a national minimum standard for technology or performance. Instead of setting a protective, technology-based standard, the rule would adopt and codify many of the site-specific arguments which permittees typically use to avoid closed-cycle cooling requirements. Since even environmentally sympathetic regulators lack the resources needed to rebut, or in most cases fully evaluate, these arguments, the Phase II Proposal will allow applicants to continue to obstruct and delay needed technology upgrades.

The two primary components of the rule that circumvent the purported technology standard are: (1) allowing applicants to attempt to replace fish they kill through “restoration measures’’ instead of installing technology to reduce or eliminate (i.e. minimize) the impact; and (2) Track III, which allows applicants to obtain both a site-specific BTA determination and more lenient requirements than the national standard.

Footnotes

129 67 Fed. Reg. 17140

EPA Response

Please refer to the response to comment 316bEFR.206.050 and the preamble to the final rule.

Comment ID 316bEFR.404.042

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

Author Name Reed Super

Organization Riverkeeper, Inc.

Restoration Measures are Unreliable and Cannot Be Permitted In Lieu of CWIS Technology.

EPA is proposing to allow any and all in-scope facilities to use "restoration measures" in lieu of technology, whether they choose compliance option Track I (existing operation is BTA), Track II (existing plus proposed is BTA), or Track III (site-specific BTA determination).<FN 130> More specifically, the Phase II Proposal provides:

In lieu of, or in combination with, reducing impingement mortality and entrainment by implementing design and construction technologies or operational measures to comply with the performance standards specified in paragraph (b) of this section [for Tracks I and III or the Director's determination pursuant to paragraph (c) of this section [for Track III], you may, with the Director's approval, employ restoration measures that will result in increases in fish and shellfish in the watershed. You must demonstrate to the director that you are maintaining fish and shellfish within the water body, including community structure and function, to a level comparable to those that would result if you were to employ design and construction technologies or operational measures.. . <FN 131>

While such measures may beneficial in compensating for past harms to the aquatic environment, they cannot be used as a substitute for dry cooling because they do not constitute best available technology for minimizing adverse environmental impact from cooling water intake structures, which is what Section 316(b) requires. Furthermore, restoration measures do not replace or compensate for the fish killed by cooling water intake structures.

Footnotes

130 40 CFR § 124.95(a)(l),(2); 40 CFR 3 124.95 (cj(1)

131 40 CFR 9: 124.95(d).

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule. Also see EPA's response to comment 316bEFR.056.003.

Comment ID 316bEFR.404.043

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 11.0

Role of Restoration

Restoration Measures are Unreliable and Do Not Replace the Fish Killed By CWISs.

Restoring aquatic habitat for fish, wildlife, and plant species maybe a worthwhile and environmentally beneficial activity. Throughout the country, extremely large areas of aquatic habitat have been destroyed by development, primarily by filling open water and wetlands. Restoration measures, if successful, can provide some level of mitigation for such development activities. However, restoration measures, whether successful or not, cannot replace the fish killed by impingement and entrainment at power plants.

EPA Response

For a discussion of the role of restoration in the final rule, see EPA's response to comment 316bEFR.206.052 and the preamble to the final rule.

Comment ID 316bEFR.404.044

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 11.06
RFC: Performance/effectiveness of restoration

Habitat restoration measures have been employed most prominently in an attempt to mitigate impingement and entrainment at the Salem Nuclear Generating Station in New Jersey. It is therefore critically important to acknowledge that, as the Delaware Riverkeeper Network explained in its separately-submitted comments on the Phase II proposal, the mitigation experiment occurring on the Delaware at Salem is failing. PSE&G has been unable to demonstrate that its restoration effort for the fish kills at its Salem plan is providing any benefit whatsoever to the fish populations of the Delaware estuary. Thus, it cannot demonstrate that the restoration measures are in any way minimizing the impingement and entrainment of over three billion Delaware River fish. Indeed, PSE&G cannot even demonstrate that if it were successful in eradicating and/or controlling phragmites, that this success would be sustainable without continuous intervening action. In fact, the primary result of PSE&G's mitigation proposal is that the Salem facility continues to kill over three billion Delaware River fish a year while PSE&G is now also harming thousands of acres of marshland by spraying it with glyphosate only to have the targeted phragmites return. There has been no minimization of adverse impact at Salem, as required by section 316(b).

Because the PSE&G restoration project at Salem is being held up as a national model for section 316(b) compliance, it is important to understand why restoration and cannot address the concerns that section 316(b) is intended to address-i.e.. impingement and entrainment of fish. PSE&G's wetlands experiment involves restoring, enhancing and/or preserving 10,000 acres of what PSE&G characterizes as degraded wetlands. The majority of those wetlands are dominated by the phragmites plant; restoration efforts include herbicide application, mowing and prescribed burning in order to remove phragmites and replace it with spartina grasses. Some freshwater diked wetland are also being converted to salt marshes. The original argument supporting this program was that enhancement of these wetlands will increase fish production in the Delaware Estuary. PSE&G is, however, unable to demonstrate that their experiment, even if successful (which is doubtful at best), actually provides benefits to the estuary ecosystem. The numerous, fundamental problems with the restoration approach at Salem include the following:

PSE&G never provided scientific data indicating that food or habitat were limiting factors for the fish populations in the Delaware Estuary-and there is in fact no data or information that would indicate that this is in fact the case. Therefore, altering wetlands to increase food and habitat availability for fish is likely not to have any effect on fish populations in the estuary. <FN 132>

PSE&G's success criteria and evaluation methodology for its wetlands enhancement efforts do not include determining whether the fish populations of the River are benefiting from the wetlands restoration efforts. Instead their success criteria focus on change in vegetation coverage, algal productivity, macrophyte productivity, etc. <FN 133>

PSE&G has failed to demonstrate that even if it is successful at replacing the existing phragmites in these areas with other species of plants, that this change in vegetation is sustainable and will not be overrun by neighboring stands of phragmites within a matter of years.<FN 134>

PSE&G has failed to conduct the baseline data on the contributions of the phragmites stands to the food chain in order to make the necessary comparisons. It is very possible that the fish used the phragmites-dominated marshes in the same way and to the same degree as they would spartina-dominated marshes and therefore nothing has been truly gained by their efforts.<FN 135>

In fact, PSE&G's own data confirms, what other scientists have found, that phragmites-dominated marshes on the Delaware Bay contribute just as much basic nutrient material into the food web as spartina-dominated marshes. " As new data are generated, the general perception that regularly flooded phragmites marshes are less functional than the spartina marshes they replace does not appear to be upheld." <FN 136>

As a result, the Salem mitigation project, rather than being an example of why mitigation should be allowed, is actually a prime example of why it should not.

Footnotes

132 See Delaware Riverkeeper Network's comments on this rule.

133 Id.

134 Id.

135 Id.

136 Id., citing Judith S. Weis, Habitat and Food Value of Phragmites australis and Spartina alterniflora, printed in New Jersey Flows, Water Resoruces Institute, Vol. 1, No. 1, Fall 2000. That article explained: "Efforts to restore salt marsh areas by replacing the undesired Phragmites with the desired Spartina are often justified by the assumption that the productivity of animal populations will be enhanced. However, evidence from the studies reported here as well as those of others (e.g. Fell et al., 1998; Wainright et al., 2000) does not support the general assumption that Phragmites leaf detritus is of poorer nutritional quality for estuarine consumers than that of Spartina." Phragmites is native to North America and has been found to be a component of Eastern U.S. marshes for 2000 to 4000 years at least. Multiple studies document that "Phragmites production is equivalent to the role of alterniflora production in the diet of key estuarine species" and that it is consumed by fish in the marsh. Phragmites has also been found beneficial in other ways with benefits beyond those provided by Spartina. For example they release less contaminants back into the environment than Spartina. "In comparison to a Spartina community, Phragmites enhances both mineral and organic decomposition, basically doubling the accretion potential of the marsh." "Phragmites function may actually exceed that of other wetland plants in ameliorating certain estuarine dilemmas like eutrophication and marsh loss." Rooth and Windham, Phragmites on Death Row: Is Biocontrol Really Warranted?, Wetland Journal, Vol, 12, No. I, Winter 2000.

EPA Response

Please see EPA's response to comment 316bEFR.056.019.

Comment ID 316bEFR.404.045

Subject Matter Code 11.0

Role of Restoration

Author Name Reed Super

Organization Riverkeeper, Inc.

In the Pisces Phase II Report, submitted in August 2002, the scientists at Pisces discuss habitat restoration projects at length. Pisces begins by noting that while creation of a salt-marsh may replace the destruction of a salt marsh, like-for-like restorations for impingement and entrainment are impossible on the community level. <FN 137> Further, with any restoration project, there is a considerable time-lag, between the original damage and the establishment of the new resource at its full potential. NOAA's Habitat Equivalency Analysis (HEA) states: "The principal concept underlying the method is that the public can be compensated for past losses of habitat resources through habitat replacement projects providing additional resources of the same type". (NOAA, 1995). Thus the origin of the restoration concept is to be as compensation for finite, existing discrete and quantifiable losses, rather than justification for continuing and future loss.<FN 138>

Pisces also reviewed the data from the Salem restoration project, among others, and found as follows:

In summary, the project sought to replace lost productivity, rather than address losses at source of particular species, such as the bay anchovy. It is unclear whether the enhanced productivity in the restored saltmarsh will in fact move through the food web to increase the number of bay anchovy, and other pelagic spawning species. What is more, the increased productivity could favour other species less sensitive to impingement and entrainment than the anchovy, resulting in a change in the species balance and increased predation on the target species.. . [T]there is strong evidence that it does not, and was not intended to, fulfill its stated aim of equivalency with the losses at the Salem plant. <FN 139>

In addition, Pisces noted numerous other negative attributes of the Salem restoration project, including:

- Any 'new fish' that are produced by the converted saltwater wetlands will also increase the number of fish that will become impinged, entrained and killed by the power plant;

- PSE&G ignores the lost productivity of the destroyed freshwater marsh, which while as productive as a salt marsh, nevertheless provides important habitat for many species.

- The Salem Estuary Enhancement Program has had a negative impact on species, such as the horseshoe crab, which have dramatically declined since 1993.<FN 140>

In its report, Pisces also reviewed a recent power plant repermitting proceeding in Mono Bay on the California coast in which California Energy Commission rejected habitat enhancement measures in large part because it was unclear as to whether these enhancements would directly aid the species most affected by impingement and entrainment. <FN 141>

Pisces concluded that there are very serious limitations of habitat enhancement as a means of mitigation for entrainment and impingement, particularly:

- Habitat equivalency analysis is primarily aimed at offsetting past losses or damage, rather than continuing loss;

- Considerable uncertainty exists as to whether equivalence can be focused on actual species harmed;

- Potential lack of availability of sufficient habitat to adequately offset losses or damage.<FN 142>

In the Pisces Phase II and NODA Report, submitted herewith, Pisces considered the potential for success and the drawbacks of various forms of restoration measures, including fish hatcheries, habitat replacement, removing barriers to fish migration and undertaking water quality improvements. Pisces' detailed comprehensive discussion concludes that:

there are no proven pathways by which Entrainment and Impingement losses can be mitigated by habitat enhancement methods. There is a tendency to trade sensible and worthwhile goals such as wetland enhancement against impingement and entrainment losses. However, there is little evidence that the improved wetland aids the populations most impacted by the power plants.

The restoration measures outlined above can only partly mitigate for the losses caused by I&E. They produce an increase in a few target species and do nothing to mitigate for the loss of the other species impacted. In addition, they may have other ecological effects which tend not to be fully quantifiable until after the event.<FN 143>

The general availability of restoration measures renders the proposal's performance criteria ineffective because their effectiveness is typically doubtful and impossible to accurately estimate. Restoration simply cannot replace the aquatic organisms killed by power plants. By including restoration measures as a compliance option in lieu of technologies and operational measures, EPA would give a seal of approval (an EPA imprimatur), thereby misleading the state permit-writers, applicants, and the public into believing that these measures can be effective, when they are not.

Footnotes

137 Id.

138 Id.

139 Id.

140 Id.

141 Id.

142 Id.

143 Pisces Phase II and NODA Report, 2.

EPA Response

For a discussion of the uncertainties associated with restoration and of EPA's goals for restoration in the context of the final rule, see EPA's response to comment 316bEFR.206.055.

For a discussion of the some of the factors that should be considered when planning a restoration project, see EPA's response to comment 316bEFR.206.054. Permit applicants and permitting authorities should also consider the types of species and the number of organisms from each of those species a restoration measure is able to provide when assessing the feasibility of a restoration measure.

Comment ID 316bEFR.404.046

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.06

Restoration measures in place of technologies

Restoration Measures Cannot Play A Role In BTA.

The uncertainty and high failure rate of restoration measures-in addition to their inability to replace fish killed by impingement and entrainment-not only makes their inclusion in this rule poor policy, it is also a violation of the Clean Water Act. BAT requirements can not be predicated on an experimental technology. Rather, there must be at least one facility where the technology has been successfully employed. The same is true for BTA, which is substantially similar to BAT. In the case of restoration measures, EPA has no evidence of restoration measures having successfully replaced the fish killed by a power plant-certainly, there is no such evidence from Salem. As a result, restoration may not be a component of BTA.

Furthermore, restoration measures cannot legally be a component of BTA because such measures, such as fish hatcheries, fish restocking programs, removal of impediments to fish migration, and the enhancement or creation of wetlands are wholly unrelated to cooling water intake structures cannot be used to fulfill the requirements of section 316(b). Section 316(b)mandates that the location, design, construction and capacity of cooling water intake structures must reflect the best technology available. Restoration measures are not related to location, design, construction or capacity of-cooling water intake structures, and therefore cannot be a component of BTA. Rather these measures, when proposed in the section 316(b) context, seek to allow facilities to continue to indiscriminately kill life rather than make attempts to curb, or stop, the damage they are inflicting. As a result, they violate the mandates of section 316(b) of the Clean Water Act.

EPA Response

For a discussion of EPA’s authority to include restoration measures as an aspect of cooling water intake structure design technology in today’s rule, see section the preamble to the final rule as well as EPA's response to comment 316bEFR.056.003.

EPA acknowledges there are uncertainties associated with restoration measures (see EPA's response to comment 316bEFR.206.055). The requirements described in sections 125.94 and 125.95 of the final rule are intended to help reduce uncertainties associated with restoration measures and enhance their performance.

Comment ID 316bEFR.404.047

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 2.04.03

Define BTA as anything less than closed cycle

The Track III Variances (Both Economic and Ecological) Are Unauthorized and Illegal.

The Phase II Proposal contains includes two separate variances from the performance standards. In the Track III compliance option, applicants may seek a site-specific determination of BTA requirements for a particular site.<FN 144> There are two ways to obtain a site-specific determination:

- by demonstrating that the facility's "costs of compliance with the applicable performance standards ... would be significantly greater than the costs considered by the Administrator when establishing such performance standards" (the "economic variance"); or

- by demonstrating that the facility's "costs would be significantly greater than the benefits of complying with such performance standards" at the site (the "ecological variance").<FN 145>

These two variances are unauthorized and their availability in a categorical BTA rule is illegal for several important reasons: (1) these variances unreasonably deviate from the cost test EPA has applied for 30 years of 316(b) permitting determinations; (2) the variances are unauthorized under the Clean Water Act which makes no provision for variances from BTA standards and only limited provision for variance from BAT standards; (3) the ecological variance requires the same kind of biased and inaccurate cost-benefit analysis that EPA used in determining the standard, but on a local level. If, despite its superior resources and a lengthy rule-making schedule, EPA could not come close to providing a full and accurate monetization of benefits (see above), then state permit-writers will do an even more incomplete job with more limited resources and under the time pressure of a permitting proceeding; and (4) allowing permit standards for power plants to be determined on a site-by-site basis would allow industry to overwhelm state agencies and public intervenors with data that they will be hard-pressed to analyze, no less counter.

Footnotes

144 40 CFR 8 125.94(a)(3) [proposed].

145 40 CFR 8 125.94(2)(1)[proposed].

EPA Response

EPA disagrees. Today's rule in general, and the site-specific option in particular, will not impose a significant burden on states, tribes, local governments, environmental advocates, or the public. There is sufficient flexibility in the final rule that EPA expects facilities will use the site-specific compliance options infrequently.

Comment ID 316bEFR.404.048

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.07.01

RFC: Appropriateness of “wholly disproportionate”

First, the variances unreasonably deviate from EPA’s long-standing cost test. Even though section 316(b) contains no mention of compliance costs, EPA has always contended “that there should be some reasonable relationship between the cost of cooling water intake structure control and the environmental benefits associated with its use.”<FN 146> Based on a statement by one Congressman in the 1972 legislative history, EPA has long interpreted BTA to mean “best technology available commercially at an economically practicable cost.” In so doing, EPA claims to be implementing “congressional concern that the application of best technology available should not impose an impractical and unbearable burden.”’<FN 147> EPA has traditionally measured economic practicability by applying the “wholly disproportionate test” to compare the benefits of cooling water intake technology against marginal cost to the ratepayer, i.e., the incremental electricity cost. Under EPA’s traditional wholly disproportionate cost test, a cooling water intake structure technology would not be deemed to reflect BTA if the incremental costs of requiring the use of that technology are wholly disproportionate to the environmental benefits to be gained through its use.

But in the Phase II Proposal, EPA departs from the wholly disproportionate test, and includes two far more lenient variances. Whereas the wholly disproportionate test would require a deviation from best technology available only where the compliance costs would be unconscionable or “shock the conscience,” the new significantly greater than test is far more lenient. EPA has not demonstrated the requisite need rationale for this deviation. Certainly, no showing has been made that these variance are necessary to avoid an “impractical and unbearable burden” on industry. Rather, they improperly seek to minimize industry’s compliance costs in contravention of the mandate to minimize environmental impacts.

Footnotes

146 65 Fed. Reg. 49094

147 Id.

EPA Response

See response to 316bEFR.206.057.

Comment ID 316bEFR.404.049

Subject Matter Code 2.04.04

Use cost-benefit tests

Author Name Reed Super

Organization Riverkeeper, Inc.

Second there is no statutory authority for variance from section 316(b) standards. Unlike BAT standards which have statutory variances in section 301(c) (economic variance to delay timetable). and section 301(n) (fundamentally different factors variance), Congress did not provide for a variance from BTA. Congress also did not provide for variance from section 306 new source performance standards. In that context, The United States Supreme Court in E.I. DuPont v. Train found unequivocally that the Clean Water Act does not allow a variance procedure for new sources:

It is clear that Congress intended these regulations to be absolute prohibitions. The use of the word “standards” implies as much. So does the description of the preferred standard as one “permitting no discharge of pollutants.” It is “unlawful for any owner or operator of any new source to operate such source in violation of any standard applicable to such source.” 306(e). In striking contrast to 301(c), there is no statutory provision for variances, and a variance provision would be inappropriate in a standard that was intended to insure national uniformity and “maximum feasible control” of new sources.<FN 148>

As with new source performance standards, no variance from BTA standards may be allowed, because EPA lacks the statutory authorization to do so.

Footnotes

148 E.I. DuPont v. Train, 430 U.S. 112, 138 (1977).

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.050

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.05

RFC: Cost-benefit in proposed provision 124.95

Third, the ecological variance will require a cost-benefit analysis on the local level, which will undoubtedly be as incomplete, misleading and useless as the national cost-benefit analysis prepared for this rule, except that, as explained below, industry will likely be able to use it to its advantage.

EPA Response

The final rule includes five compliance alternatives, including a site-specific alternative. See preamble to the final rule, particularly sections VII and VIII for a discussion of these alternatives. It also specifies the information a facility must develop to support the site-specific compliance alternative.

See also EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.404.051

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 18.0

Discussion of Site-Specific Approaches

Finally, site-specific BTA determinations will leave state agencies and interested citizens and groups at a significant disadvantage. In practice, it is at minimum a tremendous burden, and often impossible to review, comprehend, analyze and, where appropriate, refute, the enormous volume of information that applicants submit in support of their site-specific permitting demonstrations. In the absence of federal regulations, section 316(b) determinations have typically involved individualized ecological assessment and determination of best technology available for each proposed or renewed cooling water intake structure. This lack of categorical standards has resulted in uneven and conflicting regulation as well as enormous, unnecessary aquatic mortality, which runs contrary to the goals of the Clean Water Act and the direct mandate of section 316(b). The individualized assessments have typically relied on narrow and inaccurately applied population models, and have ignored other impacts on ecosystem health.

For 30 years, industry has used the threat of litigation and a variety of dubious interpretations of section 316(b) to avoid the imposition of BTA. A favorite strategy of industry is to threaten state permitting agencies with litigation in order to obtain a compromise settlement for limited mitigation or data gathering and study, rather than installing best technology. Even with extensive data collection, there has been continued disagreement among industry, permitting agencies, and environmental groups over ecological impacts.

The multiplicity of these individual determinations and the combination of ecological and mathematical/statistical expertise necessary to determine the complex population dynamics for individual species has granted industry a critical strategic advantage because of superior resources in these proceedings. This advantage is a key component in industry's strategy to avoid national technology based regulations. Industry's most common analytical tools in these individualized technical determinations are density-dependent models of fisheries populations. Cooling water users have for decades used arguments based on density-dependence to justify the destruction of large numbers of fish and crustaceans via impingement and entrainment at their CWISs. In many critical cases, mathematical models of density dependent compensation these models have been misapplied. As just one example, industry has misapplied commonly-used Ricker curves, originally developed for salmonid fisheries with intense competition for spawning space, is misapplied to the entrainment of other species which lack such intense competition.<FN 149> More fundamentally, typical compensation analysis relies on an ecologically baseless concept of "surplus production" which dismisses the ecological value of the tens of millions of fish which are a critical base of the food chain whether or not they grow to adulthood-even though their predators may be populated at far below their historic values.

Indeed, several state agencies commenting on the Phase I proposal, including New York, New Jersey and Michigan, cited the enormous burden they faced in trying to assess species and ecosystem effects caused by a particular power plant. The very purpose of categorical standards is to raise the technology determination to the federal level, and to produce national uniform technology standards that states will automatically apply, unless local water standards dictate inclusion of even stricter requirements. That is how Congress designed the Clean Water Act, and how it has functioned for 30 years. With the Phase II Proposal, EPA is attempting to rewrite the very core of the Nation's most fundamental water quality protection program. That misguided attempt will not survive judicial scrutiny.

Footnotes

149 See e.g. Draft Environmental Impact Statementfor State Pollutant Discharge Elimination System Permit Renewal for Bowline Point I & 2, Indian Point 2 & 3 and Roseton 1 & 2 Steam Generating Stations, December 1999, Appendix VI-4-B, relying on Ricker models to estimate the impact of entrainment on Atlantic tomcod young.

EPA Response

For a discussion of the framework of the final rule and EPA's reasons for authorizing five compliance alternatives, please refer to the preamble to the final rule. EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information. EPA recognizes that members of the public lack the resources, and sometimes, the expertise to refute the results of studies performed under today's rule. However, EPA hopes that by requiring the studies as part of the permitting process, the public will have a better opportunity to influence the outcome of permitting decisions under this rule.

Comment ID 316bEFR.404.052

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 17.03.03

Benefits of reduced intake capacity

THE BENEFITS OF CLOSED-CYCLE COOLING FOR ALL IN-SCOPE FACILITIES MORE THAN JUSTIFY THE RETROFIT COSTS.

As explained above in Part III, the Clean Water Act and Executive Order 12866 prohibit EPA from using cost-benefit analysis as the decision-making criterion for determining BTA standards. Nevertheless, a complete estimation of benefits would demonstrate that the monetary benefits and other ecological benefits of an all-cooling tower rule vastly exceed the costs. In his comments on the Phase II Proposal, Dr. Ackerman provides a more accurate, yet still conservative, estimate for just two of the dozens of areas that EPA admits it has undervalued benefits: non-use benefits and the value of fish not immediately landed by fisherman. The result of those two minor adjustments demonstrates that all of EPA's proposed options are cost-effective (i.e., benefits exceed costs), including the all cooling tower option (benefits exceed costs by $4.082 billion); the waterbody-flow-based cooling tower option (benefits exceed costs by at least $4.2 billion); and even the dry cooling option (benefits exceed costs by $7.728 billion). Notably, EPA's proposed option, which provides only 60 percent entrainment reduction, has the lowest net benefits ($3.764 billion). (See Part IV.A, below.)

Furthermore, there are a dozens of other aspects of the benefits analysis that EPA has undervalued or failed to value altogether. EPA has acknowledged many of these omissions in the preamble to the Phase II Proposal and in the EBA. In addition, as explained below and in the Pisces Phase II and NODA Report, there are myriad other significant shortcomings the benefits analysis, each resulting in an underestimation of benefits. The Pisces report demonstrates in worked examples how EPA could and should correct these omissions. Correcting for each of these undervalued aspects of the benefits analysis raises the benefits of each option, resulting in a further increase in the net benefits of the all cooling tower option. (See Part IV.B., below.)

In addition, because the costs of the cooling tower options are overstated, the net benefits of these options are actually larger, and the differential between them and the proposed option (which has no cooling towers) is even greater than adjustments to the benefits alone indicate. EPA should also make these appropriate downward adjustments to the compliance cost estimate for cooling towers. (See Part IV.C., below.)

Finally, the Habitat Replacement Cost (HRC) method of estimated benefits, which has drawn criticism from industry as overstating benefits, does in fact just the opposite. In light of the impossibility of quantifying and monetizing all the myriad, complex benefits of aquatic ecosystem protection, HRC provides a reasonable lower bound estimate of those benefits by measuring the cost to replace some, but not all of what is destroyed by power plants' cooling water intake structures. (See Part IV.D., below.)

EPA Response

See response to comment 316b.EFR.404.058 for a discussion of why EPA has NOT overstated costs of cooling towers.

The commenter proposes that the unlanded fraction of additional survivors has an ecological value that should be quantified. This is essentially the same comment that other commenters have made when referring to foregone "reproductive value" of I&E losses. EPA has responded to the comments about the valuation of the unlanded fraction in response to Comment 316bEFR.336.009. See also EPA's discussion of reproductive value in response to Comment 316bEFR.206.065. EPA has responded to the related issue of non-use values of fish in the response to 316bEFR.077.022.

The commenter makes a specific proposal that the unlanded fraction of additional survivors should be valued as 25% the landed value of the same species. However, the commenter provides no data to support this request.

Concerning the HRC method, please see EPA's response to Comment 316bEFR.005.035 and the document entitled "Habitat-based Replacement Cost Method" (Docket #6-1003).

See EPA's response to comment #316bEFR.206.047 on incompleteness of EPA’s analysis of the benefits of reduced cooling water intake.

See EPA's response to comment #316bEFR.005.020 on application of the cost-benefit test to assessing the value of alternative CWIS technologies.

Comment ID 316bEFR.404.053

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

CORRECTING JUST A FEW EVIDENT AREAS OF INCOMPLETENESS RAISES NET BENEFITS DRASTICALLY.

In his August 2002 comments on the Phase II Proposal, Dr. Ackerman prepared an adjusted set of figures incorporating estimates of corrections to just two of EPA's many omissions and underestimate.<FN 150> Dr. Ackerman's first adjustment is for the underestimate of non-use benefits. As discussed above in Part III, EPA's estimation at proposal that non-use benefits would be only 0.5 times recreational benefits was based on extremely limited and outdated economic literature.<FN 151> Dr. Ackerman explained that a recent literature review finds that non-use benefits are on average 1.9 -2.5 times all use values, rather than 0.5 times recreational benefits alone, as EPA assumed. Further, 1.9 -2.5 times use value is still a conservative estimate for existence values of many natural ecosystem.<FN 152> To correct for EPA's underestimate in this area, Dr. Ackerman recalculated EPA's estimates assuming that non-use values are 2 times estimated recreational, commercial, and forage values.<FN 153>

Dr. Ackerman's second adjustment is for the unvalued fraction of the mortality of recreationally and commercially valuable species. EPA's methodology values only the fraction of those species that would have been caught in the absence of I&E mortality. That is, only the fraction of the fish that would have been caught are assigned any value; the rest are ignored, even though those same fish have the potential to be caught in subsequent years and to produce offspring which will yield increased catches in future years. The catch rate, or "landed fraction," is below 20% in every case, and below 10% in some cases. Thus, the great majority of impingement and entrainment mortality of the most valuable species is never valued.

The nonlanded fraction of these species -the ones that survive uncaught -have an obvious ecological, commercial, recreational and forage value. For one thing, most fish that are protected by CWIS technology, and that are not caught by fishermen, will still be available the next year to be caught fishermen in that year. These unlanded fish will not all disappear from the ecosystem, as EPA's models assume. Rather, many of them will be caught in future years, thus further increasing the commercial and recreational catch.<FN 154> Furthermore, these unlanded fish will reproduce, and their offspring is the source of the increased catch in future years. Since the fisheries in question are depressed (they are currently both fished and subjected to once-through cooling), the fish that are protected by CWIS technologies and not caught by fisherman will cause an increase in the population over time. Such increase will be larger than the first year increase attributable to the installation of a cooling tower, which after subtracting the nonlanded fish, is all that EPA has valued. <FN 155>

Unfortunately, EPA's available data do not presently allow for calculation of the present value of future reproduction of nonlanded fish; the calculation would be complex and would likely vary by species. Below in Part IV.B, we explain a worked example of such calculation prepared by Pisces. EPA should adopt such method for valuing the unlanded species. But for present purposes, it is reasonable to assume that nonlanded fish have a value that is significantly greater than zero. Thus, Dr. Ackerman has conservatively assumed that nonlanded fish have a value equal to 0.25 times the value

of landed fish of the same species.
Dr. Ackerman's spreadsheet adjusts for the percentage reduction in losses achieved by each EBA policy option, calculating national baseline losses, and benefits of each policy option, replicating EPA's values when using EPA's assumptions.

Dr. Ackerman recalculated the spreadsheet three times: in Scenario A, keeping all EPA assumptions and input data, except assuming that non-use value is 2 times recreational, commercial and forage value; in Scenario B, restoring EPA's non-use assumption but assuming that nonlanded recreational and commercial fish are valued according to the above equation; and in Scenario C, combining my two assumptions. Dr. Ackerman's results, as shown in his Table 1, are as follows:

- Estimated benefits of each policy option are more than doubled in Scenario A, relative to the estimates in the EBA;

- Estimated benefits of each policy option are roughly doubled in Scenario B; and

- In Scenario C, combining the two adjustments, benefits of policy options are roughly 4-6 times the estimates in the EBA.

When compared to "the costs of the policy options, as reported in the EBA, each of the three scenarios has significantly greater net social benefits. And, importantly, the order of policy options, ranked according to net social benefits, changes. EPA's EBA Option 5 -the dry cooling option -has the greatest net benefit in all three scenarios, as shown in Dr. Ackerman's Table 2. In Scenario C, combining the two adjustments, EPA's proposed option, Le. EBA Option 3, is the one that fares worst. Options 1,2,3a, and 4 all have net benefits of $4.1 -$4.5 billion in Scenario C.

Because Dr. Ackerman's rough estimates of these two changes have such a large effect on the outcome of the analysis, EPA should explore both issues in greater detail. Specifically, as Dr. Ackerman recommends:

- EPA should develop approaches to non-use value more consistent with the recent economic literature, to replace the outmoded "50% rule" used in the EBA; and

- EPA should develop plausible values for the nonlanded fraction of I&E fish mortality. The one thing we know for certain is that the current estimate of zero is not the correct value.<FN 156>

The effect of such adjustments is far from trivial. They would show that all options in fact have large net benefits, and that EPA's incomplete valuation of benefits misleadingly favors the option that actually has the lowest net benefits. As Dr. Ackerman explained in August 2002, it is critical that EPA carefully explore these corrections.

In the NODA, EPA discarded much of the benefits methodology it had relied on at proposal, in favor of a regional benefits approach. Nevertheless, from the limited information available, Dr. Ackerman estimates that the NODA calculations introduce little change in aggregate estimated benefits.<FN 157> As discussed above in Section 3 and in the Ackerman NODA Comments, the NODA benefits methodology, like that at proposal, significantly understates total benefits. One adjustment EPA should make correct one of many problems with the NODA benefit methodology is to reconsider its restriction of nonuse value to the population living very close to the plants in question. Instead, EPA should add to its nonuse value for the population in bordering countries by assuming that the use value per household in the rest of the country is even 10% as high as in the bordering counties (or alternatively, one could assume that 10% of the households in the rest of the country have a non-use value as high as those in the bordering counties). <FN 158> Such adjustment more than triples the total value of baseline losses due to North Atlantic impingement and entrainment. See Ackerman NODA Comments at p. 10.

Footnotes

150 Ackerman Phase II Comments, Section 2.

151 Indeed, EPA has admitted that it understated non-use benefits. In the preamble to the Phase II Proposal it acknowledged:
- Nonuse benefits are most likely understated using the 50 percent rule because the recreational values used are likely to be understated.
- The 50 percent rule itself is conservative (e.g., only reflects any nonuse component of total value to recreational users. It does not reflect any nonuse benefits to recreational nonusers). 67 Fed. Reg. 17193.

152 Ackerman Phase II Comment at p. 6.

153 Id.

154 Of course, not all unlanded fish will return. To fully calculate this, one would have to factor in the average lifespan of the fish and average survival rates during the lifespan.

155 For a discussion of a method of calculating the worth of commercial species that are protected from impinged and entrained by cooling towers but not caught by fisherman in the first year, see Pisces Phase II Report, pp. 34-38, which is discussed below.

156 Ackennan Phase II Comments at p. 8.

157 Ackerman NODA Comments at p. 3.

158 A similar calculation could be done using EPA's estimates for households within a 32.4 mile radius. The result would be even larger total values than the ones derived by Dr. Ackennan.

EPA Response

EPA agrees that ecosystems provide many difficult-to-value services and that assigning zero values to this services would misstate society's values. As stated in the NODA (Federal Register 68 FR 13522-13587), the rule-of-thumb approach to estimating non-use is not used in the cost benefit analysis for the final Section 316(b) Phase II rule. Instead, the Agency explored various alternatives to quantifying and monetizing non-use benefits, including benefits from non-landed fish. These alternatives include: meta-analysis, the benefit transfer method, and break-even analysis. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002). However, in view of the uncertainties in estimating non-use benefits for this rule at the national level, the Agency presented a qualitative assessment of the non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

EPA has responded to concerns regarding the Agency's non-use valuation methods in responses to a number of comments. For EPA's benefit transfer approach, please see EPA's response to comment #316b.EFR.307.061 regarding using habitat values to estimate values for fish; comment #316bEFR.304.002 regarding the soundness of value estimates used for non-use benefit transfer;

comment #316bEFR.304.004 regarding comparisons of population demographics between the study region and policy region; comment #316bEFR303.020 regarding the definition of users vs. nonusers; and comment #316bEFR.303.021 regarding the allocation of values for various wetland services. For EPA's meta-analysis please see EPA's responses to comments #316bEFR.338.044 regarding meta-analysis in general; comment #316bEFR.338.046 regarding the appropriateness of the studies selected, comparison of baseline and extent of change, and comparison of affected populations; and comment #316bEFR.338.047 regarding sensitivity analysis in EPA's meta-analysis. For EPA's response to comments regarding the break-even analysis, please see response to comment #316bEFR.306.106.

For EPA's response to comments that the Agency's benefit estimates are incomplete, please see the response to comment #316bEFR.206.047.

For EPA's response to the issue valuing the "unlanded fraction" of fish please see the response to comment #316bEFR.336.009.

EPA agrees with the comment that there is potential for the affected population in the study area to be greater than the households in counties abutting the affected water body and households within 32.4 miles of the affected water body.

Comment ID 316bEFR.404.054

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

MANY OTHER ADJUSTMENTSARE REQUIRED AND WOULD FURTHER INCREASE THE TOTAL BENEFITS AND NET BENEFITS FOR ALL REGULATORY OPTIONS.

As explained in Part III, EPA's benefits analysis is drastically incomplete and undervalues the benefits of minimizing impingement and entrainment. While data limitations and other constraints make it difficult or impossible for us recalculate EPA's the entire benefits analysis (other than in the two areas addressed in Part IV.A, above), Pisces Conservation has begun that process. In their report, the scientists at Pisces have identified a number of areas -some in addition to those acknowledged by EPA-where the benefits analysis undervalues the resource. Further, they have illustrated how those errors could be corrected.

EPA Response

EPA agrees with the commenter that the proposed rule analysis does not include all possible benefits of CWIS, and that, therefore, the value of entrained and impinged fish to an ecosystem is likely to be underestimated. As stated in the NODA (Federal Register 68 FR 13522-13587), EPA attempted to expand its analysis of non-use benefits categories for the final Section 316(b) Phase II rule analysis. However, given the uncertainties in estimating national ecological benefits for this rule, the Agency limited its benefits assessment to the use benefits categories and presented a qualitative assessment of non-use benefits of the environmental protections at issue in the final 316(b) benefit cost analysis.

Comment ID 316bEFR.404.055

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.01.03

Data Issues

Baseline Impingement and Entrainment Is Significantly Higher than EPA Has Estimated

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The first significant correction EPA should make is to considerably increase the baseline impingement and entrainment data. This is critical because EPA has quantified the number of fish saved by various technologies by multiplying an effectiveness factor. The resulting number of saved fish is then multiplied by the value of those fish so as to measure the monetary benefit of the fish saving technology. Putting aside for the moment the obvious problems (discussed in Part III above) of monetizing fish deaths avoided, it is clear that an accurate, current assessment of power plant fish kills is necessary as a starting point. But EPA's data significantly understates these fish kills and should be corrected in at least the following respects:

- EPA's I&E data is decades old, much of it from the 1970s and 1980s, even though fish populations, and therefore the numbers of fish impinged and entrained at power plants, has increased over and since that period of time, due largely to improving water conditions such as increased sewage treatment. EPA should increase the baseline I&E data to account for such increases, and predict future increases by extrapolating such trends into the future. (See Pisces Phase II Report at pp. 22-27.)

- EPA has failed to account for increases in flow at Salem and other similarly situated plants, even though the data clearly indicates that Salem has increased its intake flow in recent years and EPA has acknowledged that the currently larger flows are anticipated to continue. As a result, EPA should not use the average flow data or the corresponding I&E data at Salem (or at any other plant where an increase in flow is likely to continue). Rather, it should use the current and projected flow data, and the corresponding I&E totals. (See Pisces Phase II Report at pp. 2-7.)

- EPA assumed all fish impinged are age 1. In fact, fish are impinged at all ages. Older, larger fish are more valuable for two reasons. First, when landed by fisherman, they weigh more and therefore yield more revenue. Second, when not landed, they produce offspring which can increase the size of the population. An age 6 striped bass is much more fecund than an age 1 striped bass, and is therefore worth more biologically. As Pisces examples demonstrates, by assuming all fish are age I, EPA has undervalued impingement by between one and two orders of magnitude. EPA should adjust the impingement data to take into account the actual age of fish impinged. (See Pisces Phase II Report at pp. 5-19.)

-EPA's survival rates, which are key variables used to estimate the total mortality as age 1 equivalent numbers, are most likely too low, as they are based on historical data when populations were badly suppressed by environmental damage and over-exploitation. Changing the survivorship figures used in the age 1equivalent calculations can have a large effect on the numbers of age 1equivalents estimated to be entrained or impinged. More reliable estimates of age1-equivalencewould be obtained by increasing survival rates by 25%. (See Pisces Phase II Report at pp. 20-2 1.)

EPA Response

EPA recognizes that abundances of aquatic species, and therefore the numbers of organisms vulnerable to I&E, may have increased, decreased, or stayed the same at particular sites since the time of the available I&E studies or life history data. Unfortunately, it is uncertain how old data can be adjusted to reflect current conditions, particularly given the many variables that influence the growth of biological populations.

As is common practice for EPA's regulatory analyses, EPA did not consider projected future conditions in its 316b Phase 2 benefits analysis.

Regarding the age of impinged fish, please see response to Comment 316bEFR0.29.105.

Comment ID 316bEFR.404.056

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 6.0

Environmental Impacts

Endangered Species Are Harmed and Killed By CWIS To A Far Greater Degree Than EPA Estimated.

In its benefits analysis, EPA has assumed that only two U.S. power plants (Pittsburg and Contra Costa in San Francisco Bay) out of a total of 550 in-scope facilities impinge or entrain endangered, threatened or otherwise special status species. That is, of course, patently wrong. Since power plants cooling water intake structures generally suck in a cross-section of all species present in the waterbody, any plant located near the habitat or range of a rare or special status species is likely to be impinging and/or entraining individuals of that species. As Pisces explains, “It should be assumed that all power plants situated on estuarine and coastal sites will impact to some degree threatened or endangered (T&E) species."<FN 159> Reliable data on the extent to which species are harmed and killed is not likely to be provided by the power industry for two primary reasons: first, because T&E species are, by definition, rare, they will appear in samples in much lower frequency than common species; and, second, there is a strong disincentive for plant operators to report the taking of T&E species, which may be prohibited by Federal and/or state law.

Nevertheless, it is clear that power plants do kill endangered species. As the Delaware Riverkeeper Network explains in its comments, endangered and threatened sea turtles and shortnose sturgeon are killed at Salem. Precise figures on these kills have not been provided, but they have been acknowledged and documented on the public record. A December 1998 report prepared by the National Marine Fisheries Service (NMFS) stated that Salem impacts the federally endangered shortnose sturgeon. While not a comprehensive tabulation of impacts, the report stated that 8 shortnose sturgeon were discovered in trash bars at Salem, and estimated that up to 11 shortnose sturgeon are impinged at Salem each year. Although there were no findings regarding entrainment, if adults are getting caught on trash racks it is highly likely that juveniles, and younger, are also getting killed there. Endangered and/or threatened sea turtles have also been injured and killed at Salem. The New Jersey permit record has information about the impacts to the federally threatened turtle populations injured and killed at Salem, and at one time required a turtle resuscitation program at that site.<FN 160>

There is also additional data concerning T&E species harmed and killed at other power plants. For example, the San Francisco Bay Delta estuary includes the following special status species:

- Central Valley ESU steelhead -Oncorhynchus mykiss
- Central Valley fall/late fall-run ESU Chinook salmon -Oncorhynchus tshwytscha
- Central Valley spring-run ESU Chinook salmon -Oncorhynchus tshwytscha
- Delta smelt -Hypomesus transpacificus
- Green sturgeon -Acipenser medirostris
- Longfin smelt -Spirinchus thaleichthys
- Sacramento River winter-run ESU Chinook salmon -Oncorhynchus tshwytscha
- Sacramento splittail -Pogonichthys rnacrolepidotus <FN 161>

These species are vulnerable to I&E at many Bay and Delta power plants in addition to the Pittsburg and Contra Costa plants.

In Morro Bay, California, an April 2002 staff report of the California Energy Commission noted that the estuary used for cooling water by Duke Energy's Morro Bay Generating Station is inhabited or potentially inhabited by the federally endangered tidewater goby (Eucycloglobius newberryi) and the steelhead trout (Oncorhyrnchus mykiss).

Lists of T&E species could be complied for almost all ocean and estuarine sites. For example, in the Hudson Estuary both shortnosed (Acipenser brevirostrum) and Atlantic sturgeon (Acipenser oxyrinchus) have been impinged on cooling water intakes. At many ocean and lower estuarine sites young turtles are potentially vulnerable to entrainment. At one power plant proposed for New York harbor, several turtle species were listed as potentially present, including:

- Green sea turtle -Chelonia mydas
- Loggerhead sea turtle -Caretta caretta
- Leatherback -Dermochelys coriacea
- Kemp's ridley turtle Lepidochelys kempii
- Hawksbill -Eretmochelys imbriimbricata <FN 162>

Importantly, as Pisces notes in its report, as conservation measures for species such as sturgeons and turtles are successful, populations rise, resulting in extended ranges and the risk of higher impingement in future years. Thus, the fact that EPA is using old impingement and entrainment data reflecting the poorer water quality conditions of decades past has likely depressed the reported numbers of threatened and endangered species at power plants.

As a result, EPA’s implicit assumption that T&E species are killed only at the Pittsburg and Contra Costa plants is wholly unsupportable, with the result that the benefits analysis is falsely skewed downwards. EPA should collect all available data concerning impingement and entrainment of endangered species, and collect all data of T&E ranges in the waters where in-scope facilities are located, and revise its benefits analysis to account for impacts to T&E species at the majority of the 550 in-scope facilities.

Footnotes

159 Pisces Phase II Report at p.62.

160 See August 5,2002 comments of Delaware Riverkeeper Network.

161 Pisces Phase II Report at p 62.

162 With the exception of a few leatherbacks, most of the turtles in nearshore waters in the New York coastal region are small juveniles. The loggerhead is the most abundant, followed by the Kemp's Ridley. These two species, along with a few green turtles, move into harbours and estuarine waters, while the leatherback turtles remain along the coast and are rarely seen in embayments. Kemp's Ridley inhabits the shallower areas of Chesapeake Bay in search of blue crab, their preferred prey. Their preference for shallow waters and blue crabs makes the Kemp's Ridley the most likely sea turtle species to venture into the New York & New Jersey Harbor area. Similar lists would be produced for many east coast marine or lower estuarine power plants situated to the south of New York. Pisces Phase II Report at p. 63.

EPA Response

This comment is identical to comment 316bEFR.206.064. Please see response to that comment.

Comment ID 316bEFR.404.057

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 10.02
Benefit Estimation Methodology

EPA's Static Models Underestimate the Benefits of Minimizing Fish Kills.

EPA calculated the number of fish that would be protected from impingement and entrainment by the conversion to closed-cycle cooling. EPA then valued the commercial and recreational worth of those fish. For commercial fishing, it applied the traditional catch rate and valued only those fish that would be saved by a cooling tower, and then caught by a commercial fisherman. But all of the fish saved by the cooling tower have both ecological and monetary value. EPA's limited, static models do not however capture their value. As discussed above, Dr. Ackerman assigned those fish a value equal to 25 percent of the value of the landed fish. However, a more sophisticated method of valuing those fish is possible.

For step one of the analysis, assume that those fish are sterile and thus do not produce offspring. Although they escaped the fishermen in year one, the sterile, unlanded fish would still be in the waterbody in year two, year three, year four, and so on, up to the end of their lifespans, and would therefore be available to be caught by fisherman in those years. Thus, the available population would steadily increase during the lifespan of the species, at which point it would level off. EPA's static model assumes that the population increases only by the proportion of fish saved each year by the cooling tower, but it is clear that in a dynamic model, there are additional fish which will be landed, and therefore provide direct value simply because fish live much longer than one year.

For step two of the analysis, assume that the unlanded fish spawn, as they of course do. Because they are creating future generations of fish, the fish that are saved by a cooling tower and not landed by fishermen will during their lifespan, increase the population, thereby providing additional fish to be caught in subsequent years. Pisces has demonstrated with worked examples at Salem and Pilgrim a method for valuing these unlanded fish according to their reproductive value. At Salem alone, the commercial value of striped bass increased from about $56,000 per year to about $135,000 per year, which is a 141% increase. (See Pisces Phase I1 Report at p. 34-38.) Increases would be shown for all species at all plants, if EPA follows this method. EPA should recalculate its benefits analysis to take into account the value of fish that are not immediately landed and marketed.

EPA Response

The commenter proposes that the assessment should include consideration of reproductive value of fish killed by I&E. EPA has addressed this topic in its response to comment #EFR.206.065.

The commenter asserts that the assessment would be improved if the unlanded fraction of additional survivors should be valued at a rate of 25% of the value of landed fish. The basis of this assertion is not apparent, and EPA believes that the proposed method would not withstand scrutiny. EPA is currently investigating possible alternative methods for determining the value of unlanded fish.

Comment ID 316bEFR.404.058

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 9.04
Cooling system costs (e.g., dry, wet, recirculating)

BECAUSE EPA HAS OVERSTATED COMPLIANCE COSTS FOR COOLING TOWERS, IT SHOULD MAKE APPROPRIATE DOWNWARD ADJUSTMENTS TO ITS ESTIMATES.

As also explained in Part III, EPA has significantly overstated the compliance costs of the closed-cycle cooling regulatory alternatives. In its comments on the proposed rule, Synapse Energy Economics describes a number of areas in which EPA must revise its cost estimates, including the following:

- EPA should annualize the capital costs of adding cooling towers over a longer period than 30 years to reflect the likely expected operating lives of those towers.<FN 163>

- Rather than using the baseline (I.e., once-through) system intake flow of affected plants to size the needed recirculating cooling towers and associated conduit systems, EPA should instead use Nuclear Regulatory Commission data indicating that “recirculating cooling systems have lower condenser flow to MW ratios than once-through systems, regardless of age or other characteristics"<FN 164> to properly size and cost the cooling system conversions.<FN 165>

- EPA should have used the cost of the more standard fiberglass reinforced plastic material for new cooling towers at existing fossil-fired facilities to calculate the capital costs of wet cooling towers, rather than redwood towers, as EPA has acknowledged that fiberglass has become “relatively standard” for new facility installations.<FN 166>

- EPA should revise its equations to more accurately reflect the actual costs of building a cooling tower in light of the fact that the equations used by EPA to quantify the capital cost of a new cooling tower produce cost estimates that “in almost all cases” exceeded the actual project costs, sometimes by as much as 25 percent of the actual costs. <FN 167> In the alternative, if the EPA decides to continue to use these equations without revision, it should not apply a 20 percent “retrofit factor” when quantifying the cost of adding a cooling tower at an existing facility because the combined use of both the existing equations and the 20 percent retrofit factor leads to unreasonably high estimates for the capital costs of adding a new cooling tower at an existing facility.<FN 168>

- EPA should adjust the costs associated with condenser upgrades (which EPA assumed affected facilities would elect to undertake as part of cooling system conversions from once-through to recirculating systems) in order to reflect reductions in O&M costs. Such O&M cost reductions can be expected from upgrading to the new materials which are less susceptible to failure and should lead to fewer tube leaks and, consequently, lower repair and repair outage-related costs.<FN 169>

- EPA should have used a range of lengths of concrete-lined steel piping for cooling water make-up water and blowdown that is more typical of existing facilities instead of using a range that might only apply to a limited number of plants. <FN 170>

- EPA should cost out all applicable compliance strategies-several of these compliance strategies are likely to be less costly than the strategies for which the EPA has developed costs-in order to develop an accurate assessment of each option's costs. <FN 171>

- EPA should reflect the repowering of coal-fired facilities to combined-cycle technology-at least 15 if which have recently occurred or are planned-because the costs of complying with any of these options would be lower for a repowered facility than for the original coal-fired plant.

-EPA should adjust its energy penalty calculations in accordance with the detailed explanations provided by Synapse.<FN 172>

Furthermore, EPA should also adjust its compliance costs to account for the fact that the costs of regulation are: always overestimated in advance of their implementation.

Once adopted, regulations encourage new technologies and more efficient ways of complying. Once study found that 92 percent of the time (11 out of 12 cases) costs estimated in advance of regulation were more than twice actual costs. <FN 173> Another study found that advance cost estimates were higher than actual costs 50 percent of the time, and below actual costs only 11% of the time. <FN 174> Most strikingly, before the 1990 Clean Air Act Amendments, industry anticipated that sulfur reduction measures would cost $1,500 per ton. In 2000, the actual cost was less then $150 per ton, a 90 percent decrease. <FN 175> In the present case, once cooling tower retrofits become more frequent, market factors and competition will drive the costs down. EPA's cost figures should reflect that fact.

And finally, EPA's compliance cost estimates should be adjusted to reflect the likelihood that older fossil-fired facilities will be repowered instead of retired as a result a closed-cycle retrofit mandate. Two facilities in New York State (Reliant Astoria Repowering Project and the Bethlehem Energy Center) have recently sought to significantly upgrade their plants by retrofitting closed-cycle cooling at the same time that they convert to combined-cycle natural gas technology. These plants, and others around the Country, are evidence that firms will seek to repower older, less efficient generating facilities and that such repowerings can include cooling towers as part of the repowered facility in place of once-through cooling. Such projects will provide significant environmental benefits in terms of reduced water usage and lowered air emissions and will offer substantial economic benefits for their owners. It is reasonable to assume that at least some plants will respond to a cooling tower regulation in such manner, and their costs would decrease as a result of the increased efficiency and reduced cooling water needs from combined-cycle technology.

By making these adjustments, EPA would come closer to estimating the true costs and true net benefits of the closed-cycle alternatives.

Footnotes

163 Synapse 2002 Phase II Report at p. 9.

164 Technical Development Document, at page 2.18.

I65 Synapse 2002 Phase II Report at p. 9.

166 Synapse 2002 Phase II Report at p. 9.

167 Technical Development Document, at page 2.23.

168 Synapse 2002 Phase II Report at pp. 9-10.

169 Synapse 2002 Phase II Report at p. 10.

170 Synapse 2002 Phase II Report at p. 10.

171 Synapse 2002 Phase II Report at p. 10.

172 Synapse 2002 Phase II Report at p. 11-12.

173 Ackerman and Heinzerling, supra, at p. 28 citing Eban Goodstein, "Polluted Data," American Prospect 8, November-December 1997 (http://www.prospect.org); Hart Hodges, "Falling Prices: Cost of Complying With Environmental Regulations Almost Always Less Than Advertised." Economic Policy Institute, 1997 (ht&://epinet.org).

174 Id., citing Winston Harrigton, Richard D. Morgenstern, and Peter Nelson, "On the Accuracy of Regulatory Cost Estimates," 19 Journal of Policy Analysis and Management 297-322 (Spring 2000).

I75 Ackerman and Heinzerling, supra, at p. 28.

EPA Response

The commenter is correct that the Agency annualized the capital costs of cooling towers over 30 years, based on the expected useful life of the cooling tower system. The expected life of cooling towers depends on the materials of construction, the chemistry of water in the cooling system, the site ambient conditions, the maintenance practices of the tower, and the design of the tower. As such, the Agency considered the expected life of 30 years to be typical based on consultation with the expertise of vendors and manufacturers of cooling towers. Nonetheless, the commenter provides no information or data that suggests to the Agency that a better selection than 30 years is available. For typical mechanical draft towers, the prediction of a 30 year useful life is justified and supportable.

The Agency believes that the commenter is mistaken in asserting that retrofitting to closed-cycle cooling presents the opportunity for once-through systems to reduce their condenser flows and therefore install a smaller cooling tower in return. As stated in comment 316b.EFR.306.403, a retrofit installation of cooling towers that would reduce the size of the condenser flow would be extremely costly and might entail even more downtime for construction (i.e., retrofitting the entire condenser system from single-pass configuration to a two-pass system) than if it were to utilize the existing condenser configuration. This is not to be confused with replacing condenser tube systems, which the Agency modeled for the proposal and NODA cooling tower methodology, but instead requires dramatic and costly changes to the condenser configuration and connecting buildings/piping. The commenter fails to prove that cooling tower retrofits can afford the opportunity for dramatic resizing of the condenser flows, and as such, the Agency cannot act upon the recommendation because its research reveals contradictory evidence of the commenter's unsubstantiated assertions.

The Agency notes that the capital costs of redwood cooling towers do not significantly differ from those of fiberglass reinforced plastic. The difference is roughly 2 percent in terms of average cooling tower portion of capital costs. In the analysis of the annualized capital costs of the waterbody based capacity reduction option presented in the NODA, a possible 2 percent difference in capital costs of a partial component of the capital costs is negligible. The Agency also refers to comment 316b.EFR.306.419.

The Agency disagrees fundamentally with the commenters request that the Agency decrease the capital cost equations for cooling towers due to the fact that EPA's empirical comparison revealed that the costs estimated by the Agency exceed those of other empirical cases by a minor margin in the majority of cases and a slight margin (25 %) in others. The Agency approaches the prospect of providing national costs by attempting to utilize typical installed cost estimates, yet maintaining a slight (very slight in this case) conservative approach to empirical comparisons. The slight difference between EPA's new facility cooling tower capital costs to new facility tower projects is also just a portion of the costs associated with retrofitting to cooling towers, as represented in the proposal and NODA analysis of the waterbody based capacity reduction option. The commenter's suggestion that EPA not utilize a retrofit factor is unjustified further. The Agency notes that in comparing its retrofit project cost estimates (i.e., those relying on EPA's cost methodology, which includes the 20 % retrofit factor, which has been criticized by many other commenters) to those for two real-life cases of cooling tower retrofit projects (as presented in DCN 4-2526 for the proposal) that the EPA estimates were reasonably close to those actually realized in the real cases, but the EPA costs did not exceed those of the real cases. Should the Agency have removed the 20 percent retrofit factor, the comparison to real-life empirical cases would fail to present a reasonable result.

The Agency included condenser upgrades for a portion of the possible retrofit cooling tower projects in the waterbody based capacity reduction option in order to account for the likely possibility that the increased pressure in the condenser tubing from a cooling tower. These condenser upgrades would provide for typical operation and maintenance associated with new condensers at new facilities. Because the Agency developed its O&M estimates for cooling towers based on its new facility model, there would be no basis to adopt the commenter's recommendation of reducing the O&M estimates from those developed for new condensers. If there is an argument to be made, it would be that the Agency should marginally increase the O&M estimates for the portion of the retrofit cases in which the Agency did not assign condenser upgrades, whereby the new facility oriented O&M costs might not account for the upkeep and maintenance necessary to maintain an older condenser set while simultaneously increasing the pressure. As such, the recommendation cannot be adopted by the Agency.

The Agency disagrees with the commenter's assertion that the range of lengths of makeup and blowdown piping assumed by the Agency is improper for the cooling tower retrofit analysis in the NODA. The commenter suggests that the Agency adopt lengths of piping "more typical for existing facilities," than that used by the Agency. The Agency points out that the makeup and blowdown piping assumptions by the Agency reflect realistic estimates for retrofit projects at existing facilities, as a retrofit project may require locating a cooling tower system a sizeable distance from a waterbody due to space and siting constraints that do not apply in the case of new facilities.

The Agency notes that it has costed a variety of compliance strategies for the NODA and final rule analysis. The commenter asserts that other options might be more affordable than those analyzed by the Agency, and yet does not provide any suggestions of what these "more affordable" strategies might be. As such, the Agency believes that it has analyzed a range of broad compliance strategies for implementing cooling tower retrofits, and even in the least stringent of these cases found the national costs to be unacceptable.

The Agency notes that commenter in recommending that the Agency account for the repowering to combined-cycle configurations (which could reduce flow in certain cases) fails to also recommend that the Agency account for the cases in which facilities add all new steam capacity which would have the effect of raising intake flow in certain cases. The Agency analyzed the potential repowering of facilities within the scope of the final rule and found that for as many facilities that could reduce intake flows through repowering to combined-cycle that an equal and opposing amount plan to increase their intake flows through adding additional power without converting to combined-cycle (see 67 FR 17113). Therefore, by recognizing that a balance of facilities projected to repower would increase as well as decrease intake flow, the Agency's approach to repowering is reasonable.

Regarding the energy penalty issues referenced by the commenter, the Agency notes that in the referenced report (authored by Synapse) the primary contention pertains to EPA's use of a 67 percent load factor for annual energy penalty calculation. The commenter does not contend EPA's use of a 100 percent maximum load for summer energy penalties, which comprise a portion of the modeled energy penalty for the NODA analysis of cooling tower options. The report claims that this has significantly overstated potential energy penalties from cooling tower retrofits and recommends that EPA utilize a higher load factor, one they believe to be more realistic. The commenter correctly points out that the Agency has chosen the 67 percent load factor and also that the Agency is wary that by selecting a load factor that is slightly less than a maximum factor that it has slightly raised a portion of the energy penalty component. However, the Agency notes that this is a reasonable assumption, as the Agency based its turbine penalty model on data from a single type of turbine and chose a slightly conservative value to represent a wide variety of real-life turbines and operating conditions. The Agency also notes that it utilized an assumption that new turbines would function equally well with retrofitted or older turbines, but this is not the case, which further emphasizes the need for a conservative approach to modeling turbine penalties. The Agency received a comparable detailed energy penalty study from the Department of Energy (see response to comment 316b.EFR.010.103, in which the results of the annual average energy penalty from their independent research on cooling tower retrofits correlate well with those derived and used by EPA in the NODA and proposal. In addition, the commenter contests EPA's use of the national average for California. The Agency believes this is a fair methodology, as the annual average temperatures expected in California would be well modeled by the national average for Seattle, Chicago, Jacksonville, and Boston.

Regarding the recommendation by the commenter that EPA adjust compliance costs "to account for the fact that the costs of regulations are always overestimated in advance of their implementation," the Agency does not believe that it can do so in good faith. The Agency notes that the vast majority of comments (all except those provided by the commenter and organizations representing the commenter) assert that the Agency has significantly understated the potential costs of retrofitting to cooling towers. Based on the lack of supported or well reasoned suggestions for lowering costs given in the comment, the Agency is not inclined to concede that cooling tower costs may be understated. In fact, the Agency believes that should its estimates of cooling tower costs change in any direction, there would be a sufficient basis to raise the costs based on its review of the variety of substantial data and studies included elsewhere in the Phase II comment database.

Finally, the commenter asserts that facilities would choose to repower versus shut-down if the final rule would require a "closed-cycle retrofit mandate." The basis of this assumption is evidently two cases of repowering facilities along the Hudson river. While the Agency acknowledges that these repowering facilities indeed are examples of repowering cases that may adopt closed-cycle cooling for their new power plant projects, the Agency fails to see these two examples as evidence that “should” it adopt a cooling tower retrofit mandate that all other plants would choose to repower rather than retire. In fact, the Agency fails to see how the commenter has shown how the examples are even proof that the two power-plants arrive at their decisions to repower versus retire based on a mandate to retrofit to cooling towers. The Agency believes that a wide variety of economic decisions would influence the decision of a facility to repower, and there is no credible evidence given by the commenter that shows that the vast majority of facilities facing critical financial difficulties across the country, through bankruptcies in many cases, would make a “repower versus retire” decision when faced with extreme capital cost requirements, the potential for extended connection outages, and high recurring operation and maintenance costs.

Comment ID 316bEFR.404.059

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02.03

Use of Replacement Costs (HRC and hatchery-based)

THE HABITAT REPLACEMENT COST METHOD OF VALUATION PROVIDES A REASONABLE LOWER BOUND ESTIMATE OF MONETARY BENEFITS.

In several of its case studies, EPA uses calculations of habitat-based replacement cost (HRC) to value the benefits of the regulatory alternatives. Use of the HRC method is based on the following rationale: Natural ecosystems produce numerous interrelated benefits, some of which are difficult or impossible to quantify, as EPA has admitted in the preamble and EBA. Thus, given the constraints of time, resources, data and human ability to quantify complex systems, a simpler approach is to calculate -to the extent possible -the replacement cost of the ecosystem that provides the benefits.<FN 176>

As Dr. Ackerman explains in his report, restoration cost is used as a measure of damages under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) for Superfund sites; under the National Marine Sanctuaries Act; and under the oil spill provisions of the Clean Water Act. Use of restoration costs was explicitly upheld in State of Ohio vs. US Dept of Interior, in which the US. Court of Appeals for the District of Columbia Circuit held in the CERCLA context:

Congress established a distinct preference for restoration cost as the measure of recovery in natural resources damage cases.<FN 177>

Insurance companies frequently value damages to property at estimated replacement cost. Valuation of assets at replacement cost is also a common practice in macroeconomics, where depreciation is routinely valued at replacement cost. For example, for a marketed asset, market value (as opposed to book value) is set at the current replacement cost. Such valuation is essential in understanding investments. Likewise, any detailed analysis of capital costs focuses on “economic depreciation”, or the replacement cost of consumed capital, as distinguished from accounting measures of depreciation based on book value or tax laws.<FN 178>

HRC valuations are often more expensive than other approaches to valuation. However, this is to be expected in light of the incompleteness of valuation when each particular service or benefit must be separately estimated. A separately evaluated list benefits might, if thorough and complete, show higher benefits than HRC because nature is generally more efficient in producing “ecosystem services” than artificial replacements can be, and because restoration cannot not completely restore what was destroyed. But since EPA’s itemization of benefits is utterly incomplete and significantly undervalues the benefits of cooling towers, HRC provides a closer approximation of true benefits.

Despite its limitations, HRC is valuable contribution to the process of valuation and provides a reasonable lower bound estimate of benefits. As a result, Dr. Ackerman recommends that EPA explore HRC valuation of additional sites, to broaden the data and analysis used in the estimates of benefits in this case. Specifically he recommends that EPA revise and expand the EBA Case Studies Chapter A11, explaining and supporting HRC calculations, discussing the theoretical basis for HRC, and identifying categories of ecosystem value that are not measured by any other techniques.<FN 179>

Footnotes

176 It is not possible to fully replace the aquatic organisms and ecosystem that are destroyed by impingementand entrainment at power plants. Attempts at “replacing” fish and other aspects of the environmentmay provide some benefit to some species, but cannot duplicate the natural systems which were destroyed, as the Pisces Phase II Report explains at pp. 48-60. As a result, HRC will not value 100% of the loss, but only some portion of it.

177 880 F.2d 432,458 (1989).

178 Ackennan Phase II Report at p. 14, citing Frank C. Wykoff, “Economic Depreciation and the User Cost of Business-Leased Automobiles,” and other essays in Dale W. Jorgenson and Ralph Landau, editors, Technology and Capital Formation (MIT Press, 1989).

179 Ackerman Phase II Report at p. 13.

EPA Response

The agency agrees that replacement/restoration costs are a useful tool in the regulatory process and in federal and EPA programs. Please see response to comments #316bEFR.005.035, #316bEFR.005.006, and #316bEFR.206.067.

Comment ID 316bEFR.404.060

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 7.01.03

Option 3--Site-specific determination

THE ALTERNATIVE SITE-SPECIFIC APPROACHES TO DEFINING BTA WOULD UNFAIRLY BURDEN THE PUBLIC AND WOULD CONTRAVENE THE CLEAN WATER ACT.

In the preamble to the Phase II Proposal, EPA requested comment on several site-specific regulatory alternative approaches for determining BTA. These alternative approaches operate on an even more case-by-case and site-specific basis than the Phase II Proposal, which has one site-specific compliance option, Track III. Four site-specific approaches are described in the preamble: an EPA-developed "sample site-specific rule," complete with proposed regulatory text; a site-specific alternative based on EPA's 1977 draft guidance; a regulatory approach suggested by the Utility Water Act Group (UWAG); and a regulatory approach suggested by the Public Service Electric and Gas (PSEG).<FN 180> Each of these approaches contravenes both the letter and the spirit of the Clean Water Act and should be given no further consideration by the Agency.

Footnotes

180 67 Fed. Reg. 17159-17162.

EPA Response

Please refer to the response to comment 316bEFR.206.068 and the preamble to the final rule, which explains why EPA rejected these alternatives.

Comment ID 316bEFR.404.061

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.01

Require closed cycle cooling

EPA states that the site-specific approaches “would be based on the view that the location of each power plant and the associated intake structure design, construction, and capacity are unique, and that the optimal combination of measures to reflect [BTA] for minimizing [AEI] must be determined on a case-by-case basis.” <FN 181> But this is clearly wrong. Almost without exception, impacts from cooling water intake structures are reduced by between one and two orders of magnitude by conversion from once-through to closed-cycle cooling. While other additional measures may be appropriate based on location, adverse environmental impacts cannot be minimized without closed-cycle cooling, and thus cooling towers must be required unless they are wholly disproportionate to the benefits (e.g., the highly unusual circumstance where a plant is located in a waterbody that-has no fish).

Footnotes

181 67 Fed. Reg. 17159.

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.062

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 17.06

Option: Site-specific determination of BTA

Any site-specific approach would favor industry stakeholders and present an unreasonable burden on environmentalists and local officials. As EPA correctly recognized in its Phase I preamble:

The historical case-by-case approach requires significant resources on the part of the regulatory authorities that must implement section 316(b) requirement. [It] requires that each regulated facility must develop, submit, and refine studies that characterize or estimate potential adverse environmental impact. Such studies can take several years to complete and require the support of a multi-disciplinary team. In addition, given the iterative nature of the assessment process, industry as well as EPA regional and State regulatory authorities must expend significant resources assessing study plans and methods for characterizing the environmental impact occurring at each facility and evaluating those data to determine what constitutes BTA for each specific facility. <FN 182>

EPA actually understates the burden. Public commenters and intervenors have few resources to evaluate even the initial multi-disciplinary impact studies and volumes of technical supporting documents regarding CWIS characteristics and ecosystem impacts, let alone the months or years of hearings typically needed to adjudicate scientific disputes. Local officials and environmental advocates whose resources are dwarfed by those of industry should not be forced to counter industry's elaborate and self-serving technical obfuscation on generally applicable protection principles.

Footnotes

182 65 Fed. Reg. At 49079.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.

Comment ID 316bEFR.404.063

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 2.04.05

Implement a site-specific alternative

Any approach that does not set specific national, uniform performance standards for the critical determination of capacity minimization would also violate the Clean Water Act. By leaving the BTA determination to the NPDES permit writer (state agencies in delegated states and EPA regional offices in non-delegated states), EPA would have abdicated its non-discretionary duty under Section 316(b) to set national BTA standards for generally applicable impact minimization parameters. Local agencies could require different technologies based on a variety of considerations outside the Clean Water Act, or could be forced to do so by the resources of industry applicants. The result of this approach would inevitably be that different facilities and states would have different BTA requirements for CWISs, thus ensuring inconsistent protection and potentially even reviving the "race to the bottom." To avoid creating a disincentive to power generators in a deregulated energy environment, or to avert fears of increased energy costs, states might be even more reluctant to establish stringent measures than they were in the pre-1972 context.

EPA Response

In today's rule, EPA explicitly provides that under section 510 of the CWA nothing in the rule precludes or denies the right of a state or political subdivision of a state or an interstate agency to adopt or enforce any requirement with respect to control or abatement of pollution that is not less stringent than those required by Federal law.

Comment ID 316bEFR.404.064

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 2.04.02
Apply 316(b) before a det. of impact/AEI

Furthermore, the approaches suggested by industry would require the agency to define the phrase "adverse environmental impact" in section 316(b). The basic purpose of such a definition would be to require a determination of adverse environmental impact as a threshold before a permitting agency would even consider mandating BTA. Industry is trying to create an additional procedural hurdle to the regulation of cooling water intake structures, by requiring that a proposed CWIS attain a threshold of adverse impact before best technology can be required. That approach, however, is wholly unnecessary and inconsistent with the language of Section 316(b) and the structure of the Clean Water Act. <FN 183> The only threshold requirements for application of Section 316(b) standards are that facilities include a point source (which is a NPDES permit prerequisite), must be in an industry subject to Section 301 and 306 standards (which includes all significant users of cooling water), and must have a cooling water intake structure.

At the very least, determination of AEI as a threshold to regulation provides for months or years of delay, consuming the resources of agencies and intervenors alike, and in the case of existing facilities, unnecessarily continuing the slaughter of aquatic organisms. The New York State Department of Environmental Conservation ("DEC") has adopted the correct policy regarding adverse environmental impact as a regulatory threshold. DEC "considers the death of any fish at or through a cooling water intake to be an 'adverse impact.'"<FN 184> Like the NYS DEC, EPA should refuse to allocate public fish and wildlife resources to electric energy generators or other cooling water intakes. Congress drafted section 316(b) to minimize adverse impacts, and not merely to ensure the protection of a balanced, indigenous population as provided in section 316(a). In light of the Phase II Proposal's 50 MGD regulatory threshold (which assures that every in-scope facility will be one that causes adverse environmental impact) defining and determining the level of AEI should not create an unnecessary threshold to BTA regulation.

While it is not realistic to expect to save every fish, the killing of any aquatic life by cooling water intake structures is the adverse impact that EPA must minimize by requiring best available technology under section 316(b). Industries' proposed definition and threshold determination of AEI would complicate and delay this task.

Footnotes

183 For an in-depth discussion of why determination of AEI as a threshold to section 3 16(b) determination is both unnecessary and contravenes the Clean Water Act, see Super, R. W., and D. K. Gordon, Minimizing adverse environmental impact: how murky the waters?, The Scientificworld JOURNAL (2002) 2, 219-237.

184 New York State Department Of Environmental Conservation, Division Of Fish, Wildlife, and Marine Resources, "Clean Water Act Section 316(b), Statement provided to U.S. EnvironmentalProtection Agency at June 29, 1998 public meeting to discuss adverse environmental impacts resulting from cooling water intake structures."

EPA Response

See preamble to the final rule, particularly sections III, VII, and VIII, and supporting documents.

Comment ID 316bEFR.404.065

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code NEW
Comment on new (Phase I) facility rule

THE SEGMENTS OF THE REGULATORY COMMUNITY DEFERRED TO LATER PHASES OF THIS RULEMAKING SHOULD BE REGULATED BASED ON IMPACTS, NOT TIMING.

Pursuant to the Amended Consent Decree in Riverkeeper v, Whitman, EPA's section 316(b) rulemaking has been divided into three phases. In Phase I, EPA is required regulate all new facilities using a cooling water intake structure; Phase II must address all existing power plants above a threshold level; and Phase III captures the power plants below the Phase II threshold, as well as existing non-power plant facilities. EPA has, however, made at least two deviations from that tri-furcated scheme, by deferring regulation of certain segments of the regulated community to later phases. In both cases, EPA claimed the deferral was necessary because it lacked adequate information on the relevant industrial group during the earlier regulatory phase.

Specifically, in the Phase I NODA EPA stated that it had not considered or projected impacts on offshore and coastal oil and gas drilling facilities in its Phase I proposal. <FN 185> As a result, EPA considered not including these facilities within the scope of the Phase I rule, and instead addressing them within the scope of the Phase II or Phase III rulemaking.<FN 186> In the final Phase I Rule, EPA determined that it would "propose and take final action on regulations for new offshore and coastal oil and gas facilities, as defined at 40 CFR 435.10 and 40 CFR 435.40, in the Phase III section 316(b) rule." <FN 187>

In addition, in the Phase I rule, EPA attempted to define "new facility" more narrowly than the definition under Section 306:

Modifications to an existing cooling water intake structure that do not serve the cooling water needs of a greenfield or stand alone facility in 40 CFR 122.2 and 122.29(b)(l), (2), and (4)(i.e., a facility that meets the definition of new source or new discharger and commences construction after the effective date of the rule) do not constitute a new facility subject to this rule. Thus, the definition of new facility under this rule is narrower than the definition of new source under section 306 of the CWA.

EPA's intent in defining "new facility" for purposes of the Phase I scope was to exclude any facility built at a site where there is currently an existing operation devoted to the same industrial purpose, regardless of whether its industrial process are substantially independent of the existing facility at the same site.'" For example, adding a new electric-generating unit (whether peaking or not) at an existing power plant site would not be a new facility under Phase I, but would be an existing facility under Phase II, under EPA staffs interpretation. <FN 190>

As with oil and gas extraction facilities, EPA chose to delay the regulation of these new source facilities from Phase I to Phase I1 because it lacked information during the earlier rulemaking phase:

EPA generally deferred regulation of new sources constructed on a site at which an existing source is located (see 40 CFR 122.29(b)(3)) until the agency completes analysis of its survey data on existing facilities.<FN 191>

Thus, with both deferrals, EPA has not claimed that the relevant segment of the regulated community should be subject to the same regulations as the facilities in the later phase, only that their regulations should be promulgated at the same time as the regulations for the facilities in the later phases. But EPA has ignored this important point in the Phase II proposal.

The Phase II Proposal makes no distinction in its thresholds or standards between existing facilities and those facilities that are new sources under CWA Section 306 and were purportedly not included as new facilities under the Phase I rule. But such facilities, because they are actually new facilities and are substantially independent from industrial processes at the existing facility on the same site, have the flexibility to install the technologies required in the Phase I rule. EPA has not established why these facilities should instead be regulated like existing facilities. Now that EPA has the survey data it was waiting for, it should do one of two things in promulgating the Phase II rule: either (1) amend the definition of new facility in 40 CFR 125.83 to make clear that such definition will be consistent with the new source definition under CWA section 306 with respect to substantially independent processes; or, (2) if these new source facilities are to be considered existing facilities for section 316(b)purposes, EPA should provide separate standards for them consistent with the new facility standards.

Similarly, in Phase III, when promulgating regulations for existing industrial and small power plant facilities, EPA should not subject new oil and gas extraction facilities to those same (likely, more lenient) regulations by default. Rather, EPA should either include new oil and gas extraction facilities in the definition of new facilities (and thereby subject them to the Phase I standards) or should provide separate appropriate standards for that industry. With respect to the environmental impacts of offshore oil rigs, it is clear that such structures act like artificial reefs and are therefore extremely effective at attracting fish, which would then be exposed to impingement and entrainment.<FN 192> Indeed, industry has claimed that their oil rigs make excellent fishing spots. Thus, stringent cooling water intake regulations are necessary to protect fish at these facilities.

Footnotes

185 66 Fed Reg. at 28856.

186 66 Fed. Reg. at 28857.

187 66 Fed. Reg. at 6531.1

188 66 Fed. Reg. at 65259 (emphasis added)

189 Telephone conversation with EPA staff, January 31,2002.

190 Id. Whether the codified text of the Phase I regulations actually accomplisheswhat the preamble and staff claim to have intended is far from certain. Reading the regulations alone, the definition of new facility at 40 CFR 5 125.83 appears to be consistent with, not narrower than, the definition of new source under CWA Section 306 and 40 CFR 122.29 because the references and citations in the Phase I rule to “stand alone” and “greenfield” facilities (40 CFR 122.29(b)(l)(i),(ii), and (iii)) and the “substantially independent”test for stand-alone facilities have been incorporated into 40 CFR 125.83.

191 66 Fed. Reg. at 65286.

192 See PISCES Consulting, Ltd., Comments on new data and approaches for the regulation of cooling water intake structures, prepared by Dr. P.A. Henderson, June 22, 2001 at p. 1.

EPA Response

Please refer to the response to comment 316bEFR.206.073.

Comment ID 316bEFR.404.101

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Environmental Defense Fund. March 1984. The Tuolumne River: Preservation or Development? An Economic Assessment.

EPA Response

EPA has reviewed this submission. The Agency assessed the attached study for potential applicability to the 316(b) benefits assessment. However, EPA has not included quantitative measures of nonuse values in the final 316b rule analysis due to unavoidable uncertainty in monetizing non-use values for this rule. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN #6-0002).

Comment ID 316bEFR.404.102

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Reed Super
Organization Riverkeeper, Inc.

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Carson, R.T., et al. Undated. Contingent Valuation and Lost Passive Use: Damages from the Exxon Valdez.

EPA Response

EPA has reviewed this submission. The Agency assessed the attached study for potential applicability to the 316(b) benefits assessment. However, EPA has not included quantitative measures of nonuse values in the final 316b rule analysis due to unavoidable uncertainty in monetizing non-use values for this rule. For detail see Chapters A12, C6, D6, and G6 of the final Phase II Regional Studies Document (DCN # 6-0003) and Chapter D1 (break-even analysis) of the final Phase II EBA document (DCN # 6-0002).

Comment ID 316bEFR.404.103

Subject Matter Code 10.02
Benefit Estimation Methodology

Author Name Reed Super
Organization Riverkeeper, Inc.

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Sen, Amartya. 2000. The Discipline of Cost-Benefit Analysis. Journal of Legal Studies, vol. XXIX (June 2000):93 1-952.

EPA Response

EPA has reviewed this submission.

Comment ID 316bEFR.404.104

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Various Articles from the University of Pennsylvania Law Review, Vol. 150, No. 5. May 2002. 3 selected pages.

EPA Response

EPA has reviewed this submission.

Comment ID 316bEFR.404.105

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Loomis, J.B. & White, D.S. 1996. Economic Benefits of Rare and Endangered Species: Summary and Meta-Analysis. Ecological Economics 18 (1996) 197-206.

EPA Response

EPA has reviewed this submission. The Agency relied on the above-referenced study together with other studies of economic benefits of improved protection of rare and endangered species in developing a benefit transfer approach to valuing reduction in mortality of threatened and endangered species resulting from the final 316(b) regulation. See Chapter A13 of the final Phase II Regional Studies Document (DCN #6-0003) for detail.

Comment ID 316bEFR.404.106

Subject Matter Code 11.0

Role of Restoration

Author Name Reed Super

Organization Riverkeeper, Inc.

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Einum, S. & Fleming, LA. 1997. Genetic Divergence and Interactions in the Wild Among Native, Farmed and Hybrid Atlantic Salmon. Journal of Fish Biology (1997) 50, 634-651.

EPA Response

EPA acknowledges receipt of this document and has reviewed its contents.

Comment ID 316bEFR.404.107

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 11.0

Role of Restoration

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Brown, C. & Laland, K. 2001. Social Learning and Life Skills Training for Hatchery Reared Fish. Journal of Fish Biology (2001) 59,471-493.

EPA Response

EPA acknowledges receipt of this document and has reviewed its contents.

Comment ID 316bEFR.404.108

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 11.0
Role of Restoration

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Thorhaug, A. 1986. Review of Seagrass Restoration Efforts. Ambio (1986) 15(2):471-493.

EPA Response

EPA acknowledges receipt of this document and has reviewed its contents.

Comment ID 316bEFR.404.109

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.01

Ecological Evaluation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Boreman, J. & Goodyear, C.P. 1981. An Empirical Methodology for Estimating Entrainment Losses at Power Plants Sited on Estuaries. Transitions of the American Fisheries Society 110:253-260, 1981.

EPA Response

EPA notes the submission of this information.

Comment ID 316bEFR.404.110

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 12.03

RFC: Entrainment vs. entrainment mortality

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Schubel, J.R., et al. 1977. Thermal Effects of Power Plant Entrainment on Survival of Larval Fishes: A Laboratory Assessment. Chesapeake Science Vol. 18, No. 3, p. 290-298. September.

EPA Response

EPA thanks the commenter for this submission. EPA has reviewed the study as part of this rulemaking.

Comment ID 316bEFR.404.111

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 10.01
Ecological Evaluation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Morgan, R.P. & Stross, R.G. 1969. Destruction of Phytoplankton in the Cooling Water Supply of a Steam Electric Station. Chesapeake Science Vol. 10, No. 3 & 4, p. 165-171.September-December.

EPA Response

EPA notes the submission of this information.

Comment ID 316bEFR.404.112

Author Name Reed Super
Organization Riverkeeper, Inc.

Subject Matter Code 10.02
Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Seelye, K.Q. & Tierney, J. 2003. “EPA Drops Age-Based Cost Studies.” The New York Times. May 7, 2003, Section A; Page 34; Column 1; National Desk.

EPA Response

EPA has reviewed this submission.

Comment ID 316bEFR.404.113

Subject Matter Code MISC
Miscellaneous comment

Author Name Reed Super
Organization Riverkeeper, Inc.

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

University of Alaska Sea Grant College Program. 1999. Ecosystem Approaches for Fisheries Management. 16th Lowell Wakefield Fisheries Symposium. Report No. 99-01.

EPA Response

EPA notes the attachment. Thank you.

Comment ID 316bEFR.404.114

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Link, J. 1999. (Re) Constructing Food Webs and Managing Fisheries. Ecosystem Approaches for Fisheries Management, Alaska Sea Grant College Program, AK-SG-99-01, 1999.

EPA Response

EPA notes that it has received this information.

Comment ID 316bEFR.404.115

Author Name Reed Super

Organization Riverkeeper, Inc.

Subject Matter Code 10.02

Benefit Estimation Methodology

Riverkeeper submitted with late comment (OW-2002-0049, 5-2.4 in the docket or 316bEFR.404 in this database) the following attachment:

Okey, T.A. & Pauly, D. 1999. A Mass-Balanced Model of Trophic Flows in Prince William Sound: Decompartmentalizing Ecosystem Knowledge. Ecosystem Approaches for Fisheries Management, Alaska Sea Grant College Program, AK-SG-99-01, 1999.

EPA Response

EPA notes receipt of this information.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

William Hogarth

On Behalf Of:

National Marine Fisheries Service

Author ID Number:

316bEFR.405

Comment ID 316bEFR.405.001

Author Name William Hogarth

Organization National Marine Fisheries Service

Subject Matter Code SUP

General statement of support

In comments on the Phase I rule, dated December 18, 2000, NOAA stated that it supported the EPA's proposal to reduce impacts associated with the operation of new cooling water intake structures though the adoption of national minimum standards for the installation of cooling water intake technology.

EPA Response

No response necessary.

Comment ID 316bEFR.405.002

Author Name William Hogarth

Organization National Marine Fisheries Service

Subject Matter Code 18.01

RFC: Definition of "adverse environmental impact"

In those comments NOAA recommended that the EPA provide a definition for adverse environmental impact. NOAA feels this definition is even more necessary for existing plants because such facilities have less flexibility in addressing possible impacts with technology than plants on the drawing board.

EPA Response

No response is required for this comment as NOAA is a Federal partner in the rulemaking.

Comment ID 316bEFR.405.003

Author Name William Hogarth

Organization National Marine Fisheries Service

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

NOAA understands the practical differences between existing plants and proposed (new) plants. NOAA recognizes that it may be difficult to retrofit an existing plant with intake technology to meet performance standards. In that regard, NOAA believes that mitigation can have a greater role in Phase II rules than in those for Phase I. Technology should be the first choice in reducing an existing impact. However, if cost limits the retrofit of intake technology, mitigation such as habitat restoration should be considered to reduce the impact. Habitat restoration can be an important tool in aiding the recovery of fish populations and NOAA believes that this should be an option available to regulators.

EPA Response

No response is necessary.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Quinlan J. Shea

On Behalf Of:

Edison Electric Institute

Author ID Number:

316bEFR.406

Comment ID 316bEFR.406.001

Author Name Quinlan J. Shea

Organization Edison Electric Institute

Subject Matter Code 10.1

General: cost tests

I am writing to clarify a point made in the second paragraph on page 11 of those comments. [see 316bEFR.328.008] EEI indicated that -- because it was unable to obtain facility-specific assumptions EPA used to generate its estimates of the nationwide cost of the proposed regulations -- EPA should not share this cost information with other regulators, "in particular for use as a starting point in developing permit requirements."

However, by making that comment, EEI did NOT mean for EPA to withhold the information from facility owners. Facility owners need information about EPA's technology and cost assumptions for their individual facilities for the purposes of applying the "cost-cost" test in the proposed rule. Therefore, EEI requests that the agency make available to each facility owner EPA's assumptions as to both the technology that would apply at the facility and the cost of that technology at the facility. EPA should make this information available to facility owners now and upon request at any time in the future.

As a member of the Utility Water Act Group (UWAG), EEI fully supports UWAG's interpretation of the cost-cost test, as set out in UWAG's comments on the NODA and the underlying proposed regulations. Properly applied, the cost-cost test must compare the cost of the technology that EPA assumed for a given facility in promulgating the rule with the cost of technology the facility would actually be required to adopt to meet the proposed rule's performance standards. The point of the cost-cost test is to allow for site-specific relief if a facility would otherwise bear a significantly greater cost than EPA assumed in analyzing the proposed rule. Thus, in order for facility owners to properly apply the cost-cost test, EPA needs to make the underlying technology and cost assumptions for each facility available to the facility owner.

EPA Response

EPA notes that it received this letter from the commenter far after the close of the notice of data availability open comment period. Due to the very delayed submittal of the information, EPA attempted as best as it could, considering the limited time frame, to fully consider the comments.

EPA has no legal obligation to respond to such late comments. See e.g., Personal Watercraft v. Dept. of Commerce, 48 F.3d 540 (D.C. Cir. 1995). Nevertheless, EPA has attempted to respond to these comments to the extent possible.

The Agency notes that the cost-cost test included in the final rule is implementable without the necessity to share facility-specific confidential information with the permit authority. EPA also notes that the permit authorities have the legal means to obtain facility-specific information in determining conditions of permits affecting said facilities, provided that the information is germane to the permit requirements or supporting analysis of the permit.

See response to comment 316b.EFR.410.001 for EPA's response to the referenced comment on the cost-cost test.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Mike Huckabee

On Behalf Of:

State of Arkansas, Office of the Governor

Author ID Number:

316bEFR.407

Comment ID 316bEFR.407.001

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

States have been implementing section 316(b) for more than 30 years and have developed significant expertise in the regulation of cooling water intake structures, as have the power plant owners that would be directly affected by the proposed rule. The proposed rule has enormous potential cost and energy impacts for the regulated utilities and their customers.

The proposed rule presents an opportunity to fulfill EPA's commitment to an effective Federal-State partnership and a regulatory regime that is flexible, cost-effective, and based on sound science. To avoid substantial disruption to state water quality programs and to our electric energy supply, it is important that the EPA preserve flexibility in the proposed rule by allowing use of equivalent state programs, preapproved technology in defined circumstances, site-specific variations, reasonable methods for assessing costs and benefits of particular cooling water intake structure options without understating the costs or inflating the benefits, and habitat restoration as an option or adjunct to technology and operational measures.

EPA Response

EPA recognizes the potential impact to Directors and has developed today's final rule with tremendous flexibility. Existing State 316(b) programs may be approved under 125.90(c). The final rule provides an approved technology compliance alternative in 125.94(b)(4); a site-specific determination of BTA is also available for facilities whose costs may be significantly greater than EPA's estimated costs or whose costs may be significantly greater than the benefits of complying with the national performance requirements. EPA has also included the provision of the Technology Installation and Operation Plan in 125.94(d). EPA believes that these and other flexibilities in the final rule will help to avoid any disruption to State water quality programs and the electric energy supply.

Comment ID 316bEFR.407.002

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

Subject Matter Code 17.02

Option: Reduce capacity comm. with closed-cycle

In addition, it is equally important that EPA not mandate the use of cooling towers or other particular technology or operational measures across-the-board at power plants that rely on cooling water. Such an across-the-board mandate would fail to recognize the substantial variation in circumstances at each plant, as well as in the feasibility and cost of various cooling water intake options. It would also stifle innovation and would substantially increase the costs of implementing 316(b) without producing corresponding benefits.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161) in today's final rule. Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

For a variety of reasons, EPA opted not to implement a regulatory approach based solely upon closed-cycle, recirculating cooling. Please refer to section VII.E of the preamble for more information on why EPA rejected this alternative.

Comment ID 316bEFR.407.003

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

Subject Matter Code 10.07

RFC: Cost: benefit ratio for site-specific BTA?

I encourage the EPA to allow the use of site-specific variations whenever the cost of the technology that would otherwise be required exceeds the EPA's anticipated cost or expected benefits.

EPA Response

The final rule includes a site-specific compliance alternative. See 125.94. Also see preamble to the final rule, particularly sections VII and VIII for a discussion of all compliance alternatives.

Comment ID 316bEFR.407.004

Subject Matter Code 21.09

Permit applications/implementation schedule

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

I also urge the EPA to provide transition provisions for the new rule, delaying its effective date for at least two years from the date it is issued, and allowing use of compliance schedules.

EPA Response

See response to comment 316bEFR.025.019.

Comment ID 316bEFR.407.005

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

Subject Matter Code 21.04

Determination of compliance

I also support clarification that indicator species can be used in determining biological impacts of intake structures, and that those impacts are to be evaluated at a population level. Further, when NPDES permits for these facilities come up for renewal, if circumstances have not fundamentally changed, little, if any, new information should be required of the applicant, and the renewal process should be quite streamlined.

EPA Response

In today's final rule, EPA has not prescribed the methods for determining compliance. Rather, the permit applicant may propose the parameters for determining compliance in the Verification Monitoring Plan (125.95(b)(7)), Technology Installation and Operation Plan (125.95(b)(4)(ii)), if selected, and, if applicable, the Restoration Plan required at 125.95(b)(5), for review and approval by the Director. For a discussion of how compliance is to be determined, please see, e.g., EPA's response to comment 316bEFR.017.003. For EPA's explanation of EPA's monitoring requirements, please refer to EPA's response to comment 316bEFR.307.027. Also please see the final rule preamble for a discussion of the Technology Installation and Operation Plan.

Comment ID 316bEFR.407.006

Author Name Mike Huckabee

Organization State of Arkansas, Office of the Governor

Subject Matter Code 21.05

Role of States and Tribes (alt./equiv. programs)

Water quality is site-specific, and the design, location, and circumstances of each power plant are unique. Therefore, a decision framework that allows permit applicants to point to site-specific factors in seeking a reasonable regulatory outcome will help produce the most cost-effective and environmentally beneficial outcomes. I encourage you to build on the solid foundation of state experience with site-specific decision-making regarding section 316(b) of the Clean Water Act. I am encouraged that the proposed rule recognizes the site-specific nature of the issue, providing several compliance options based on cost-benefit and cost-cost analyses and most importantly, rejecting any mandate for the use of one technology in a one-size-fits-all approach.

The EPA should consider fortifying the proposal to encourage States to maintain, promote, and refine existing programs that implement section 316(b), including an alternative that accommodates facilities that have already demonstrated no adverse environmental impact. That would streamline the hundreds of permits each state must administer, reduce permit backlog, and maintain the integrity of state programs in this area. In many cases, environmentally protective and responsible decisions have already been rendered in accordance with appropriate stakeholder input. To require these decisions to be re-evaluated and permits reissued is bureaucratic, unnecessary, costly, and counterproductive since there are additional water quality concerns that should be immediately addressed.

EPA Response

In today's final rule, EPA has included the site-specific determination of BTA as 125.94(c) in recognition of the unique characteristics that some sites may pose.
EPA has also included a mechanism to approve existing State 316(b) programs under 125.90(c). Please see response to 316bEFR.023.001. However, EPA disagrees with allowing historical determinations of BTA to be used to meet compliance requirements of today's rule. This issue is discussed more fully in the response to comment 316bEFR.040.001.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Kathleen Hartnett White

On Behalf Of:

Texas Commission on Environmental Quality

Author ID Number:

316bEFR.408

Comment ID 316bEFR.408.001

Author Name Kathleen Hartnett White

Organization Texas Commission on Environmental Quality

Subject Matter Code 21.08

Burden on permitting agencies (general)

TCEQ is aware of the need to mitigate the effects of entrainment and impingement of aquatic organisms in cooling water intake structures, but the agency is also concerned about implementation costs for state agencies responsible for the requirements under the National Pollutant Discharge Elimination System. In previous correspondence, the agency estimated that the costs for permit administration in Texas would be about $1,712,451 to $4,127,085 over the first five years, depending on the number of site-specific demonstrations. Representatives of electric generating utilities in Texas have indicated that most facilities will choose to conduct site-specific studies.

EPA Response

EPA is sensitive to the resource limitations of some States. Since proposal and NODA, EPA has added many efficiencies to today's final rule to assist in speeding implementation and reducing application burden. Please see EPA's response to comment 316bEFR.034.005. EPA has provided five compliance alternatives including a site- specific determination of BTA, with the Director's approval. Because of the multiple compliance alternatives and the availability of the Technology Installation and Operation Plan as discussed in the preamble to today's rule, EPA believes that most facilities will not seek compliance via a site-specific determination of best technology available. Only a handful of facilities are expected to pursue the site-specific determination of best technology available.

Comment ID 316bEFR.408.002

Subject Matter Code 8.02

Proposed standards for lakes and reservoirs

Author Name Kathleen Hartnett White

Organization Texas Commission on Environmental Quality

The majority of facilities in Texas that would be subject to the proposed regulations are constructed on reservoirs designed to be cooling water impoundments for a specific facility. These impoundments were constructed in the watersheds of relatively small streams that usually provide opportunities for public fishing and aquatic recreation. Many of the fisheries are maintained and manipulated by stocking a variety of non-native fish species. The regulatory histories, uses, and ecosystems of these cooling water impoundments are markedly different from natural lakes and larger mainstream impoundments.

EPA Response

Please refer to the response to comment 316bEFR.041.551 for a discussion of the biology of reservoirs.

Comment ID 316bEFR.408.003

Author Name Kathleen Hartnett White

Organization Texas Commission on Environmental Quality

Subject Matter Code 7.01.03

Option 3--Site-specific determination

Therefore, the agency has concluded that prescribing specific technology is inappropriate in this instance, and that rules governing this particular issue should address the unique characteristics, flora, and fauna present in the water body. The agency supports options that allow industries to choose appropriate specific technologies or present site specific data and studies to determine the best protective approach for the site. This approach could significantly reduce compliance and administrative costs and still protect sensitive aquatic ecosystems.

Once again, I appreciate the opportunity to submit these comments, and urge EPA to continue to consider flexible, site specific methods to achieve the requirements of Section 316(b) of the Clean Water Act.

EPA Response

EPA agrees that flexibility for permittees is an important consideration and notes that the final rule contains five compliance alternatives from which a permittee may choose. Please refer to the preamble for a discussion of the framework of the final rule.

EPA notes that the final rule includes a site-specific compliance alternative, which includes a provision for a cost-cost and cost-benefit test. Please refer to the response to comment 316bEFR.338.002 for more information.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Gary Myers

On Behalf Of:

Tennessee Wildlife Resources Agency

Author ID Number:

316bEFR.409

Comment ID 316bEFR.409.001

Author Name Gary Myers

Organization Tennessee Wildlife Resources Agency

Subject Matter Code 11.01

RFC: Proposed use of restoration measures

The Tennessee Wildlife Resources Agency (TWRA) recommends the US Environmental Protection Agency (EPA) retain provisions for compensatory mitigation as a restoration and compliance option under Section 316 of the Federal Clean Water Act. In drastically altered aquatic systems, such as the Tennessee and Cumberland Rivers, compensatory mitigation is an option that can provide maximum ecological and recreational benefit. Restoration of waters for classified uses such as fish and aquatic life and recreation use, including sport fishing, are established goals of both federal and state water quality law.

Tennessee opted to include compensatory mitigation as part of the 316(b) consideration for the National Pollutant Discharge Elimination System (NPDES) John Sevier Steam-Electric Facility on the Holston River in Hawkins County, Tennessee. The Holston River at this location changes seasonally from riverine to reservoir depending on the surface elevation of Cherokee Reservoir, water temperature at this location is a function of releases from Ft. Patrick Henry Reservoir, and sediments in the John Sevier retention reservoir are contaminated by mercury from the former Olin Corporation facility in Saltville, Virginia. In this complex situation, compensatory mitigation was the preferred alternative for maximum ecological and recreational benefit.

Since 1977, mitigation ponds constructed at the TWRA Normandy Hatchery have produces more than 4.3 fingerlings of eleven sport fish species. These ponds will continue to produce fingerlings for the foreseeable future.

Between 1982 and 1995, TVA stocked over 5 million hatchery-reared walleye, saugeye, and paddlefish fingerlings, and over 1.5 million saugeye fry into Cherokee Reservoir. Throughout this period, paddlefish numbers in Cherokee continued to increase and the survival of stocked fish was good. Saugeye (a walleye x sauger hybrid, selected by the Tennessee Wildlife Resources Agency) demonstrated good to excellent growth and survival; a strong sport fishery was established. Stocked walleye also survived and grew to catchable size in Cherokee, and thereby a fishery was also established for that species. From 1993 until the present, TWRA, as a part of this restoration program, has stocked 67,275 blue catfish, 1,225,837 black crappie, 274,238 hybrid striped bass, 11,416 paddlefish, 472,259 sauger, 25,328 hybrid striped bass, 1,065,200 striped bass, 580,823 walleye, and 44,126 white crappie.

TWRA's 2002 estimate of value of stocked fisheries to Cherokee Reservoir anglers (daily expenditures only) as approximately $731,310. This is a conservation estimate for the single year 2002. This would equate to $7 million in recreational fishing on Cherokee Reservoir and the Holston River over the last decade. TDEC continues to review the status of the restoration project at its 5-year renewal of the John Sevier NPDES permit, and to document restoration success as part of the permit rationale. 316(b) mitigation for the John Sevier facility includes enhanced public access and recreation facilities. Utilization and enjoyment of the public use area is year-round, and provides a variety of recreational opportunities, including wildlife viewing, sportfishing, picnicking, and boat launching.

We highly recommend that EPA retain compensatory mitigation as an option under Section 316 of the Clean Water Act.

EPA Response

In the final rule, EPA allows use of restoration to minimize or to help to minimize adverse environmental impacts that derive from impingement and entrainment of aquatic organisms. For a discussion of EPA's authority to include restoration measures as a compliance option in the final rule, see the preamble to the final rule.

For a discussion of the role of ancillary benefits, see EPA’s response to comment 316bEFR.032.011.

For a discussion of the role of state program priorities, see EPA’s response to comment 316bEFR.099.029.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

EEI

On Behalf Of:

Edison Electric Institute

Author ID Number:

316bEFR.410

Comment ID 316bEFR.410.001

Author Name EEI

Organization Edison Electric Institute

Subject Matter Code 10.1

General: cost tests

PROPER IMPLEMENTATION OF THE COST-COST & BENEFIT-COST TESTS IS ESSENTIAL FOR AN EFFECTIVE FINAL 316(B) RULE

Issue: A meaningful cost-cost test is one that ensures implementation costs bear a reasonable relationship to the site-specific and national costs EPA considered. It is an essential component of any effective final phase II 316(b) rule. The test provides the mechanism to balance general technology performance standards, site-specific circumstances and cost. The cost-cost provision was included in the proposed rule to ensure that the actual costs of meeting the performance standard ranges at a given site are not significantly greater than the costs the agency considered in developing those performance standards or have unacceptable unforeseen economic or social consequences.

EPA is considering a new option for implementing the cost-cost test. We have several significant concerns with this new approach. Specifically, we are concerned that:
1) This approach can result in the implementation of fundamentally different technology selections from those assumed by EPA in analyzing the impacts of the rule, rendering the agency's economic analysis used for justifying the regulation invalid;
2) This approach can result in a significant increase of transaction and compliance costs for states and permittees and;
3) This approach makes it more difficult for facilities and permit writers to justify alternative standards that take into account site-specific variations in cost and effectiveness – reducing the cost-effectiveness of the overall rule.

Background: EPA's proposed Phase II 316(b) rule includes two important provisions -- the "cost-benefit" and "cost-cost" provisions. Although both are crucial to the rule, this paper focuses on the cost-cost provision, addressing questions that have been raised about how the cost-cost provision should be properly applied. The application of tests such as these allows society's resources to be applied efficiently and results in better public policy than an approach that simply requires all facilities to meet uniform performance standards. However, how these tests are applied will determine their efficacy in individual permit proceedings. If these tests are not implemented correctly, the agency's purpose for including them in the proposed rule will be undermined.

EPA acknowledges that many features of cooling water intake structures (CWIS) affect the feasibility, cost and performance of environmental control technologies available to existing facilities. This is one of the reasons that EPA did not designate a single technology for installation at all facilities and chose to express its proposed numeric performance standards as ranges (e.g., 60% to 90% reductions in entrainment and 80% to 95% reductions in impingement mortality). These ranges reflect the inherent uncertainty in predicting the efficacy of a given technology at any one facility. See, e.g., Existing Facility Proposed Rule, 67 Fed. Reg. at 17,141 col. 3.

Because the Phase II 316(b) rule relates solely to existing power plants, any modifications to the CWIS entail a retrofit of the existing facility. This creates design constraints due to availability of land, location of other existing equipment, the nature of the existing intake design, the hydrological conditions (currents, velocity, sedimentation levels) in the source waterbody and site-specific factors (e.g., geology, soil type) that affect not only the type of technology available for installation at a given site but also the cost of installing and operating that technology.

Unlike traditional effluent limitation guidelines that are directed at reducing the amount of a pollutant in a wastestream, 316(b) is aimed at minimizing adverse impact on aquatic organisms present in the source waterbody. The types of organisms present and the natural fluctuations in both the number and types of organisms present are beyond the control of the permittee. These differences can result in differing levels of performance in reducing entrainment or impingement.

As EPA has recognized, these variations mean that facilities will need to identify best technology available (BTA) for meeting those performance standards. Moreover, there may be cases in which the cost of achieving those standards is significantly greater than the costs EPA considered or the value of the benefits likely to accrue.

EPA is currently considering two options on how best to implement the cost-cost test: (1) a comparison of costs EPA estimated for a facility against the costs that the permittee estimates for achieving compliance with the performance standard (Facility-Specific Test); and (2) a comparison of the costs the facility estimates for installing a given technology against the costs EPAwould have estimated for that technology had it applied that technology in its estimate of compliance costs for that facility (Technology Cost Test). The facility-specific cost test is the approach EPA outlined in the proposed rule; the technology cost test is not.

Discussion of Issues

I. Why is it essential to include the cost-cost test as part of the final Phase II § 316(b) Rule?

-The cost-cost test is a practical tool to address site-specific variability in costs: Many site-specific factors affect the feasibility, cost, performance and benefits of different fish protection technologies for cooling water intake structures. Although EPA compiled a substantial amount of information about CWIS technology performance generally, and about the features of Phase II facilities and their source waters, neither EPA nor the regulated community has yet done the site-specific studies necessary to determine which of the several technology alternatives that EPA considered (or others that EPA did not consider) is the "best available" for meeting the performance standards at any given site or set of sites. Recognizing the greater degree of variability inherent in this rulemaking when compared to a typical technology-based rulemaking, EPA included the “cost-cost” test in the proposed rule. The test allows the establishment of site-specific alternative limits in cases where the actual costs a facility would incur is significantly greater than the costs EPA considered. See, e.g., Existing Facility Proposed Rule, 67 Fed. Reg. at 17,221 col. 1.

-The cost-cost test is administratively simple: The cost-cost test provides a relatively simple means for permittees and permit writers to identify compliance costs that are beyond what the EPA considered to be reasonable in establishing the numerical standards. The cost-cost test also provides a clear baseline for the evaluation of alternative BTA selection.
-The cost-cost test complements the cost-benefit test: In classic regulatory analysis, the adoption of a standard should be based on a careful analysis of the benefits and costs of the options. The 316(b) guidelines allow a permittee to propose an alternative standard if it can show that the costs of

applying the performance standard exceed the benefits. The cost-cost test is an important complement to the cost-benefit test in cases where a detailed cost/benefit analysis may be difficult, expensive or time-consuming. In such cases, the cost-cost test can serve as a simple but effective proxy for a more complex benefits analysis. EPA's difficulties in estimating the national benefits of its proposals is clear indication that there will be a number of instances where a permittee cannot undertake a full benefit-cost analysis, but can nonetheless justify the need for a site-specific alternative performance standard through the use of the cost-coat test.

II. Why is it important to ensure that the test is applied comparing unit costs to unit costs?
-The rule must provide a known and defensible baseline as a basis for cost comparisons: For the cost test to function properly, it is crucial to know what costs to use as the baseline for the cost comparison. Unless the baseline costs are the same as, or at least bear some reasonable relationship to the costs EPA actually considered for each site, the cost-cost test will not serve the purpose for which it was intended. Ultimately, this will undermine the effectiveness, fairness, and legitimacy of the rule.
-A unit cost to unit cost comparison ensures that actual costs will remain consistent with EPA's economic analysis: To evaluate the costs and economic impacts of its preferred approach, EPA used available data and made judgments about which of the technologies would be most likely to achieve the performance standard for each affected facility, without regard to cost. Then, for each facility, EPA estimated the likely site-specific cost of the selected technology. The costs EPA considered ranged from $ 0 to around $23 million. EPA used the site-specific cost estimates, to assess (1) the effects of the performance standard on the economic viability of each facility, and the resulting risk of plant closures; (2) the effect of plant closures on local, regional, and national electricity supplies; (3) the total national cost of the rule and the regional and national economic impact of those costs. In short, the site-specific cost estimates, which are highly technology-dependent, are the foundation of EPA's entire national cost analysis, as well as of the local, regional, and national economic impact analysis. Because EPA's conclusions regarding the net benefits of the rule are dependent upon its facility level assumptions concerning technology assignments and associated costs, EPA must ensure that the cost-cost test is applied in a way that ensures that actual facility costs will not substantially exceed its estimates. Otherwise, the test will not serve its intended purpose: to ensure that the agency's approach to assessing technologies and setting performance standards does not result in costs that are in excess of the costs EPA considered in developing the proposed rule, or have unacceptable unforeseen economic or social consequences. Without such a comparison, EPA's claims of compliance with the Unfunded Mandates Reform Act and E.O. 12866 are meaningless.
-The technology cost test approach could significantly increase compliance costs: In the proposed rule, EPA stated its intent to implement the cost-cost test on a unit cost basis and not on a theoretical similar technology basis.
"To document that its site-specific costs would be significantly greater than those EPA considered, the facility would need to develop engineering cost estimates as part of its Comprehensive Cost Evaluation Study. The facility would then consider the model plants presented herein, determine which model plant most closely matches its fuel source, mode of electricity generation, existing intake technologies, waterbody type, geographic location, and intake flow and compare its engineering estimates to EPA's estimated cost for this model plant." See, Existing Facility Proposed Rule, Technical Development Document, Appendix A. p. A-1.
EPA is considering an alternative approach that would require a facility to compare the site-specific cost of installing a technology that would in fact meet the performance standard with the cost the agency considered for this same technology at a comparable facility. Under this approach, a facility

which concludes that it can only achieve the standard by installing a wedgewire screen at a cost of $20 million would not be eligible for alternative limits under the cost-cost test, because EPA may have estimated that this would be the cost of a wedgewire screen for a facility of that size. This could occur even if EPA had actually assumed that the facility could meet the standard using a barrier net costing $63,000.
Thus, under the alternate application of the cost-cost test EPA is considering, the national cost of implementation could be significantly higher than that estimated by EPA because the cost-cost test would no longer be implemented as EPA had originally contemplated it. It would be conducted on the basis of what EPA would have calculated a facility would spend to comply had the agency chosen the same technology, rather than on the basis of what EPA actually assumed the facility would spend to comply.
-The EPA proposed technology cost test could significantly increase transaction costs: The technology cost approach requires several steps that are not necessary under the facility-specific cost approach. These additional steps include the possibility of developing several different site-specific engineering cost and effectiveness estimates. Then, for each prepared cost estimate there would be cost variables that differ depending on construction materials, component sizes, etc. that would need to be considered. Transaction costs would be higher than the facility-specific cost approach because of: 1) the greater number of engineering estimates required and; 2) the time spent in discussions with the state over which technologies and cost variables are the most appropriate to consider. In essence, the technology cost test creates more work and ambiguity over the selection of appropriate technologies and the inclusion of "proper" cost factors.

III. The cost-cost test can be applied to ensure comparison of actual costs, and achieve environmentally protective, equitable, and administratively efficient results.

-The cost-cost test, properly applied, will not result in unjustified regulatory relief: The proposed cost-cost test reflects a simplified "numbers to numbers" cost comparison and will not relieve facilities of the obligation to meet a performance standard . The requirement for meeting an alternative performance standard would still apply. It simply will ensure that meeting the alternative standard will not cost a facility significantly more than EPA has estimated. Concerns that the test would enable facilities to justify doing nothing are unfounded.
-EPA concern over possible misuse of cost-cost test: EPA has consistently stated that site-specificity in the implementation of the 316(b) standards is key to achieving the performance objectives in a cost effective manner. Therefore, the test should not be viewed as a variance process; it should be considered a mechanism to optimize technology performance under site-specific circumstances. In the classic effluent guideline framework the performance and unit costs of technologies are better defined, there are fewer site specific variables, and there is a greater degree of control over the facility specific variables since the discharge is under direct control of the permitted entity in contrast to the 316(b) context where the permittee does not have control over the presence and behavior of aquatic organisms in the source waterbody.

[see hard copy for table]

EPA Response

EPA notes that it received this letter from the commenter far after the close of the notice of data availability open comment period. Due to the very delayed submittal of the information, EPA attempted as best as it could, considering the limited time frame, to fully consider the comments.

EPA has no legal obligation to respond to such late comments. See e.g., Personal Watercraft v. Dept. of Commerce, 48 F.3d 540 (D.C. Cir. 1995). Nevertheless, EPA has attempted to respond to these comments to the extent possible.

EPA first notes that the commenter is partly incorrect in stating that a “facility-specific cost test is the approach EPA outlined in the proposed rule.” In Appendix A of the proposal Technical Development Document the Agency states the following:

"The facility would...consider the model plants presented herein, determine which model plant most closely matches its fuel source, mode of electricity generation, existing intake technologies, waterbody type, geographic location, and intake flow and compare its engineering estimates to EPA’s estimated cost for this model plant."

In addition, regarding model plants the Agency stated the following in the NODA (68 FR 13527):

"the Agency utilizes as much information as is available about the characteristics of the hundreds of facilities within the scope of the proposed rule. By incorporating as many site-specific features as possible into the design and implementation of its costing approach the Agency has been able to capture a representative range of compliance costs at what it deems ``model facilities." However, the Agency did not have and will never have the opportunity to visit and study in detail all of the engineering aspects of each facility complying with this rule (over 400 facilities could incur technology-related compliance costs as a result of this rule). Therefore, although the Agency has developed costs that represent EPA's best effort to develop a site-specific engineering assessment for a particular facility, this assessment does not incorporate certain peculiarities that only long-term study of each
facility would bear out. Hence, the Agency refers to its approach as a ``model" facility approach."

Hence, contrary to the opinion stated by the commenter, the Agency has stated explicitly its view that facilities compare their compliance costs to a model facility cost that is representative of the costs considered by the Agency in developing the final rule.

Because of the uncertainty inherent in the necessary approach to modeling facility-level costs adopted by the Agency, the final rule includes a provision in the cost-cost test that, in essence, balances the facility-specific comparison requested by the commenter with a site-specific check open to both the permit authority and the facility. This site-specific check functions such that should a party have concerns about the results and basis for the facility-specific comparison that limited adjustments to EPA's technology-based costs be conducted. For more information on the Agency’s approach to the final cost test see section IX.H of the preamble to the final rule.

The Agency generally agrees with the suggestion made by the commenter’s organization (UWAG) for the NODA, as presented in comment 316b.EFR.307.033. The approach suggested in this comment is as follows: EPA should “make available information about what intake technology it chose for each facility, so that the facility can calculate EPA’s estimated cost for that facility by starting with EPA’s choice of technology and applying EPA’s own costing method. To know what the cost assigned by

EPA is, permittees and permit writers need to know (1) what technology (wedge wire screen, fine mesh screen, or aquatic filter barrier) EPA chose for each facility and (2) what EPA's costing method would estimate it to cost."

The Agency has adopted for the final rule an approach that utilizes the principles of the suggestions from the commenter. As such, the Agency has fulfilled this commenting entity's request from comment 316b.307.033, balanced the proposed methodology of comparing to "similar facilities", and provided a balance check in the chance that the necessarily broad-based EPA cost methodology did not account for certain site-specific conditions not apparent through the data available to the Agency for the costing effort.

The Agency notes that it met with the commenter to listen to their concerns relating to the cost tests. The Agency heard the perspective of the commenter as documented in the above comment, and considered thoroughly various means by which to provide the fairest and least arbitrary means for a cost-test implementation in the final rule. In the end, the comments above do not solve the fundamental issues of fairness and equality as they relate to implementation of a facility-specific (only) cost test. The Agency stresses that the above comment provides no discussion of the means by which the costs of the final rule have been developed and their uncertainties, and by ignoring this lynchpin subject to the relevance of the cost-cost tests the commenter fails to fully consider a fundamental aspect of the cost-cost test application. As such, the Agency must reconcile the means by which the costs were developed with the best application of the cost-cost test through its judgment and in consideration of the concerns raised by the commenter. In the end, the Agency believes that the hybrid cost-cost test relying on both facility to facility cost comparisons and a site-specific technology cost check equates to the most equitable and fair test for the facilities complying, the permit writers, and the environment.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures
for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

EPA Symposium on Cooling Water
Intake Technologies

On Behalf Of:

Author ID Number:

316bEFR.901

Comment ID 316bEFR.901.001

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Keynote Address

Alex Matthiessen, Executive Director, Riverkeeper, Inc.

Mr. Matthiessen presented a brief overview and history of Riverkeeper, Inc., and noted some of the milestones in the organization's efforts to protect the Hudson River, beginning with the group's first victory — stopping the Storm King pump storage facility. He explained that Riverkeeper favors the following flow reduction technologies: dry cooling at new facilities, retrofit wet cooling at existing facilities, repowering, use of degraded water sources, and seasonal flow reductions. The organization prefers not to promote the use of screening technologies because of maintenance and operational issues that can cause degradation of performance. He also referred to PSE & G's permit for its Bethlehem facility, where cooperation led to a success story: Air pollution and fish impacts will be reduced by more than 98 percent. Riverkeeper is also working with Mirant at Lovett on the evaluation of Gunderboom over the next 5 years.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

See comment 316bEFR.206.022 for a discussion of why EPA did not opt for closed-cycle cooling.

EPA conducted a full analysis for the Phase I rule and concluded that dry cooling was not an economically practicable option for new facilities on a national basis. Dry cooling systems use either a natural or a mechanical air draft to transfer heat from condenser tubes to air. In conventional closed-cycle recirculating wet cooling towers, cooling water that has been used to cool the condensers is pumped to the top of a recirculating cooling tower; as the heated water falls, it cools through an evaporative process and warm, moist air rises out of the tower, often creating a vapor plume. Hybrid wet-dry cooling towers employ both a wet section and dry section and reduce or eliminate the visible plumes associated with wet cooling towers.

For the Phase I rule, EPA evaluated zero or nearly zero intake flow regulatory alternatives, based on the use of dry cooling systems. EPA determined that the annual compliance cost to industry for this option would be at least $490 million. EPA based the costs on 121 new facilities having to install dry cooling. At Phase II proposal, EPA estimated that total social costs for dry cooling were $2.1 billion per year. Thus, this option would be more expensive than dry cooling for new facilities. The cost for Phase II existing facilities to install dry cooling would be significantly higher that the cost for new facilities to do so due to the complexities of retrofitting both the dry cooling equipment and components of the cooling system. At proposal, EPA estimated that 550 Phase II existing facilities would be subject to Phase II regulation. The cost would be significantly higher because existing facilities have less flexibility, thus incurring higher compliance costs (capital and operating) than new facilities. For example, existing facilities might need to upgrade or modify existing turbines, condensers, and/or cooling water conduit systems, which typically imposes greater costs than use of the same technology at a new facility. In addition, retrofitting a dry cooling tower at an existing facility would require shutdown periods during which the facility would lose both production and revenues, and decrease the thermal efficiency of an electric generating facility.

The disparity in costs and operating efficiency of dry cooling systems compared with wet cooling systems is considerable when viewed on a nationwide or regional basis. For example, under a uniform national requirement based on dry cooling, facilities in the southern regions of the United States would be at an unfair competitive disadvantage compared to those in cooler northern climates because dry cooling systems operate more efficiently in colder climates. Even under a regional subcategorization strategy for facilities in cool climatic regions of the United States, adoption of a minimum requirement based on dry cooling would likely impose unfair competitive restrictions for steam electric power generating facilities because of the elevated capital and operating costs associated with dry cooling. Adoption of requirements based on dry cooling for a subcategory of facilities under a particular capacity would pose similar competitive disadvantages for those facilities.

As explained in the preamble to the proposal, EPA does not consider performance standards based on dry cooling a reasonable option for a national requirement, nor for subcategorization under this rule, because the technology of dry cooling carries costs that would potentially cause significant closures for Phase II existing facilities. Dry cooling technology would also have a significant detrimental effect on electricity production by reducing the energy efficiency of steam turbines. Unlike a new facility that can use direct dry cooling, an existing facility that retrofits for dry cooling would most likely use indirect dry cooling, which is much less efficient than direct dry cooling. In contrast to direct dry cooling, indirect dry cooling does not operate as an air-cooled condenser. In other words, the steam is not condensed within the structure of the dry cooling tower, but instead indirectly through an indirect heat exchanger. Therefore, the indirect dry cooling system would need to overcome additional heat resistance in the shell of the condenser compared to the direct dry cooling system. Ultimately, the inefficiency (i.e., energy penalty) of indirect dry cooling systems will exceed those of direct dry cooling systems in all cases.

Although the dry cooling option is extremely effective at reducing impingement and entrainment, it is not economically practicable for existing facilities.

EPA notes the commenter's preference against screening technologies but disagrees that maintenance requirements should preclude their use to meet the requirements of today's rule. Proper operation and maintenance of any technology, including screening systems and closed-cycle systems is necessary for any permitted facility.

Comment ID 316bEFR.901.002

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Keynote Address

Charles Goodman, Senior Vice President, Research and Environmental Affairs, Southern Company

Mr. Goodman opened his address by indicating that he felt a need to find a balance between effectiveness and cost as they pertain to the protection of aquatic life from intake structures. He pointed out the work that EPRI and the industry overall have already done to address Section 316(b) of the Clean Water Act. The best solutions consider site-specific issues. Some 316(b) alternatives are associated with other environmental impacts, such as those associated with wet cooling. Goodman emphasized that a single, “one size fits all” solution is not the optimum one, but rather one that maximizes net benefits

EPA Response

EPA appreciates the comment. Today's rule maintains the desired flexibility for facilities to determine the most cost-effective combination of design and construction technologies, operational measures, or restoration measures best suited to each individual facility.

Comment ID 316bEFR.901.003

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Greg Seegert, EA Engineering, asked about the mathematical relationships that Reed Super, Riverkeeper, Inc., presented and the reliability of those relationships; he also asked whether Mr. Super could site an R2 value. Also, for Lovett, Mr. Seegert had understood that Mr. Super was dealing with entrainment but had used formulas from the Pisces paper, which are actually based on impingement. He asked Mr. Super to explain.

A. In answer to the second question, Mr. Super said that he showed formulas for the volume:impingement relationship as well as the volume: entrainment relationship, and used the volume:entrainment relationship for the Lovett numbers. Mr. Super deferred to Peter Henderson, a statistician, to answer questions about reliability of the mathematical relationships. He explained that the points were plotted using actual facility data, and that the resulting line was the best line that could be drawn.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.004

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Paul Martin, TRC Environmental, asked Mr. Super whether he had used the energy cost of running the cooling towers as part of the costs in calculating the energy penalty.

A. Mr. Super answered that there are two components to the energy penalty: backpressure and energy penalty associated with mechanical draft tower fans. He used the energy penalties on average as discussed in the USDOE reports to illustrate that the penalty is only a small percentage as compared with orders of magnitude of reduction in environmental impacts.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion on the energy penalty associated with closed-cycle cooling systems, see comment 316bEFR.206.022.

Comment ID 316bEFR.901.005

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Andy Turnpenny, Fish Guidance Systems, asked Mr. Super how he addressed climate impacts as traded off for fish impacts.

A. Mr. Super indicated that it often takes a small amount of one resource to protect another resource and that one must look at the relative benefits. He emphasized that it does not mean sacrificing air for water but rather taking advantage of huge benefits to water. If people were concerned about side effects of pollution technologies, there would be none, because all of the technologies (recycling, for example) require some smaller expenditure of other resources. These smaller impacts may be reduced by other methods.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.006

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Steve Cibiki, ENSR, stated that discharge of blowdown and consumption are detriments of recirculated systems.

A. Mr. Super pointed out that dry cooling addresses both, and that thermal plumes do contribute to evaporative losses.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.007

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Geoff Grubbs, USEPA, asked Mr. Taft to speculate about which are the most promising emerging technologies and where R&D dollars should be spent, given future demands from population growth and resulting resource pressures from activities such as overfishing.

A. Mr. Taft indicated that there is a need for an improved understanding of technologies such as cylindrical wedge wire screens and aquatic filter barriers in order to know how to apply them nationally would be helpful. For example, combining technologies such as AFB for impingement together with fine mesh screens for entrainment, needs to be examined. Historically we have over studied certain technologies and under-studied others. There is a need to fill in these data gaps..

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

EPA welcomes and encourages the continued research and development of intake technologies to address current and future impacts from cooling water intake structures.

Comment ID 316bEFR.901.008

Subject Matter Code 7.03

Available I&E technologies

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Debra Littleton, USDOE, pointed out that USDOE has never said the energy penalty for dry cooling was 1.5 percent.

A. Mr. Super indicated that he cited the USDOE 1.5 percent penalty for wet cooling and that the 1.5 percent number for dry cooling came from the Morro Bay analysis from the California Energy Commission.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion on the energy penalty associated with closed-cycle cooling systems, see comment 316bEFR.206.022.

Comment ID 316bEFR.901.009

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q: Karen Patterson, Tetra Tech NUS, asked whether the state agencies have given thought to their ability to be involved, given resource restrictions.

A. Edward Radle, retired, New York State Department of Environmental Conservation (NYSDEC) – Steam Electric Unit, answered that New York State intends to be fully engaged in the effort. Michael Calaban, New York State Department of Environmental Conservation – Steam Electric Unit, added that the two positions vacated at NYSDEC by retirement have been filled. Mr. McLean indicated that, for Maryland, the Department of Natural Resources, Power Plant Research Program (Maryland DNR – PPRP) is funded outside of state funds, so they will have the resources to address the issues.

EPA Response

EPA recognizes and encourages the participation of states in developing and implementing 316(b) programs. EPA notes the programs mentioned by the commenter.

Comment ID 316bEFR.901.010

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Steve Dixon, PG&E, asked Mr. Super about his implication about reduced flows from all plants, and how costs can be addressed in the case of merchant plants.

A. Mr. Super replied that flow reduction would be useful in almost every situation. If the rules are equal, and everyone has to meet them, then the costs would be the same.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion why EPA did not opt for closed-cycle cooling systems, see comment 316bEFR.206.022.

Comment ID 316bEFR.901.011

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Debra Littleton, USDOE, pointed out that 3 out of 4 new wet towers have plume abatement. She referenced the USDOE studies on retrofit of wet towers. She asked Bill Powers if he was convinced that you could not retrofit to air-cooled condensers because of the 8-inch backpressure limits.

A. Mr. Powers said no, that there were ways to address this issue, but it has not been done. You could retrofit the turbine to bring in higher backpressure limits.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion why EPA did not opt for closed-cycle cooling systems, see comment 316bEFR.206.022.

Comment ID 316bEFR.901.012

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Mr. Super asked John Young, ASA Analysis & Communications, Inc. whether his evaluation was based on the lower capacity rates assumed for that plant. What would happen if the market changed to require higher capacity?

A. Yes, you would get higher capacity factors.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.013

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. John Veil, Argonne National Laboratory, asked Mr. Powers about entrainment of insects on air-cooled condensers.

A. Mr. Super said that tube spacing is designed to pass most insects. Riverkeeper is about to release a study by Pisces on insect entrainment that does not show it to be an issue.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.014

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Denny Smith, USDOE, asked Mr. Powers about the footprint of dry cooling towers vs. the footprint of wet cooling (in particular, size requirements and restraints). In light of the ratio, what would it mean for a typical 300-500 MW unit? Mr. Smith added that the cost for a new dry system unit would be equivalent to $50/KW. How would this impact retrofits?

A. Mr. Powers cited another case where the air-cooled condenser was not as long as the wet tower, and in this case footprint was not an issue. He mentioned that you would need to take into account which impact you were trying to minimize: height or length.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion why EPA did not opt for closed-cycle cooling systems, see comment 316bEFR.206.022.

For a discussion why EPA did not opt for dry cooling systems, see comment 316bEFR.901.001.

Comment ID 316bEFR.901.015

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Gordon Hart, Performance Contracting, asked John Maulbetsch, Maulbetsch Consulting, questions regarding the graphs used in his presentation. In particular, he requested an estimate of the net present value (millions per year) for energy efficiency costs for dry cooling.

A. Mr. Maulbetsch answered that the assumed energy efficiency penalty was 1 percent and the basis for the 20-year net present value was a 5 percent discount rate at a $25/MW cost at a 100-MW facility— a fairly low cost.

Q. Mr. Hart pointed out that one of the benefits of dry cooling is that you get a steam turbine credit—which makes it significantly cheaper with dry-cooled than with a conventional unit. The graph implies that the dry-cooling turbine would be designed for a 5.5-inch with a conventional turbine. With such a configuration, Mr. Hart anticipated constantly tripping the turbine. With a dry-cooled system, Mr. Hart said that you would not be designing it with a conventional turbine, but rather with a modified unit.

A. Mr. Maulbetsch agreed that the option was available. First you would probably look at the conventional turbine simply because that's what has usually been purchased. You could use other turbines (such as the high-backpressure turbine, which to date has only been theorized). You do need to look at the total cost relative to the lifetime of the plant, and include energy penalty costs. It's a complex calculation.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion why EPA did not opt for dry cooling systems, see comment 316bEFR.901.001.

Comment ID 316bEFR.901.016

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. John Kelly, Entergy Nuclear Operations, asked whether anyone could address the additional hotel load: the additional usage of systems that would have to be installed for backfitting a plant. For example, the cost of running fans and the pumping needs of going to a higher head.

A. Mr. Maulbetsch said that he did have that data in his presentation but breezed over it because of time. He said that he would not normally include fans and pumping under the term “hotel load.” He explained that if you go from once-through cooling to a closed-cycle system, and keep the flow rate the same, you add to the system pressure because of having to pump to the top of the tower (20-45 feet). This can double the pressure drop in the loop, and adding the fans can get you to 1.5- 2.5 percent energy use, which is significant over a long period of time. As pertains to the issue of re-optimizing the flow, if you do it, it will raise the going-in costs of the retrofit. If you don’t do it, you will have higher costs over the lifetime of the plant, and this is a choice you will have to make.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.017

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Comment. Dave Michaud, WE Energies, talked about a barrier net installation that they have had good success with. He reinforced statements by Dave Bailey (Mirant) regarding barrier nets, adding that in freshwater systems (hydropower plants, specifically, with ~600 cubic feet per second (cfs) flow), barrier nets (1) have been found to require bottom sealing and (2) generally do not have a problem with biofouling in freshwater, although the barrier nets he's familiar with are removed in winter conditions. Their original net is still in service after approximately 10 years, and with excellent results. Its useful life was expected to be only about 2 years. Operations and Maintenance costs typically run under $1,000 per year.

EPA Response

EPA notes the comment and recognizes the potential use of barrier nets to reduce impingement. For further discussion of barrier nets and their effectiveness, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.018

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Deborah Littleton, USDOE, asked Mr. Bailey to explain the preferred options in the proposal, particularly options for the calculation baseline. For example, at Chalk Point, what would they do to meet the performance standards?

A. Mr. Bailey said that Chalk Point has some before and after data for baseline projections. They could remove the net (to simulate a calculation baseline), but this would be counterproductive. He felt that they should use the data developed as the facility was deployed, rather than introducing error associated with trying to calculate a hypothetical baseline.

Comment. Ken Strait, PSEG, added that Salem also has a lot of data to use. The question becomes how to apply the percent reductions, as the facility needs to retain maximum flexibility as to which method to use. They might prefer using a method with RIS.

EPA Response

EPA notes the comment and recognizes the potential use of barrier nets to reduce impingement. For further discussion of barrier nets and their effectiveness, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.019

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Greg Seegert, EA Engineering, pointed out that there are a lot of difficulties associated with the establishment baseline. He referred to Mr. Bailey's data on blue crabs as evidence that population fluctuations can cause problems assessing effectiveness. He added that the hypothetical shoreline intake would be difficult to measure. For Mr. Bailey: How would one measure the calculation baseline? It doesn't include a measure of "at risk" population changes, such as the blue crabs near Chalk Point mentioned earlier. Generally, one could only tell by doing extra sampling (indexing). Also, Chalk Point has more data than most facilities. How would one compare data without access to ample data, such as state surveys or other index data? If you do not have the indexing data sets that Mr. Bailey had, how could you evaluate population variation?

A. Mr. Bailey said that one would need some sort of baseline for relative abundance. You would have to do your own before/after studies to measure relative abundance. The other option may be to modify half the screens and do a side-by-side comparison. One would have to consider the data in the mindset of before and after prior to installing a given technology. For example, the barrier net has to take into account relative abundance, whereas other technologies (such as screens) may be able to compare percent reduction values. This certainly needs to be considered further.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion on the calculation baseline, please see response to comments 316bEFR.308.014 and 316bEFR.063.005, as well as the preamble to today's rule.

Comment ID 316bEFR.901.020

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Tim Connor, USEPA, mentioned to Mr. Bailey that the barrier net costs in today's presentations were much lower than the costs mentioned in yesterday's presentation by Mr. Taft.

A. Mr. Bailey explained that these were 1981-1984 costs, so they would be higher in present value. It is unclear what site-specific factors may drive up costs at some locations.

EPA Response

EPA notes the comment and recognizes the potential use of barrier nets to reduce impingement. For further discussion of barrier nets and their effectiveness, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.021

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Bart Ruiter, Dupont, asked Mr. Bailey what the follow-up monitoring costs are for these barrier nets.

A. Mr. Bailey answered that he was not sure. Some are at no cost, because the state performs these index surveys. Also, the trawling studies were part of an overall 316(a) study, so the specific costs are not clear.

Comment. Ken Strait, PSEG, added that Salem spends approximately $80,000 per year for impingement and entrainment monitoring.

Comment. Isabel Johnson, Golder Associates, Ltd., added that in 1996-9 dollars, costs were approximately $60,000 per year.

Comment. Robert Rieder, Detroit Edison Company, added that the barrier net at Luddington is approximately 2.5 miles long. Capital costs were $1.5 million and the nets are replaced every 4-5 years. Operations and Maintenance costs are about $1.3 million, because divers perform clean-in-place operations. Algae and zebra mussels are problematic at the site. Approximately $100,000 per year is spent on monitoring.

EPA Response

EPA notes the comment and recognizes the potential use of barrier nets to reduce impingement. For further discussion of barrier nets and their effectiveness, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.022

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Doug Dixon, EPRI, asked with respect to Ristroph screens, could they meet the 80 percent impingement standards for reducing the number of fish impinged? Given that the most frequently impinged fish are often sensitive species, would it be sufficient?

A. Ken Strait, PSEG: It depends on the method of calculation. For example, there may be no survival data for non-RIS fish. The screens would likely meet the standard for biomass, but maybe not for number of fish. It would depend upon how the guidance is written and how they want to assess it.

EPA Response

EPA notes the comment and recognizes the potential use of modified ristroph screens to reduce impingement mortality. For further discussion of modified ristroph screens and their effectiveness, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.023

Subject Matter Code 7.03

Available I&E technologies

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

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Q. Randy Lewis, Cinergy, asked whether there has been any monitoring of the response of fish communities or populations after installing a technology.

A. Mr. Bailey replied that no extensive AEI studies have been done, but he would guess there would be no discernible response in either direction. They have spent $7 million on 316(b) demonstration studies, and not seen any discernable impacts.

Comment. Ken Strait, PSEG, said that no indications of long-term effect in either direction have been noted. He indicated that only one species is declining and it is all along the eastern coast.

Comment. Isabel Johnson, Golder Associates, Ltd., added that they haven’t done any population level studies since the 1980s.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.024

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Gordon Hart, Performance Contracting, asked with respect to screen blockages at Salem and the potential for plant shutdowns, what plans are there to avoid those circumstances?

A. Ken Strait, PSEG, replied that Salem has had the highest debris loadings on record for the Delaware River and the screens are handling the loads well. The primary problem for Salem right now is related to "carryover," where debris ends up in the condenser.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.025

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Elicia Blumberg, Tetra Tech, asked Andy Turnpenny, Fawley Aquatic Research, and Jeremy Nedwell, with respect to noise deterrent systems, what impacts do they have on underwater noise pollution, especially on marine mammals?

A. Mr. Turnpenny explained that the systems usually use low frequency sound and are well contained, often within 25 meters of the source. Mr. Hartlepool has a seal colony nearby, so this has always been a design consideration for sound deterrent systems.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Please see response to comment 316bEFR.077.032.

Comment ID 316bEFR.901.026

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Tom Englert, LMS, asked Chuck Coutant, Oak Ridge National Laboratory, whether he had some other results showing that the velocity vectors are still through the screen. With respect to angled screen flows, some papers have cast doubt on the existence of sweeping flows since the flow is still through the screen.

A. Mr. Coutant answered that yes, even though the theory shows the flow going through the screen, the empirical data show they do work, possibly because the fish detects the screen.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

EPA agrees that while flow obviously does go through the screens, laboratory analysis and in situ demonstrations (Brayton Point, San Onofre NGS) have shown success in diverting some species of motile fish from intake screens to return troughs or fish elevators. Data indicate that, similar to the effect of velocity caps, angled screens create a discernible change in current that some species seek to avoid. For more discussion of angled screens, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.027

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Greg Seegert, EA Engineering, asked Steve Jinks, ASA Analysis & Communications, Inc. whether there are any studies on size-specific survival? These could impact biomass calculations for determining compliance.

A. Mr. Jinks replied that this issue hasn't been talked about. Usually, the results are inconsistent. Smaller impinged individuals do often have a low survival rate.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.028

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Mr. Seegert: What about the same issue regarding numerical abundance and those species being more sensitive?

A. Mr. Jinks: Intuitively, one would expect demersal and benthic species to be more tolerant, since they are more rigid, hard-bodied, and adapted for low dissolved oxygen. However, they did not study the numbers for that, but would expect that some facilities could expect problems with sensitive species.

Comment. Mr. Coutant: Facilities with sensitive fish species can avoid handling them entirely with angled screens or other technologies—one can guide a fish to a return instead of using a screen to handle them.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

EPA notes the success of angled screens in some applications and studies (Brayton Point, San Onofre) but cautions against assuming that angled screens will be successful for all sensitive species at all facilities. Angled screens, like all technologies, must be considered against the local conditions present at a facility. For additional information regarding angled screens, see Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.029

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

The following comment was made by an attendee during the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms held May 6 - 7, 2003, in Arlington Virginia, in response to presentations made during the symposium. The comment has been summarized based on notes taken at the symposium. Despite best efforts to capture the key points, this comment does not constitute a verbatim record.

Q. Brad Wright, Constellation, for Steve Jinks: Are there any studies on entrainment survival?

A. Steve Jinks, ASA Analysis & Communications, Inc.: EPRI has done a similar review for entrainment survival.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

EPA has evaluated many of the studies concerning entrainment survival. For further discussion see the Technology Development Document.

Comment ID 316bEFR.901.030

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Dave Michaud, WE Energies, asked Peter Henderson, Pisces Conservation Ltd., and Mark Strickland, PSEG Services Corporation, about the light penetration at Lovett and Bowline. Is the water turbid or is there opportunity for light, and thereby for scavengers to colonize the material?

A. Mr. Henderson stated that he thought light at Lovett doesn't penetrate very far, so you won't see much algal growth further down. The same conditions exist for Bowline, partly due to algal blooms on the surface.

Comment. Matthew Raffenberg, Lawler, Matusky, and Skelly Engineers, LLP, added that biological growth occurs only in the photic zone, and the waters are typically turbid at those plants.

Comment. Mr. Strickland, indicated the same conditions exist at Bethlehem.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion of Gunderboom technology, see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.031

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Gordon Hart, Performance Contracting, mentioned that William Dey, ASA Analysis & Communications, Inc., estimated through-screen velocity at 0.25 fps (feet per second), which is significantly less than the figure mentioned in a presentation by Steve Amaral, Alden Research Laboratory, Inc., this morning, which quoted 1-3 fps. Matthew Raffenberg's estimates, for the filter fabric barriers, according to my [back of the envelope] calculations were an order of magnitude lower than 0.25 fps. All of these estimates of velocities are very different. How are the areas selected to achieve these different velocities?

A. Mr. Dey said the velocity estimate of 0.25 fps was only important in terms of costing. Actually 0.5 fps is much closer to reality; 0.25 fps is very conservative for wedge wire.

A. Mr. Amaral, Alden Research Laboratory, Inc., clarified that he had spoken about the louvers in the morning (in response to the 1-3 fps comment). Biologically, this is based on what the fish can avoid as per their swimming speeds (this varies by species and size classes, as well as among technologies). He stated that they observed low impingement and entrainment rates at the 0.5 fps velocity. The estimates differ for louvers and wedge wire screens. Even in the higher channel velocities (1 fps, for example), some eggs and larvae demonstrated low impingement and entrainment rates.

Comment. Mr. Raffenberg added that the selection of flow was initially based on what could pass the Gunderboom fabric. That's how they developed their estimate of 5 gallons per minute (gpm). Gunderboom is working to develop different fabric types and probably can elaborate further.

Comment. Ed Radle, NYSDEC, commented that when experimenting with fabric viability, they pasted the fabric to a barrel, sunk the barrel, and pumped water out of the barrel at different rates. At a very low rate the particles settled to the side and sloughed off. They developed the 5 gpm/square foot criteria based on observations that material impinged on the fabric filter cloth would slough off and no cleaning system would be required. He cautioned that the lesson learned is that laboratory experiments rarely mirror what happens in the field.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

Comment ID 316bEFR.901.032

Subject Matter Code 7.03

Available I&E technologies

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

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Q. Mr. Coutant, Oak Ridge National Laboratory, asked Peter Henderson: On biofouling tests that you mentioned in your presentation, was there flow? If it was static, at what point does the fabric itself become the impingement/entrainment problem?

A. Peter Henderson, Pisces Conservation Ltd. And Oxford University, replied that the example he gave was for static conditions where the only flow would be tidal movement. A contemporaneous study, done by Gunderboom using an airburst system, however, showed the same problems with colonization. There was appreciable growth. Mr. Henderson could not answer the second question; they are working on the issue of animals being pulled into the Gunderboom.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion of Gunderboom technology, see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.033

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Q. Andy McCusker, Gunderboom Incorporated, stated that his background is in marine benthic biology. He found the Gunderboom results anomalous, as they have panels in place in the upper Hudson River, Sacramento River, and beaches in the Long Island Sound, which have been analyzed by third-party scientists, and have not demonstrated results similar to Mr. Henderson's. What they did find is an invasive species of hydroid. They would like to explain that the technology does not always demonstrate that level of biofouling.

Q. Kent Zammit, EPRI, asked Mr. McCusker, whether there is publicly available data for the panels that they tested at other sites. Second, are flows available as well for those panels? Third, can you comment on the effects of the backwashing system on minimizing biofouling in addition to the sedimentation?

A. Mr. McCusker explained that the panels at the other sites were static and did not have flows. Inspection results have not been made publicly available, but there are plans to do so.

A. Mr. Raffenberg explained, regarding the backwashing system described by Mr. McCusker, that the airburst system was in 4 feet of water and did not display the same kind of shaking of the fabric or expansion of the air bubbles that you get in 20-30 feet of water. Though it's site-specific, there is potential for the airburst system to reduce biofouling, particularly for Lovett.

Comment. Mr. McCusker explained that they observed a tube-building amphipod, Corophium, unsuccessfully attempt to perforate the airburst system.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion of Gunderboom technology, see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.034

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Comment. Rick Wantuck, NOAA Fisheries in California, mentioned that there are presently four proposals in California for Gunderboom deployment. One has been formally permitted by his agency for a 5-year test program. All the questions that have been raised—biofouling in particular—are on Mr. Wantuck's mind, as are longevity and maintainability of the filter fabric. Other issues include debris impacts in flowing streams and anchoring in tidal environments. He concluded that this technology is worthy of more study and requires more evidence before it should be viewed as a panacea. In addition, it should be noted that the California proposals suggest year-round deployment, while New York based proposals are on a seasonal deployment basis.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion of Gunderboom technology, see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

Comment ID 316bEFR.901.035

Author Name EPA Symposium on Cooling Water Intake Technologies

Organization

Subject Matter Code 7.03

Available I&E technologies

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Comment. Ed Radle, NYSDEC, stated that regarding maximum speed, the velocity at 5 gpm/ft2 is equivalent to 0.01 fps, which is extremely slow. The limit would be driven by the swimming speed of the larvae in question, and there is little available literature on that. The experiment he did with shad showed that they did not orient to the flow at all. Mr. Radle read a section from the journal Sea Technology, the 2001 issue called Aquaculture Beyond the Reef. In summary, their research found that while biofouling was an issue during early deployment, the assemblage of herbivores around the technology rendered scrubbing unnecessary in time. The herbivores fed upon Corophium and other biofouling organisms. He said that this was a sales pitch for Gunderboom.

EPA Response

EPA notes the comment and appreciates the participation of the commenter at the Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms.

For a discussion of Gunderboom technology, see response to comment 316bEFR.077.027 and Chapter 3 of the Technology Development Document.

Response to Public Comment

---National Pollutant Discharge Elimination System---
Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

James French

On Behalf Of:

Collector Wells International, Inc.

Author ID Number:

316bEFR.902

Comment ID 316bEFR.902.001

Subject Matter Code 7.03

Available I&E technologies

Author Name James French

Organization Collector Wells International, Inc.

Regarding 316b --sometimes we forget and try to reinvent the wheel. I am preparing to have a round table discussion of the 316b rule and the upcomming Power Gen show in Las Vegas. Upon review of the rule and alternate technologies I see now mention of collector wells used for cooling. Please refer to EPA doc 440/1-76/015-a Entitled "Development
document for best technology available for the location, design, construction and capacity of cooling water intake structures for minimizing adverse environmental impact" dated april , 1976. Hopefully this document was reviewed prior to promulagating many of the new regulations that will be soon in place. If the aquifer is sufficient to accept collector wells then the problems of fish and aquatic life forms go away.

EPA Response

EPA welcomes continuing investigation into the applicability of non-traditional technologies and technologies not widely deployed. EPA has not determined any technology to be universally applicable to all facilities under all circumstances in today's rule. Instead, EPA maintains a desired flexibility for facilities to meet the performance by opting for one of several design and control technologies, operational measures, and/or restoration measures. EPA has neither prescribed nor prohibited any single technology from the suite of alternatives available to facilities.

Response to Public Comment

---National Pollutant Discharge Elimination System--- Regulations Addressing Cooling Water Intake Structures for Phase II Existing Facilities

(40 CFR Parts 9, 122, 123, 124, and 125)

Response to Comments Submitted by:

Larry Wilson

On Behalf Of:

NY DEC

Author ID Number:

316bEFR.903

Comment ID 316bEFR.903.001

Author Name Larry Wilson

Organization NY DEC

Subject Matter Code 17.03

Option: Technol. to reduce I&E regardless of WB type

I wish to make a last request that EPA consider selecting "Impingement Mortality and Entrainment Controls Everywhere" (as presented on pages 17158-17159 in Section VI(B)(4)). I believe this option could be efficiently implemented by our agency and would result in the most uniform and effective measures being required of all facilities.

EPA Response

EPA elected to not adopt any of the alternative technology-based options or the alternative site-specific approaches discussed in the proposed rule (67 FR 17154-17161). Please refer to section VII of the preamble to the final rule for further information as to why these options were not selected.

Comment ID 316bEFR.903.002

Author Name Larry Wilson

Organization NY DEC

Subject Matter Code 17.06

Option: Site-specific determination of BTA

I also request that in any case, EPA eliminate "Method 3"which would generate numerous studies and impose a substantial review burden on state agencies. Should this option remain I am concerned that all facility owners in New York would chose to make the case that the costs of any mitigation was too great. This would effectively incapacitate our unit of 4 people by burying us in economic reports we would be unable to evaluate or refute.

EPA Response

EPA disagrees that a large percentage of facilities will opt for a site-specific determination of BTA. Please refer to the response to comment 316bEFR.202.002 for more information.